Development Concept Plan for Bullfrog Basin: Glen Canyon National Recreation Area

Department of Interior; National Park Service; United States

Follow this and additional works at: https://digitalcommons.usu.edu/elusive_docs

Recommended Citation
https://digitalcommons.usu.edu/elusive_docs/21
DATE DUE

- DUE NOV 16 1997

ION AREA

A COMPREHENSIVE VISITOR SERVICE BASE

AND SUPPORT SERVICES
RECOMMENDED:

David G. Wright                        March 3, 1976
Associate Manager, Denver Service Center

Temple A. Reynolds                    March 3, 1976
Superintendent, Glen Canyon National Recreation Area

APPROVED:

Glen T. Bean                            May 24, 1976
Acting Regional Director, Rocky Mountain Region

This plan outlines the development that may ultimately occur within the Bullfrog Basin area. Portions of that development will eventually become the responsibility of the National Park Service, and other portions will become the responsibility of the concessioner. Approval of the plan by the National Park Service does not, however, constitute a commitment to carry out any portion of the plan. Likewise, the concessioner is not deemed to have made a commitment to carry out any portion of the development by participating in the planning process. National Park Service commitments are governed by appropriations made by Congress. The concessioner’s commitments will be governed by future concession contracts, which will be negotiated as the need arises between the National Park Service and the concessioner.
CONTENTS

THE OVERVIEW 1

THE HISTORY 5

THE EXISTING EXPERIENCE 9
  The Setting 9
  The Land 9
  The Climate 9
  The Vegetation 11
  The Wildlife 11
  The Air 11
  The Lake 13
  The Recreationist 13
  Access and Existing Facilities 15

THE NEED 19

THE DEVELOPMENT CONCEPT 23
  General Development 23
  Components of the Plan 25
  Aesthetics and Architectural Guidelines 39

IMPLEMENTATION 46

ALTERNATIVES 49

SUMMARY 66

APPENDIXES 69
  Appendix A: Cove Analysis & Probability Ranges of Lake Powell Water Surface Elevation
  Appendix B: Visitation as Anticipated from Traffic Projections
  Appendix C: Recommended Plant Materials
  Appendix D: Concept Sketches

BIBLIOGRAPHY 83

PLANNING TEAM 85
THE OVERVIEW

"In recent decades, with exploding population and diminishing open space, the urgent need for National Recreation Areas is receiving new emphasis and attention."


This statement should, perhaps, have greater impact today than it did 10 years ago. Although United States population growth has more or less stabilized, open space has continued to diminish rapidly and soaring land values have dictated that land be used for purposes other than recreation. Yet Americans continue to have more leisure time and seek additional and varied public outdoor recreation opportunities. The tremendously diverse lands of the United States offer a wide variety of natural settings in which the recreational experience can occur, from sunny seashores to dense green forests and from rugged mountain tops to expansive deserts. A number of these unique areas have been set aside by the federal government for public recreation purposes. Glen Canyon National Recreation Area in southeastern Utah and northern Arizona is such an area.
Today, government-owned lands amount to less than one-half the area once held title to by the government. There are a number of uses other than recreation to which this land must be devoted. Therefore, those established national recreation areas must be thoughtfully planned, managed, and cared for in order to best preserve the lands and their natural attractive qualities and to assure the possibility of a high quality recreation experience for the greatest number of visitors. This development concept addresses these needs for a single recreational development, Bullfrog Basin, in Glen Canyon National Recreation Area. It seeks to establish a guideline for management and visitor use of this water-oriented recreational service base on Lake Powell. This guideline is flexible, yet gives direction to, and sets long-term goals for the Bullfrog Basin development.

Glen Canyon National Recreation Area is located in the heart of the majestic canyon lands of the Colorado Plateau. The plateau includes parts of Utah, Colorado, New Mexico, and Arizona and is drained by the Colorado River and its many tributaries. The primary attraction of the recreation area is Lake Powell, a 186-mile-long reservoir on the Colorado River that is impounded by the Glen Canyon Dam. The lake in its magnificent southwest setting is an inviting recreational opportunity. Bullfrog Basin, Utah, is one of the five existing marina and recreational service base developments on the lake. Development of these service bases ranges from small scale service at Hite, Utah, to a large operation at Wahweap, Arizona, where the greater part of the recreation area’s visitation takes place. Bullfrog Basin, located approximately at the midpoint of Lake Powell on the northern shoreline, is a development of moderate proportions with both temporary and permanent facilities.

Two basic problems have arisen at the existing Bullfrog Basin development. First, storms have continually battered the marina resulting in frequent loss of property to both the concessioner and visitors. Second, existing development was planned and laid out a number of years ago, and it does not respond to today’s visitor and management needs or today’s concern about the importance and necessity of working with the environment.

The first problem has been partially answered during the development of this planning document by relocation of the marina to a more protected cove area. The development concept plan presented here is a step toward solving problems and establishing a new direction for development at Bullfrog Basin in order that it can serve the maximum number of recreational visitors with a minimum of environmental impact.
VICINITY MAP

GLEN CANYON NATIONAL RECREATION AREA

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE
Over 2 billion years ago, the lowest rock layers that are now seen exposed along the Colorado River were being laid down by winds and seas. Through the ages, the layering process continued to deposit hundreds of feet of multicolored sandstone that was later uplifted to form the Colorado Plateau. About 12 million years ago, the Colorado River began its journey from the Rocky Mountains across the plateau to the Gulf of California. The river, running swiftly and heavy with sediments, cut deeper and deeper into the plateau and carved tortuous paths through the colorful sandstone and limestone layers. The result was an incomparable network of deep twisted canyons whose towering walls relate a graphic tale of the geologic history of the region. In Glen Canyon, a serene stretch of the Colorado in extreme southeastern Utah, the river cut unique sheer walls of narrow canyons in the red, orange, and beige sandstone. This is the heart of dramatic canyon country.

Man’s recorded history in this land is brief because the environment does not readily provide those elements necessary for man’s development and growth. Although the entire region was created through erosion, there is little arable land in canyon country. Much of the land surface is bare rock with no soil cover. Newly formed soil is often carried into water courses by winds or surface runoff. Stream-deposited soil is likely to be loose, shallow, and unstable, although it may be quite fertile. Because the land is arid, the few arable sites must in general be irrigated in order to bear crops. Lack of stable soil cover and moisture supports only a minimal vegetation cover that in turn
offers little relief from the climate and provides few locations for wildlife habitat. The sun sears the face of the land and invincible winds rush across the vast openness.

The canyon lands were occupied from around A.D. 1 to about the middle of the 1200s chiefly by the Anasazi. These people, whose name is a Navajo word meaning ancient ones, left many and varied traces of their occupation. Masonry structures for dwelling, storage, and water control are common. Much worked stone can be found, and quarrying and stone working sites are abundant. Rock art panels are extensive and spectacular in the region. There are many aboriginal trails, including hand and toe paths up sheer cliffs, which created a network of communication between canyon and highland throughout the region.

The aboriginal occupants had an agricultural life-style similar to and influenced by the larger Anasazi culture centers to the south and the Fremont people to the north. Their special exploitive skills and intimate knowledge of the terrain and its resources enabled them to make optimum use of all parts of the regional ecological systems, from canyon bottom to upland plateau. Abandonment of the region occurred slightly earlier than that of the northern Anasazi regions in the late 1200s, with environmental change the probable reason for abandonment.

Little is known about the canyon country until the arrival of the Spanish. A few Spanish explorers came during the end of the 16th century and the beginning of the 17th century in search of mines and a water passage connecting the Atlantic and Pacific Oceans. They had no success. By this time, modern Indian tribes, the Navajos and the Utes, were inhabiting the canyon country. In 1776 Fathers Dominguez and Escalante, attempting to establish trails connecting the frontier provinces of Spain, made a circle tour of the canyon country through the Colorado Plateau and the Great Basin. The purpose of this trip was to establish a route from Santa Fe to California and the California missions. The trip was aborted in October of that year (1776), and the party returned to Santa Fe.

The maps and diary from this expedition vastly expanded knowledge of the canyon country. Following the Escalante expedition, slave traders, fur trappers, and other Spanish explorers continued to traverse the land, but none settled near Glen Canyon.

In the 1850s, the U.S. Topographical Engineers began to map the Utah canyon lands. Mormon exploration began with Jacob Hamblin leading several missionary trips to Hopi Villages beginning in 1858, and crossing the Colorado River just above the site of the Escalante crossing. In 1860 Hamblin ferried the river at what is known as Lees Ferry. Ferries were in service at this location until 1929 when the Navajo High Arch Bridge was completed. John Wesley Powell made two exploration trips down the
Colorado River, one in 1869 and one in 1871-1872, and helped complete the regional topography and solve some of the mysteries of the Colorado River canyons. During expansion of the Mormon frontier of settlement outward from Salt Lake City in the 1880s, ferryboats were used to transport settlers across the nearly impassable river. Charles Hall, a member of an early exploration party, ran a ferry at Hole-in-the-Rock for one year. However, river access was so difficult there that he moved north to Hall's Creek in 1881. Hall's Creek lies immediately to the southwest of Bullfrog Basin and parallels Bullfrog Creek. Hall operated a ferry based at Hall's Creek from 1881 to 1883.

Rumors of gold and secret Navajo silver mines in canyon country spread through the United States during the 1880s. Prospectors came in increasing numbers through the latter part of the 19th century, but the enormous deposits hoped for never materialized. Small deposits of copper and placer gold and small veins of silver kept prospectors seeking the rumored riches. This region has continued to attract prospectors in search of gold, copper, oil, coal, and uranium up through the present time. Quantities of fossil fuel deposits are currently attracting the greatest attention (Gregory 1964).

Today, southeastern Utah remains one of the least populated areas in the United States. The four counties surrounding Lake Powell represent over one-fifth of the land area of Utah and have fewer than 20,000 inhabitants. However, man is attempting to live in this area and enjoy the scenic and recreational opportunities that are abundant here. Within the canyons of the Colorado River, a number of dams have been built to store precious river waters for irrigation in the arid Southwest and to generate hydroelectric power. The Glen Canyon Dam is one element of this system. In 1963, the turbid red waters of the Colorado River began to accumulate behind the dam to form serpentine Lake Powell. The lake, which provides navigable water pathways to the secrets and unique beauty of the Glen Canyon and its tributaries, attracted many visitors and recreationists during the last decade. The lands of Glen Canyon National Recreation Area surround much of Lake Powell and are administered by the National Park Service “to provide for public outdoor recreation use and enjoyment of Lake Powell and the lands adjacent thereto . . . and to preserve scenic, scientific, and historic features contributing to the public enjoyment of the area” (Public Law 92-593). Glen Canyon National Recreation Area became a distinct unit of the National Park System in 1972.

In 1965, development of Bullfrog Basin as a water-oriented recreational service base was begun. The National Park Service prepared a developed area plan in 1967 to guide further development. The present development configuration reflects the proposals of that plan.
Navajo Mountain rises as the most prominent topographic feature on the southeast side of Lake Powell.
THE EXISTING EXPERIENCE

THE SETTING

The Land
The canyon lands of Utah are a vast expanse of red rock country that has been cut, torn, uplifted, and eroded by time, wind, and water. It appears as if giant hands have molded the contours of domed terraces and undulating slickrock, and chiseled the sharp edges of deep gorges from hard sandstone layers. The canyon country is a desolate, arid wilderness that claims a strange attraction to men. The relentless heat and the parched land challenge men to survive on their own ingenuity and understanding of the environment.

The colors are spectacular here in the high desert, especially when the sun is low. The distant mountains are draped in regal purple and shadowy violet. The immediate rock formations glow with orange, red, and brownish-orange lights. The gray-green plant cover is a muted blanket over portions of the red landscape. The brilliant blue of the sky and the waters of Lake Powell contrasts vividly with the reds and oranges of the land.

The land surface ranges from exposed rock to a soil cover of fine clay and sand that varies from 0 to 20 feet deep. The exposed rock is mostly Navajo (wind deposit) and Carmel (sea deposit) sandstone. At Bullfrog Basin, it is an intricate arrangement of slickrock, molded ridges, twisting washes, and gentle slopes covered by shifting blow sand (fine particles of soil that can be carried by the wind when it reaches 20 mile-an-hour velocities). These elements are set against a backdrop of broad cone-shaped peaks whose prominent sandstone striations liken the formation to a mammoth multilayered cake. The elevation of Bullfrog Basin is approximately 3,800 feet above sea level. Erosion is the force that continually changes the face of this land.

The Climate
The climate is typical of high desert areas. Weather observers record 5.5 to 6.5 inches of precipitation per year. This falls mainly in the form of rain, but some snow occurs during winter months. Temperatures frequently soar above 90 degrees Fahrenheit during the long summer days, while night temperatures drop to a more comfortable 70 degrees. In the winter, temperatures reach 40 to 50 degrees during the day and fall below freezing at night. Prevailing winds come from the southwest, yet strong winds accompanying the passage of storm fronts may occur at any time of year and come from any direction. Winds are frequent during the late winter and early spring months, and gusts and high wind velocities can cause discomfort and property damage.
The Vegetation
Vegetation is sparse. The small quantities of moisture support only a limited number of xerophytic (drought-resistant) shrubs and grasses such as blackbrush, Indian ricegrass, and joint fir (Ephedra). Competing plants depend on a widespread root system to obtain as much water as possible from the dry desert soil. These plants must be able to survive extreme variations in temperature as well as drought, heavy rains, and snow. Where the small scale plants do not anchor the soil sufficiently, strong winds blow across the mesas and slopes and lift particles of fine soil into sandblasting red clouds. Only in secluded canyons where water and shelter is available do groups of cottonwood and poplar trees contribute vital greenery to the rocky landscape. Tamarisk, a non-native shrub, thrives in this climate wherever it can find abundant water, such as in stream bottoms and along the lakeshore.

Native vegetation is fragile in its ability to absorb man’s impact. Heavily disturbed land will cease to support perennial species. Scars left from previous grading and utility trenching are evidence of this. Continuous foot and tire traffic will break or destroy plants and compact the soil. Only when moisture is available will opportunistic annuals grow in these disturbed areas.

The Wildlife
Forms of wildlife are limited in the high desert because habitat and food, both provided by vegetation, are scarce. Wildlife includes a number of rodents such as antelope ground squirrels, rabbits, kangaroo rats, and deer mice. Bats, lizards, snakes, skunks, bobcats, badgers, beaver, mule deer, cougar, and weasels also inhabit the area. Common birds are horned larks, house finches, mourning doves, crows, ravens, Chukar partridge, and an occasional hawk, owl, or eagle. Game fish found in the lake include largemouth bass, black crappie, rainbow trout, walleye, striped bass, and channel catfish.

The Air
This region has some of the clearest air in the United States because there is little development, a small population, and only minimal vehicle traffic.

From Bullfrog Basin one can see Navajo Mountain rising 40 miles to the south and Waterpocket Fold disappearing many miles to the north. Distant thunderstorms show displays of lightning and heavy skies in the late afternoon during the summer months.

Development of fossil-fuel energy resources in the Southwest may affect air quality and visibility in the Bullfrog Basin area. The Navajo Generating Station near Page, Arizona, began operating at one-third capacity in mid-1974 and is currently the only significant source of pollutants in the area. Other power-generating plants have been proposed for sites near Lake Powell to use coal resources located at the Kaiparowits Plateau and the Henry Mountains.
LAKE LEVELS
BULLFROG BASIN
GLEN CANYON
NATIONAL RECREATION AREA
United States Department of the Interior/National Park Service
The Lake
Lake Powell is like a blue lightning bolt in the red-orange desert. The Colorado River waters are impounded here for irrigation, generation of hydroelectric power, recreation, and silt retention. Water is a precious substance in the Southwest. All Colorado River waters are apportioned among the states through which the Colorado River runs. During wet years, water accumulates in the reservoirs, and during drier years, water must be released to meet downstream water allotments. Hence the level of Lake Powell can fluctuate from year to year and from season to season. The maximum impoundment level of the lake is 3,711 feet, and the predicted low-water operation level is 3,570 feet. Average operating level is predicted to be 3,650 feet for the next 20 years. Lake Powell has not yet reached maximum impoundment. The level of Lake Powell as of August 1975 was approximately 3,670 feet. (See Appendix A Cove Analysis & Probability Ranges of Lake Powell Water Surface Elevation.)

Much of the shoreline at Bullfrog Basin is shallow, sloping terraces. Although this facilitates water access, it makes the relationship of development to the water difficult since all permanent structures must be located above the 3,711-foot high-water elevation. When the lake level recedes, development becomes remote from the water.

THE RECREATIONIST
At the present time water-oriented recreation is the main goal of the visitor at Bullfrog Basin. Lake Powell offers the unique opportunity to explore and to participate in recreational activities on quiet water pathways in the solemn beauty of rugged canyon country. The waterways give intimate access to the geologic history of the Colorado Plateau revealed in the exposed layers of the earth’s eroded crust. Water is the medium over which the visitor can travel in any direction.

The recreationist seeks many things at Bullfrog Basin. Basic water activities such as fishing, powerboating, and waterskiing attract many visitors. Some sailboats and canoes are used at Bullfrog, but at the present time powerboats are far more popular. The recreationist may also choose Bullfrog as a starting point for a camping trip to the backcountry or to distant lakeshores. At the present time, approximately 40 percent of the visitors to Bullfrog Basin camp on the lake. All visitors are exploring, at some level, the magnificence of Glen Canyon and its tributary canyons, and many visitors record the scenes in photographs.

Lake Powell is a serene environment where not even the rustle of leaves disturbs the natural silence. Many visitors seek the quiet solitude or the uncrowded environment where they may participate in recreational activities.
Camping on the shores of Lake Powell.

Aerial view of launch ramp and Bullfrog Basin.
In this remote location, many visitors require services to accompany participation in their chosen recreational activities. These services include food and merchandising facilities, overnight accommodations, protection from the elements, vehicle and boat repairs, storage of vehicles and trailers, and land-oriented recreation. Services are provided by the National Park Service and concessioners.

ACCESS AND EXISTING FACILITIES

Visitors have access to Bullfrog Basin by land, by water, and by air. Road access to Bullfrog is from the north. Salt Lake City, approximately 320 road miles away, is the nearest metropolitan area. The road traveler comes to the high desert of the Colorado Plateau through green farm and dairy country, aspen and pine forests, and rugged mountains. Abruptly, the setting changes about 125 miles from Bullfrog. The vegetation almost disappears and gives way to broad vistas of rough, rocky landscape that rises through the Henry Mountains and drops down into the red lands of sandstone mesas, monuments, and canyons.

Bullfrog Basin, with its central lake location, is easily accessible by boat from the other marinas on Lake Powell. Hall's Crossing lies 3 miles across the lake. Rainbow Bridge Marina is 50 lake miles to the south, Hite Marina is 50 lake miles to the north, and Wahweap is 85 lake miles to the south.

Small aircraft bring visitors to Bullfrog, landing on a 3,400-foot asphalt-surfaced airstrip. From the air, the traveler can see the spectacular shape of the lake with its continuous path of meanders and goosenecks, the immensity of the land, and the contrasting forms and colors.

Bullfrog Basin attracted more than 72,000 visitors in 1975. This is approximately 6 percent of the total visitation received by the recreation area. Facilities provided by the National Park Service to accommodate visitors include a launch ramp, parking areas, a campground with minimal landscaping, and utilities. Overnight rental accommodations, utility hook-ups for recreation vehicles, marina with rental slips, general store and fuel services at the marina, service station, restaurant, utilities, and maintenance services are provided by the concessioner. During peak holiday periods, facilities can become overloaded. Visitors may wait up to 2 hours to launch their boats, and parked cars overflow the provided spaces onto the access road. The campgrounds, including partially developed loops, are crowded. Demand for overnight rental accommodations provided by the concessioner exceeds the number available.

The Bullfrog Basin marina has frequently been severely damaged by strong winds and accompanying wave action. The marina in its present location receives greater protection than it did previously.
THE NEED

The Utah State Comprehensive Outdoor Recreation Plan predicts that the Utah resident recreation-participation rate and particularly the nonresident rate will continue to increase through the outdoor recreation plan's time frame limit of 1985. Fishing, camping, swimming, hiking, and boating, all of which can be accommodated at Bullfrog Basin, are among the most popular outdoor recreational activities in Utah.

Traffic projections indicate that visitation to Bullfrog Basin will increase and that Bullfrog Basin alone could receive 1,000,000 visitors per year by the year 2000 should future roads presently under consideration be completed (Utah State Department of Highways. See Appendix B).

The existing developed area plan, which has been the planning document for existing development, provides for some expansion of most facilities. However, provisions for expansion of the launch ramp with adjacent parking and the campground area have not
been included. Although portions of these areas will be improved by paving, they are already congested at times of peak visitation. If the development is congested at the present time, it will clearly be more congested as visitation increases. The four-way intersection near the village center also has the potential to become highly congested. All traffic within the developed area must pass through this intersection. In addition, the marina, which has been relocated, was not planned to function with the development from its present location.

Some elements of the existing development are temporary and do not promote a harmonious relationship between the development and the site. Travelers on the main entrance road to the development arrive at a “backdoor” between dry boat storage and maintenance facilities. Many of the buildings (overnight accommodations, employee housing, and the restaurant) are temporary trailers with little, if any, landscaping and are laid out in a monotonous grid fashion. There is little shade for visitor and resident comfort. Existing development has been almost totally utilitarian with few aesthetic amenities.

The preceding discussion of the history, the environment, the existing facilities, and the problems at Bullfrog Basin gives perspective to the process of making plans for future development. The planning process has taken time to reflect on the past and evaluate the present in order to speculate for the future. Local and regional managers of the National Park Service, the concessioner, and the planning team participated in regular workshop meetings during the entire planning procedure in order to define aspects of the problem, develop alternative solutions, and evaluate those alternatives at the site. Each participant shared new ideas, interests, and points of view. A number of objectives for the project were defined by the workshop group as follows:

1. Develop the maximum high-quality recreational opportunity and experience with minimal environmental impact. This is the prime objective because juxtaposition of recreational experience with preservation of scenic resources gives rise to possible conflict.

2. Develop a program that will meet the management objectives and economic realities of both the National Park Service and the concessioner.

3. Accommodate the present visitor needs as well as those projected for future recreational development.

4. Develop a land-use and implementation program that will allow for future change and flexibility and enable easy incremental expansion.
SERVICE STATION AND CAMPGROUND

TRAILER VILLAGE

CAMPGROUND
5. Develop architectural concepts to guide the creation of a cohesive development.

6. Design a development that harmonizes in form, materials, and placement with the natural aesthetics of the high desert.

7. Utilize the existing investments in buildings, roads, and utilities as much as practicable.

8. Provide for an integral visitor interpretive experience that expands the visitors' awareness of Bullfrog and the uniqueness of the area and enhances the natural ability of the land to communicate to the visitors.


10. Plan to mitigate the adverse effects of the climate (intense sun and severe winds and storms) in order to increase visitor comfort and decrease damage to the marina and other public and private investments.

11. Design to reduce dependency on individual motor vehicles for intrasite circulation.

12. Provide alternative recreational opportunities that are consistent with the available resources.

These goals must be recognized as general and may be modified as development proceeds. Bullfrog Basin is a young development, and explicit past use trends have not been established. Therefore, future trends and visitation projections are difficult to make because adequate background information is not available. Although we can make visitation projections from apparent visitor-use demand and average daily traffic projections for existing and proposed roads, we cannot be assured that these projections will hold true. The variability of the future limits the effectiveness of a definite program determined at the present time. For example, these variables may influence the actual development of Bullfrog Basin: Visitations projections may not be fulfilled; decreasing availability of fossil fuels may change visitation patterns; or visitor recreational desires may change.

Therefore, the land-use plan for Bullfrog Basin, like the goals must be flexible in order to respond to future change. The plan and its implementation will be designed to maintain flexibility within the long-range goals of management, the limitations of the environment, and the recreational desires of visitors in this unique setting.
THE DEVELOPMENT CONCEPT

GENERAL DEVELOPMENT

The proposed development concept plan seeks to establish a guideline for development at Bullfrog Basin that can accommodate graceful expansion in order to facilitate future increases in visitation. Visitors come to Bullfrog Basin primarily to participate in water recreation on Lake Powell in the magnificent canyon lands of southeastern Utah. This is a unique combination of water recreation and unparalleled scenery. Therefore, the plan is organized to relate to both the lake as a recreation goal and the setting as a singular feature of the natural environment.

The natural landforms of ridges and washes divide Bullfrog Basin into distinct development areas and create a number of separate coves along the lakeshore. Within the defined land and water areas, specific elements are organized to take advantage of views, protective topographic features, functional separation, and existing utilities and roads. The proposed plan would provide for many of the same facilities both existing and formerly proposed for Bullfrog because no change in visitor desires and management philosophy is foreseen at the present time.

The central ridge creates a major natural division of the site. For the most part, the National Park Service would manage facilities on the east side of the ridge, and a concessioner would manage facilities to the west of the ridge. A fork in the access road would separate traffic destined for National Park Service facilities from concessioner destination traffic at the entrance to the developed area. The village center, which is the core of land-oriented activities and houses both National Park Service and concessioner facilities, is located at a natural depression or saddle in the central ridge. Here it is easily accessible by all visitors and residents of the development. The marina takes advantage of naturally protected water areas in Cove 2 and could serve as the visual focus of the concessioner's facilities. Dry storage, wet storage, boat services, and a launch ramp occupy shoreline and protected water areas of Cove 1. The public launch ramps have a prominent position and good water access from a point between Coves 2 and 3.

Facilities for housing overnight visitors should be grouped among the landforms and related to the land and water activity areas. Employees' residences could be clustered with the school facility and community recreational open space. A system of partially shaded walks for pedestrian and bicycle use could link all elements at Bullfrog Basin in order to provide easy circulation throughout the development. Panoramic vistas and intimate background sights are available from all areas. Selective use of landscaping would help to define, enclose, and shade the development.

All actions proposed must comply with the procedures of the Advisory Council for Historic Preservation before the decision is made to implement them.
COMPONENTS OF THE PLAN

Water Recreation Facilities

Public Boat-Launch Ramps The existing and proposed launch ramps provide access to the waters of Lake Powell. A number of visitors use only this facility, because they bring their own supplies and camp on distant lakeshores. But in addition, many visitors launch and retrieve their boats each day.

The existing boat-launch ramp at Bullfrog Basin was constructed by the National Park Service. It is built of asphalitic concrete and is 125-feet wide from elevation 3,710 feet to 3,610 feet and 130-feet wide from elevation 3,610 feet to 3,520 feet. Adjacent parking above 3,700 feet can accommodate up to 234 vehicles with trailers. The ramp receives heavy use during peak holiday periods as well as moderate to heavy use for several months of the year. During peak use, the ramp can facilitate approximately one launch per minute or 500 to 600 launches per day (National Park Service, Memorial Day Weekend Use Statistics, 1974). The prime time for launching boats is from 6:00 a.m. to 10:00 a.m. Boat retrieval occurs chiefly between 4:00 p.m. and 8:00 p.m. In order to better accommodate both present and future boat use, a second public launch ramp of similar capacity should be constructed, and parking above 3,700 feet should be expanded to accommodate approximately 800 additional vehicles with trailers. Excess excavated soil and rock could be used to form berms around parking areas in order to screen parking from view.

The proposed, second public launch ramp should be located south of the existing ramp. It would be designed to serve both high and low lake levels. A short breakwater should be installed to provide protection for this ramp. Areas below maximum impoundment level (3,711 feet) could be graded and possibly paved to accommodate parking at low and moderate water levels.

The Marina The concessioner’s marina is the focus of the remainder of boating activities at Bullfrog Basin. Here boaters can purchase fuel, buy provisions to begin an excursion, or supplement needs of a current lake journey. Visitors may rent small boats, store boats in wet storage (covered slips and buoys), or merely watch and enjoy the activities, people, and vehicles that tell the story of a lakeside marina.

The history of the marina facility at Bullfrog Basin is disastrous. Almost every year since initial docks and slips were constructed, severe storms have damaged or destroyed parts of the marina. Early in 1974, the marina was moved to its present location in Cove 2. Here the central ridge of Bullfrog gives partial protection from destructive waves and winds that come out of the south and southwest. The marina combined with buoy storage could be expanded from 132 berths to 900 berths at average lake levels. The 900 berths would be accommodated by the combined capacities of Cove 1 and Cove 2 when adequately protected from the elements. Size of the marina and actual wet boat storage capacity is dependent on the lake level. At high water levels, the marina is large and can accommodate large numbers of boats. As lake draw down occurs, the boat storage capacity of the coves decreases (approximately 725 boats at
elevation 3,570 feet). When this happens, part of the wet boat storage capacity could be relocated to dry storage if necessary.

Marina expansion must include construction of breakwaters to add further protection. It is recommended that the breakwaters be a floating type that is flexible, easy to move in order to accommodate the changing water levels, and able to effectively baffle waves that occur during storms on the lake. (Most storm waves at Lake Powell do not exceed 4 feet in height.) Small sections of fixed breakwater could be used to supplement the floating breakwater.

All other marina facilities should be expanded to Cove 2 as the development capacity of Bullfrog Basin increases. The fuel sales area and marina grocery and supply could be increased in size. Tour boats could be administered and operated from this area also. Land access to the marina should be from the north side of Cove 2 where available parking areas are generous and access walks and utility runs can be short and direct. Parking areas for a maximum of 1,100 vehicles could be constructed in increments. Areas could also be graded for parking at low water levels for approximately 300 additional vehicles. Fuel supplies and marina services could be located to the northwest of the marina and marina parking area where they can be screened by an existing linear earth mound.

**Dry Storage and Boat Service Facilities**  
Dry storage and boat services that supplement the concessioner’s marina operation could be relocated to the south side of Cove 1.

A new dry storage area in the remote Cove 1 location has two important features: Its remoteness allows the development of good security, and its proximity to the water means that the concessioner can launch boats directly from dry storage. To aid in security and organization, the concessioner could establish a control point immediately to the west of the canyon that separates the marina facilities from the remainder of the development. From this control point, visitors could be directed to appropriate facilities and parking areas, for example marina parking, dry storage, or parking for houseboat renters.

A launch ramp for use at dry storage could be constructed at Cove 1. The new ramp would be well protected and also would serve as a temporary access point for the cross-lake ferry service authorized to be provided by Lake Powell Ferry Service, Inc. The ramp should be separated from dry storage by security fences. As noted previously, part of the marina berthing capacity would be located in Cove 1.

The 25-acre, dry storage site could accommodate 2,000 vehicles and has adjacent areas for expansion. There are many ideal, level storage areas among the slickrock mounds. Low-cost protection from the sun might be created easily in these areas with canopies or light-weight trusses that would span between the rock outcroppings to create covered storage space. This minimal structure would provide the necessary protection for dry boat storage. Boats could be stacked under these canopies to conserve and
dry storage concept

swim beach
increase storage capability. Also, travel trailers and recreational vehicles could be stored like boats for regular visitors, thus freeing space in the trailer village and campground for other guests. This storage service would relieve the visitor of the responsibility of hauling a travel trailer to Bullfrog for each visit.

The Cove 1 storage location has an additional advantage: It is out of sight of the main development behind rock outcroppings and earth mounds, hence the inactive storage function would not be visible from the general development.

The concessioner could also operate boat maintenance services from this location. Initially, boat services might be maintained at the service station facility currently located adjacent to the village center. As development expands, boat services should be relocated to the proposed dry storage area, and boat wash-down facilities could be provided.

**Cross-Lake Ferry Ramp** If increased visitation represents an increased demand for ferry service across Lake Powell between Hall’s Crossing and Bullfrog Basin, a permanent cross-lake ferry ramp is recommended. It would be located on a separate road southeast of the main Bullfrog Basin development. At the present time, Stanton Canyon appears to offer a good site for this facility because it is well protected and provides the most direct access from Hall’s Crossing. A ferry ramp in this location would relieve traffic pressures on the central development and facilitate through-traffic.

**Swim Beach** A swim beach could be created at Cove 3 below the campground and picnic/day use facilities, as this site is a long, very gentle slope.

**Overnight Accommodations**

**Campground** The campground should be expanded in its present location where gentle slopes provide the necessary level areas for camping and recreational vehicles. The existing campground contains three paved loops and minimal landscaping. The vehicle entrance to the campground should be relocated to the east on the main road in order to minimize traffic congestion at the village center and launch ramp. The campground area should be redesigned to improve serviceability. An additional camping area could be located in a draw southeast of the existing campground and separated from it by a 150- to 200-foot-high slickrock ridge. This area is rugged and could be laid out as a meandering loop of individual campsites. Parking would be grouped and individual campsites could be located within walking distance from parking areas. These campsites are remote from the rest of the development and could afford a semi-private camping experience.

The campground would provide a variety of experiences to a diverse group of visitors. It could be a combination of camping facilities that are unique to the experience of Glen Canyon National Recreation Area.
The entire campground could be managed as a unit, and vehicle access could be limited to the single entry road. Large and small group camping areas as well as individual campsites would be available throughout the campground. The type and mix of campers assigned to different locations could be determined by the National Park Service according to management needs. For example, if a large group of people camping together wants to play music late into the night, they could be located so that they would not disturb campers who want to retire early.

Picnic tables and campfire sites should be included with each campsite, and restrooms and water supplies should be located as necessary throughout the campground.

Trees, shrubs, and other plant materials should be added in the campground to provide relief, shade, and protection in this severe climate. Individual shade structures, covered walks, and shaded community activity areas could be constructed in the campground. The combination of planting and shade structures might be used in order to produce an effective system of sun-shading as soon as possible. Planting alone would not provide effective shade until it has had 5 to 10 years to mature. In this climate, shade is absolutely necessary for comfort during blistering summer months.

Two slickrock ridges that run from the striated peaks to the water define the limits of the campground and planted area.

The campground location has many advantageous relationships with other functions of the development and with the topography. It allows easy access to the public launch ramp and village center and would have lake frontage at high water levels.

The gentle slopes of the campground allow lake views and distant vistas from all campsites. The slickrock ridges define, give storm protection, and give scale to the two campground locations.

**Lodging** The lodging facilities should be oriented to Cove 2 and connect with the marina via pedestrian paths and possible boardwalk areas. Together, these facilities would define Cove 2 as the center of concessioner water-oriented facilities. Lodging should be located on the southeast side of Cove 2 on a hilltop and hillside area that are predominantly slickrock. From these locations, one has spectacular vistas of Waterpocket Fold, Bullfrog Bay, the Henry Mountains, and even summer thunderstorm activity. In particular, the point of this hill allows some of the most splendid views of the surrounding areas.

Lodging is proposed to be of two types: a low-rise (1 to 2 stories) structure located near the point and a medium-rise (3 to 5 stories) facility located near the marina and village center. The low-rise structure would take advantage of existing utilities, the
regular slopes of the slickrock hillside, and the point that was previously graded to accommodate development proposed by former plans. The site has level areas that are necessary for parking area requirements and service access. The building could be sited in several ways: It could be located primarily on the previously graded site; it could step down the hillside in an arrangement reflecting the land forms; or it could be designed as a combination of both.

Although this location is a spectacular site, it presents two factors that must be carefully considered. The site is very prominent and visible from every direction, and the design of the buildings must recognize this. In other words, the buildings must be designed so that they do not detract from the natural beauty of the site and setting. Also, the site is not well protected, hence the building design must include protection from the sun and wind in order to provide for visitor comfort. These considerations are discussed in detail in the section "Architecture and Aesthetics."

Lodging on this 5-acre site could total up to 120 units. Other services and amenities might include a restaurant, parking for 100 vehicles, outdoor decks and shaded spaces, a central courtyard, trees and landscaping, and courtesy docks for boats belonging to lodging visitors.

The medium-rise lodging facility could contain approximately 120 units, a restaurant, and related services and could be constructed in later stages of development. It should be located on a 9-acre site consisting of a slickrock slope adjacent to a gentle, soil-covered slope where parking could be accommodated. The parking area for 200 cars pulling trailers could serve the village center also. These lodging facilities need protection from sun and wind, too. Enclosed courtyards could serve as protected areas. The paths and boardwalk would link these accommodations to other Cove 2 facilities and to courtesy docks for visitors from other marinas. This discussion of lodging facilities represents broad concepts that could evolve into a variety of building forms when these facilities are actually designed.

Concessioner Campground  The concessioner campground would be expanded in its present location and immediately west of the small canyon that divides the Bullfrog developed area at Cove 2. The total area designated for development encompasses approximately 40 acres and would ultimately accommodate up to 342 sites. The location is central to many activities and affords excellent views of Bullfrog Bay.

The current arrangement of trailers does not recognize either the site or the views. During implementation of this plan, consideration should be given to designing a better campground layout. This should be done to relieve the monotony of the existing trailer site development. Recognizing that there are limitations imposed by utility installations and variable trailer sizes, other possible improvements should be considered such as landscaping, planters, and shade structures, which could provide
necessary relief from the elements and help to create a variety of public and private spaces. Decks and paths through the area could be used to define pedestrian circulation and help improve the character of the development. In addition, the concept of covered parking spaces could be considered as a special solution to the problems of camping in a desert environment. They could even be incorporated into campsites so that vehicles would, in effect, be utilizing carports in the desert. Such structures could have open sides, but would provide shade and protection for camper vehicles without obstructing views of the surrounding area. They could also serve to architecturally unify a development that tends to be extremely diverse in appearance.

Visitor Services

Village Center The village center is the core of land-oriented activities at Bullfrog Basin. It is located at the center of the development thus facilitating accessibility. Functions contained in the village center might include a village general store, a gift shop, a restaurant, beauty and barber shops, concessioner administration, laundry facilities, and land-oriented recreation facilities such as a recreation room, a children’s play area, a library, and volleyball, basketball, and tennis courts.

The village center would occupy approximately 5½ acres. This site is partially protected from the prevailing southwest winds by a low ridge, and the proposed building form could augment this natural protection. A semi-enclosed or enclosed courtyard could provide a protected area for pedestrian use and circulation, display of merchandise, and an interpretive exhibition. Landscaping should grow well in this space, which could be a green oasis and gathering area. Trellises, deep building overhangs, and arcades could provide shade and additional protection.

Parking for 120 vehicles should be provided to accommodate easy access for shoppers.

Visitor Contact, Management, and Interpretive Facilities The National Park Service, as managers of Bullfrog Basin and the surrounding recreation area lands, would maintain a number of different facilities to accomplish a variety of service-oriented functions.

A visitor contact station should be located on the entrance road at the intersection where traffic separates for National Park Service or concessioner facilities. It would serve as an information and aid center where the visitor can learn about facilities available at Bullfrog, rules and regulations applying to the recreation area, history of the Glen Canyon area, and activity schedules, or receive first aid and general visitor assistance. This facility could also serve as the Bullfrog ranger station and National Park Service administrative headquarters for the Bullfrog developed site.

A second service facility could be located in the village center and would house the unit manager who administers the north unit of the recreation area including Bullfrog,
Escalante, Hall's Crossing, Hite, and Orange Cliffs. This office would also provide walk-in visitor information. Located here, too, could be a facility for joint use by the National Park Service and the concessioner. This might be an "amphitiorium" (an amphitheater type structure which could function either as a closed or open air facility) to house movies, interpretive performances, sky interpretation, group activities, and crafts classes. This facility could function as part of the village center and activity center complex and should relate to the covered walks, decks, trellises, and landscaped outdoor spaces.

Paths and Shade The main elements of this development should be connected by systems of bicycle and foot paths in order to encourage pedestrian and non-motorized vehicle circulation. Although people tend to drive from one place to another in a location where they are exposed to intense sun and heat, shaded pathways could induce a number of people to walk when distances are relatively short.

The paths could be covered in some areas, especially where lengthy sections of exposed walk would discourage pedestrians. This could be accomplished with flexible structural elements that could be relocated as necessary to adapt to use patterns and seasonal changes. The flexible system would allow both covered and open sections of walk to provide appropriate amounts of sun and shade. Seating areas, overlook sites, night lighting, and drinking fountains are amenities that would increase the usefulness of the walks.

The system of walks could also lead through each area of development. This would organize pedestrian circulation within an area (the campground, for example) and enable a visitor to walk throughout the development if he desires.

A boardwalk is recommended as a specific element of the pedestrian system. It would be located along the southeast side of Cove 2 and serve to connect the functions that relate to this cove (lodging with accompanying services and the marina).

Picnic and Day-Use Facilities These facilities, which include picnic areas, shade structures, restrooms, and playfields, should be located immediately below the campground. They would be accessible from the main road, the village center, the campground, the launch ramp, and the swim beach.

Planting Planting introduced by man in the desert is on one hand a familiar, comfortable, psychological, and real relief from the dry persistent heat and brilliant light, and on the other hand, a foreign element in this land where trees are scarce and desert shrubs compete for water to survive. Although several kinds of trees and shrubs are native to this climate zone, they grow primarily at natural drainage courses where there is natural protection and water supply. Typical desert vegetation on the exposed slopes at Bullfrog Basin is sparse and small scale.
This development concept purposes the use of selective new planting in the development area. Planting at Bullfrog Basin would, in effect, be part of the temporary development of man like the recreational vehicles and the marina. It would require man’s maintenance (irrigation) to exist and would die and disappear when man leaves. Therefore, carefully selected planting is entirely appropriate to fulfill man’s needs for comfort and shade in the desert.

The topography at Bullfrog Basin not only enables easy separation of functions, but also defines limits of planted areas and enables use of planting in patterns similar to that occurring naturally in the landscape. Planting to be introduced in the campground, at the village center, in the employee housing areas, and at the trailer village would be on a large scale, totally compatible with natural vegetation patterns. This new vegetation could be located in the depressions between ridges and adjacent to canyons, natural drainage courses, and roadways. The ridges would provide some wind protection.

Native trees and shrubs should be planted, and other plant materials suited to the desert climate could be introduced. These plants could provide a possible habitat for animals and may induce the return of wildlife that once inhabited the shores of the Colorado River. A list of recommended plant materials is contained in Appendix C.

Irrigation requirements for the planted areas would have to be met either with water from additional wells or water pumped from Lake Powell. One new well is proposed. Since water is scarce in the Southwest, irrigation water would be conserved insofar as possible by selection of favorable planting locations and choice of plant materials best adapted to this climate.

Service Station  The concessioner operates an existing service station and boat maintenance facility at the proposed village center location. This facility would best remain in its existing location through early phases of development; however, the side access road should be relocated in order to separate the service station from the village center. In this location it is possible that the service station and boat maintenance facility could outgrow the available site and that the traffic they generate would cause congestion. During later phases of development, boat maintenance is proposed to be moved to the dry storage area. The service station should be relocated if traffic congestion becomes a problem in this location.

The service station would probably be relocated farther out on the main entrance road. Here it could easily serve incoming and outgoing traffic and have adequate expansion area. It is proposed that the service station be designed as a functional yet architecturally compatible facility. This could be accomplished by using minimal amounts of paving, and by using planting, fences, and berms as screening elements.
Auxiliary Facilities

Employee Housing  A necessary element in this service base development is employee housing. At the present time, employees are housed in two different locations: Most of the concessioner’s employees live in the existing trailer village, and the National Park Service personnel plus a few concessioner employees live on a gentle slope above the campground. The housing units are for the most part trailers. There are very few plant materials or residential amenities in the trailer village, but the National Park Service housing area has a number of large trees and shrubs. The current arrangement establishes a definite physical separation between the two employee categories.

It is proposed that all employee housing be located in a new permanent housing area to the east of the marina and village center core development. This location permits a separation of the long-term residents from the main development in order that they may have a sense of permanence, home, and privacy. Yet this location is close enough to other activities for easy access in an emergency.

The new employee housing area would ultimately occupy 30 acres. Approximately 15 individual housing units and 4 apartment units would be provided for National Park Service employees, and 50 individual housing units, 10 apartments, and 1 dormitory unit would be built for concessioner employees. It is recommended that these housing units be laid out to create a variety of identifiable spaces rather than in the traditional repetitive patterns. This can help create a better sense of community and enhance individuality and privacy for the area’s long-term residents.

Decks and paths sheltered by either trees, shrubs, or shade structures could lead through employee housing and connect to other elements at Bullfrog Basin. Planting and possible wind breaks would be added to mitigate the effects of the sun’s persistant heat.

School, Play Area, and Common Space for Employees  A one-room school facility adjoins the existing National Park Service employee housing area. It generally serves fewer than 15 students in grades kindergarten through six. Children from both Bullfrog Basin and Hall’s Crossing attend the school. As the permanent population of Bullfrog Basin increases, it is expected that additional school space will be needed for the same grades. The school could also serve as a community center and focus for employee housing area. A large play area and common open space would adjoin this building.

Maintenance Area  At the present time, the maintenance area is adjacent to the National Park Service employee housing. Although this is a condensed arrangement of facilities and allows some employees to live close to their work, the major impact of this relationship is negative. The clutter of the maintenance yard presents an unattractive entrance to Bullfrog. The noise of trucks, maintenance activities, and generators is a great disturbance.
For the aforementioned reasons, this maintenance area should be relocated at some later time to a remote location where it would not create visual or noise intrusions. At the present time, Stanton Canyon appears to be the most favorable site. The suggested location could serve as maintenance headquarters for the entire north unit of the Glen Canyon National Recreation Area. In the meantime, however, the maintenance area should remain in its existing location and improvements made to mitigate the appearance and noisy conditions of the existing facility.

Support Facilities
An existing asphalt-surfaced airstrip affords access to Bullfrog Basin for small aircraft. The airstrip should be lengthened and widened to improve operational safety. Additional tie-downs should be provided.

Utilities (water, power, and sewer) should be added as necessary to serve this development. An additional well should be drilled in order to supplement the existing water supply, and two oxidation ponds should be added to increase waste-disposal capacity.

During development of specific elements at Bullfrog Basin, consideration should be given to the possibility that all facilities may at some time in the near future be powered by solar energy, wind energy, electricity transmitted to the site from distant power plants, or some combination of these energy sources.

Fire protection should be considered throughout the development in the detailed planning stages. Appropriate hydrants, hoses, and water supplies should be installed as necessary.

CAPACITIES

In summary, the proposed project could include up to 600 campsites, 200 campsites with utility hookups, 240 lodging units, and 142 trailer units (approximately 4,700 people based on 4 people per unit); moorage for up to 900 boats; a village center with merchandising facilities and recreation and administrative facilities; employee housing; a school; boat-launch ramps; dry storage and boat service facilities; and parking areas for each facility.

Assuming that 40 percent of the visitors would continue to camp on the water during peak use periods, and therefore would not require overnight accommodations, visitation on a peak use day could approach 8,000 persons (4,700 + 3,200 = 7,900, use 8,000). Since access to Lake Powell is the primary visitor objective, the projected 8,000 visitors should be able to be accommodated by the boat/water access capacity of the development. Assuming that there is an average of 4 persons per boat, the necessary boat capacity would therefore be 2,000 boats per day.
The boat capacity of Bullfrog Basin is equal to the number of boats in wet storage (900), plus the number of boats that can be launched to camp on the lake, plus the number of boats that are launched and retrieved each day. Assuming each of three launch ramps can handle 500 to 600 launches or retrievals per day, 1,500 to 1,800 boats can be accommodated at the launch ramps. With 40 percent of the visitors camping on the lake, 800 (3,200 – 4) boats would need only to be launched. Therefore, the actual boat capacity is equal to the number of boats in wet storage (900), plus the number of boats launched to camp on the lake (800), plus the number of boats that can be launched and retrieved each day \[ (1,500 \text{ to } 1,800 - 800) \div 2 \text{ or } 350 \text{ to } 500 \]. The sum of these boat capacities is equal to 2,050 to 2,200 boats per day or slightly more than the 2,000 boats that must be accommodated. Therefore, the actual boat capacity is adequate to serve projected visitation.

AESTHETICS AND ARCHITECTURAL GUIDELINES

The natural aesthetic of Bullfrog Basin was created by millions of years of evolution in climate, geology, plant and animal life, water resources, and erosion. The lush vegetation and the desert sands have become fossil deposits and rock layers, and the vast inland seas have disappeared. Winds, sun, rains, and rivers have come and gone leaving the land for today, a vast highland desert at approximately 3,800 feet above sea level.

The desert here is quiet, remote, and almost lonely; it is vast, wild, and untamed; it is hot, barren, and unsupportive to man. The desert is a colorful geologic museum of gigantic proportions; it is a sculpture gallery of immense monoliths and subtle details in petrified sand dunes; it is a color palette of all the warm colors from brown to magenta to orange to beige contrasted with the azure sky and water. All these visual and sensory perceptions contribute to the aesthetic of the desert and define its unique natural endowments.

Bullfrog Basin is part of a national recreation area, and as such, participates in the goal of preserving the natural endowments of the area in conjunction with providing for public recreational use of the land for people today and in the future. A possible conflict arises from the juxtaposition of preservation and recreation. For this reason, areas such as Bullfrog Basin must be carefully analyzed, designed, and managed to create the best possible relationship between man and the natural aesthetic. Much of this relationship is determined by the architecture and design of manmade features and the relationship of the development to the site.

The existing development is difficult to evaluate in terms of its relationship and contribution to the natural aesthetic, because existing development represents an initial drive to fulfill recreational needs, and it includes only partial implementation of a total
development concept
plan. Existing development has proceeded toward utilitarian, functional, and economic ends. As the development presently exists, it detracts from the natural aesthetic. However, existing elements of the plan have the potential to be developed into an excellent relationship with the land and the environment.

The proposed plan was evolved from the existing development and makes use of many of its elements. For example, the existing National Park Service campground and village center locations would be maintained because these sites suit their functions and relationships well. They are located in low, well-defined, semi-protected areas that provide easy unobtrusive building sites requiring little or no grading. On the other hand, parking areas at the launch ramp were cut from slopes and present a highly visible profile to the lake and surrounding country. No attempt has been made to alleviate the visual impact of vehicles. Also an unprotected area on a highly visible point was leveled for a motel building site. This site should be reworked and could be developed successfully.

The purpose of this development concept plan is to determine the functional inter-relationship, propose the basic land use plan, and to suggest architectural concepts to guide the development.

A number of aesthetic and architectural guidelines were established during evolution of this proposal and influenced the development concept plan. They seek to define and build a mutually beneficial relationship between man and nature in recreation and preservation uses, and perhaps create a solution where the total is greater than the sum of the individual parts. These concepts are listed here in an effort to promote understanding of the process and for use as guidelines for the additional design and planning that must take place before the development is finally realized.

**Concepts**
- Focus attention on the lake
- Provide protection from the elements
- Foster respect for the natural environment
- Establish transition spaces
- Develop landscaping
- Establish a sense of unity and order
- Establish a sense of quality

**Focus Attention on the Lake**

**Concept:** The focus of attention and physical orientation of the entire development should be towards the lake.

**Reasons:** The recreation provided by the lake is the rationale for the development; thus, the lake should be the center of activity.
The lake, being the most recognizable feature in the area, locates, orients, and provides a sense of scale to the visitor.

Water is essential for survival in this environment.

**Suggestions:** Overnight accommodations, campgrounds, trailer village, employee housing, and village center should provide views of the lake from the interior as well as the exterior of the structures when practical.

Construction and alignment of roads and paths should consider the sequential views of the lake in an effort to stimulate a sense of destination.

**Provide Protection from the Elements**

**Concept:** The development, in design and implementation, should provide for protection, comfort, and relief from the natural elements, particularly the sun and the wind.

**Reasons:** It is clearly evident that the elements that formed the canyon lands area and that make it such a spectacular place to be, can, at times, drain all enthusiasm out of any activity, recreational or otherwise.

**Suggestions:** The methods and materials of construction should be chosen on the basis of their insulating and protective characteristics wherever economically realistic.

The use of solar and wind-generated energy would be highly appropriate wherever feasible.

In line with the concept of viable transition spaces, the design and site location of buildings should be such that they create an exterior space that provides relief from the sun and wind. Where appropriate, the existing topography should be utilized for protection.

The use of planting is encouraged as a method of creating shade, defining spaces, and controlling blow-sand conditions and thereby decreasing the impact of the wind.

The architectural character should reflect the concern for protection and comfort.
Indicate Respect for the Natural Environment

**Concept:** The development, in design and implementation, should recognize, respect, and preserve the natural aesthetics of the Glen Canyon region.

**Reasons:** The natural environment provides a singular aesthetic experience that cannot be duplicated by man. The drama of the red-orange land contrasted with the azure sky and water is unique.

Although it is not unique when compared with other locations in the Glen Canyon National Recreation Area, the Bullfrog development site represents a primary contact point between the visitor and the natural environment. As such the site should not be disregarded or disrespected, but this development should set an example of an appropriate relationship between man and this unique setting.

Loss or degradation of certain natural conditions, such as air and water quality, can be detrimental to health.

**Suggestions:** Individual use of vehicles for intrasite transportation should be minimized. This could be accomplished with additional boat-launching locations, shuttle service, simplified internal circulation, and planning for pedestrian and bicycle circulation. These actions would minimize local pollution, duplication of parking facilities, and crowding.

The visitor should be provided with educational opportunities to learn about the environment in order to increase his awareness and appreciation of Glen Canyon National Recreation Area.

Excessive noise where inappropriate to the activity or situation should be minimized.

Grading should be minimized, and effects of grading scars should be mitigated.

There should be a strong emphasis on maintenance of both development facilities and the natural environment.

Service areas and service entrances should be located out of view of the general public.
The use of dry storage for trailers and recreational vehicles should be encouraged as a means of reducing transportation, pollution, and energy-use pressures.

The use of energy sources such as the sun and the wind as alternatives to fossil fuels would be appropriate.

**Establish Transition Space**

**Concept:** Transition environments (outdoor manmade environments) should be established as alternatives to being in a building, on the water, or in the natural setting.

**Reasons:** Sun and wind often make being outside uncomfortable at best and yet the natural conditions are best experienced outside.

By increasing the habitability of outside space, the number of recreational experiences is increased.

Transition environments, especially in and around lodging units, aid in creating semi-public and semi-private areas between the strictly public and private spaces. This, in turn, encourages social interaction.

Providing usable outdoor areas may decrease necessary indoor space.

The idea of usable, protected, and interesting outdoor spaces is very similar to the natural condition where the intimate canyon areas provide the exciting habitable spaces in an otherwise hot, open, inhospitable environment.

**Suggestions:** Site planning, especially in the trailer village, should be accomplished in such a manner that an in-between open space is created. Canopies, trellises, and landscaping would all be appropriate means of establishing transition space.

“Places to be” should be established such as playfields, boardwalks, and gathering areas.

Sections of the campground should provide for group camping.

Pedestrian and bicycle routes should be set up apart from the vehicle roadway as a means of drawing people out of “containers” such as buildings, boats, and cars.
Develop Landscaping

Concept: Although natural vegetation at Bullfrog is sparse and small scale, landscaping elements such as trees, shrubs, and flowers should be established in the developed area where they can be maintained.

Reasons: Landscaping can be used to provide shade and color at Bullfrog Basin. Landscaping can help define the developed area and circulation patterns.

Maintained landscaping is a durable replacement for the fragile desert plants in locations that receive intense traffic.

Suggestions: Landscaping should be used when it is practical, functional, and desirable.

Establish a Sense of Unity and Order

Concept: The development should be designed so as to suggest a feeling of organization and unity without regimentation.

Reasons: The development should relate as a whole so that visitor identification will extend to the other facilities in the hope of generating more use of these facilities.

Design should give the feeling that the whole development is unified rather than just a campground or motel that happens to be near some other facilities.

Suggestions: Similar construction methods and materials should be used and style and form should be repeated where appropriate.

The healthy, open, working relationship between the National Park Service and the concessioner should be continued in carrying out their mutual responsibility to serve the public.

Maintenance, service, and storage functions should be contained in locations that are not highly visible. These functions should be screened if necessary.

Appendix D contains a series of concept sketches which illustrate possible aesthetic and architectural guidelines.
This concept plan is one step toward possible implementation of expansion and future development at Bullfrog Basin. It is estimated that implementation would take 20 to 30 years. Implementation would, in all probability, be almost a continuous process rather than specifically phased increments because of availability of funds for both public and private investment. Also the low visitor-use winter season of each year presents an ideal time to build in this location.

The approximate costs for each element have been estimated based on mid-1974 construction costs and do not reflect escalation figures. From this base estimate, priorities can be further evaluated, and cost figures can be easily estimated for each element at a particular point in the future, using actual escalation percentages.

During implementation of this plan, a number of factors could influence priorities. Influences such as change in visitor desires, change in methods of construction, and change in energy sources and availability could each affect the plan.
### CONSTRUCTION COST ESTIMATE (1974)

<table>
<thead>
<tr>
<th>Element</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Work</td>
<td>$1,806,000</td>
</tr>
<tr>
<td>Roads, trails, and parking areas</td>
<td>2,400,000</td>
</tr>
<tr>
<td>Landscape and irrigation</td>
<td>1,140,000</td>
</tr>
<tr>
<td>Utilities</td>
<td>1,400,000</td>
</tr>
<tr>
<td>Project components</td>
<td></td>
</tr>
<tr>
<td>Campground (600 sites)</td>
<td>845,000</td>
</tr>
<tr>
<td>Concessioner campground (342 sites)</td>
<td>1,662,400</td>
</tr>
<tr>
<td>Village center (25,000 s.f.)</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Lodging:</td>
<td></td>
</tr>
<tr>
<td>Hill (120 units)</td>
<td>3,600,000</td>
</tr>
<tr>
<td>Waterfront (120 units)</td>
<td>4,800,000</td>
</tr>
<tr>
<td>Marina (900 Berths)</td>
<td>2,520,000</td>
</tr>
<tr>
<td>Breakwater (800 l.f.)</td>
<td>80,000</td>
</tr>
<tr>
<td>Maintenance, boat service and dry storage</td>
<td>1,100,000</td>
</tr>
<tr>
<td>(2,000 storage capacity)</td>
<td></td>
</tr>
<tr>
<td>Employee Housing:</td>
<td></td>
</tr>
<tr>
<td>NPS (19 units)</td>
<td>800,000</td>
</tr>
<tr>
<td>Concessioner (60 units and dorm)</td>
<td>1,900,000</td>
</tr>
<tr>
<td>School</td>
<td>270,000</td>
</tr>
<tr>
<td>Day-use and picnic area</td>
<td>50,000</td>
</tr>
<tr>
<td>Service station</td>
<td>200,000</td>
</tr>
<tr>
<td>NPS offices and interpretive facilities</td>
<td>150,000</td>
</tr>
<tr>
<td>Public launch ramp</td>
<td>420,000</td>
</tr>
<tr>
<td>Dry storage launch ramp</td>
<td>200,000</td>
</tr>
<tr>
<td>NPS maintenance area (relocate)</td>
<td>1,000,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$27,343,400</strong></td>
</tr>
</tbody>
</table>
RANGE OF ALTERNATIVES TO THE PROPOSED PLAN

- Remove all facilities & discontinue services
- No action—continue services as they now exist
- Develop only portions of the Proposed Plan
- Variations of the Proposed Plan
- Similar development at alternative site
  - Developed Area Plan
  - Alternative Development at Coves 2 & 3
  - Development at Cove 1
  - Development at Hansen's Cove
ALTERNATIVES

Establishing legislation and management policies for recreation areas of the National Park System establish guidelines, limitations, and basic goals for service base developments such as Bullfrog Basin in Glen Canyon National Recreation Area. Hence, viable development alternatives for Bullfrog Basin must be oriented to visitor service and exist only within the range defined by these documents and policies. The range can be represented as a progression in degree of development from no development (remove all facilities and discontinue services) at one extreme, to intense development (greatly expand and improve facilities) at the other extreme.

Within this range, the following alternatives to the proposed development concept were defined and analyzed during evolution of the proposed plan.

ALTERNATIVE 1: NO ACTION

A possible alternative to further development at Bullfrog Basin is continuation of services as they now exist with no expansion of facilities. Existing facilities served over 72,000 people during each of the past two years. Although these facilities met recreation demands, peak demand periods during warm weather holidays faced visitors with crowding and long waits at the launch ramp. Regional highway use projections indicate that visitation should continue to increase at Bullfrog Basin. If visitation does indeed increase, facilities would be subject to visitor use restrictions by the National Park Service.

The existing facilities of Bullfrog Basin have a definite attraction and appeal to a number of people who seek a relatively quiet, informal, remote, low-key, water-oriented recreational facility. To expand these facilities as proposed would most
certainly change the character of development to a more organized, modern, all-encompassing community. It could lose its attraction for some. However, it may appeal to a broader segment of society and hence, expose the beauty of this land to more people.

The existing development represents both partial and temporary implementation of a development concept for Bullfrog Basin. As such, Bullfrog facilities generally lack a definite architectural character and unifying elements and do not relate well to the surrounding environment. Few amenities such as shade, landscaping, and pedestrian paths have been developed. Also, intrasite circulation is almost entirely dependent on individual vehicles.

Selection of this alternative would mean that Bullfrog Basin has essentially reached basic capacity maximums for prime holiday vacation periods, and increased visitation would have to be accommodated at other times of the year. It would perpetuate the use of a partial and temporary development that does not fulfill a number of basic management objectives. Although Bullfrog does meet the needs of many visitors at the present time, it could more successfully meet visitor and management needs, as well as apparent future visitor increases, if the development design were revised and expanded. For these reasons the “no action” alternative was not recommended.

**ALTERNATIVE II: REMOVE ALL FACILITIES AND DISCONTINUE SERVICES**

Removal of facilities represents the alternative that has the least number of adverse environmental impacts. The relative absence of people and vehicles in this fragile area would promote its longevity as a nearly natural site. With proper rehabilitation and management, it may be possible to return the disturbed area to a nearly natural condition.

However, Glen Canyon National Recreation Area was established to encourage recreational opportunities and to preserve the area and its long-term value as a recreation area. In order to accomplish these goals, a framework was established in which the recreationist could relate to the recreation area. Part of this framework included the establishment of service bases at selected points along the lakeshore. Bullfrog Basin represents 10 years of development and investment and serves a large number of visitors from the north and west. Its central lake location is desirable for lake access and use.

Although Hall’s Crossing, located immediately across the lake, serves approximately the same functions as Bullfrog Basin, access to Hall’s Crossing is more difficult for the traditional Bullfrog visitor. The visitor population that now attends Bullfrog Basin would probably be absorbed by all other developments on Lake Powell as well as Hall’s
Crossing, if Bullfrog Basin were to be abandoned. Those developments might be overloaded initially.

Bullfrog Basin serves the needs of some of the visitors to Glen Canyon National Recreation Area. Because it has a central location and represents recent public and private investment, it is recommended that the existence of Bullfrog Basin be continued and development be expanded to better facilitate visitor services.

ALTERNATIVE III: IMPLEMENT ONLY PORTIONS OF THE PROPOSED PLAN

This plan represents concentration of development expansion on particular aspects of visitor demand rather than a wide variety of recreational interests. For example, the plan might emphasize facilities or perhaps facilitate large numbers of recreational vehicles.

The proposed development concept plan reflects apparent visitor needs, management philosophy, and environmental and economic considerations that are available for evaluation at this time. A wide variety of recreational opportunities is presently seen as the desired development mix. The proposed plan, in effect, incorporates the flexibility to accommodate a different emphasis of interests, because development will be a gradual process.

ALTERNATIVE IV: VARIATIONS OF THE PROPOSED PLAN

Developed Area Plan
The existing development reflects partial implementation of the developed area plan as prepared in 1967. The 1967 developed area plan was based on development of the east side of the main ridge at Bullfrog Basin for National Park Service operated facilities and development of the west side of the ridge for concessioner operated facilities. The village center would occupy a saddle or low point in the center of the development where it is equally accessible to all. The marina and launch ramp were planned for Cove 3.

The existing development reflects the problems of the developed area plan. First, the scope of development proposed by the plan did not anticipate the level of visitation that would come to Bullfrog Basin. The areas designated for many functions of the development are inadequate in size to support projected visitation. Some areas are crowded at the present time and should be expanded to support the current level of visitation. For example, the launch ramp cannot adequately fulfill launching requirements during periods of peak visitation. Boaters must wait up to 2 hours to launch their boats, and the accompanying parking area cannot handle the number of
LEGEND

- MARINA
- LAUNCH RAMP
- VILLAGE CENTER
- LODGING
- TRAILER VILLAGE
- CAMPGROUND WITH UTILITY HOOK-UPS
- CAMPGROUND
- EMPLOYEE HOUSING
- PICNIC AREA
- DRY STORAGE & BOAT SERVICE FACILITIES
- SERVICE FACILITIES
- PARKING

DEVELOPED AREA PLAN
BULLFROG BASIN
GLEN CANYON NATIONAL RECREATION AREA

United States Department of the Interior / National Park Service

608 | 40,048
DSC 1 JULY 75
vehicles generated by ramp use. Parking occasionally extends halfway up the entrance road. The campground is also crowded during these periods. Second, the marina, which was originally located in Cove 3, has been relocated to Cove 2 for better protection. The marina in the new location has a different relationship to the existing development, and this relationship must be recognized by the plan. Third, the four-way intersection at the village center that connects the entrance road, the concessioner’s overnight facilities, the public launch ramp, and the campground has the potential to become a congested traffic situation. Almost all traffic under the developed area plan would circulate through this intersection.

The proposed plan seeks to solve these problems by expanding facilities that were planned without expansion capability, relocating facilities that do not have adequate expansion areas, arranging the concessioner’s facilities to focus around the marina, and reorganizing intrasite traffic circulation by separating concessioner and National Park Service visitors at an early point on the entrance road.

**Alternate Development at Coves 2 and 3**

During development of this proposal, a number of alternative locations were considered for several elements within the Cove 2 and Cove 3 development areas (see following alternative maps). These alternative locations were not recommended primarily because of socioeconomic impacts in that management potential and construction cost criteria were not fulfilled.

The proposed plan was selected as providing the best management possibilities and the greatest flexibility for the future as well as the ability to accommodate present needs and provide the best visitor use experience.

**ALTERNATIVE V: SIMILAR DEVELOPMENT AT ALTERNATE SITES**

Similar development to that listed in the proposed plan was considered at two alternate locations (see following map)

**Development at Cove 1**

Selection of this alternative would involve construction of a totally new development at Cove 1. Cove 1 is a well-protected scenic location. It is an excellent site for a marina and has greater berthing capacity than Cove 2. The land/water access is good at the cove shoreline, which is near Bullfrog Bay, but becomes more difficult as the cove reaches inland. The site allows spectacular vistas and has good camping potential much the same as Coves 2 and 3.

The impacts of this alternative are many. Development at this site would represent abandoning the investment in existing facilities at Coves 2 and 3 and reintroducing
ALTERNATIVE FOUR A
BULLFROG BASIN
GLEN CANYON NATIONAL RECREATION AREA

LEGEND

* MARINA
LAUNCH RAMP
VILLAGE CENTER
LODGING
TRAILER VILLAGE
CAMPGROUND WITH
UTILITY HOOK-UPS
CAMPGROUND
EMPLOYEE HOUSING
PLAYFIELD &
PICNIC AREA
DRY STORAGE &
BOAT SERVICE FACILITIES
SERVICE FACILITIES
PARKING

LOW WATER 3510
AVERAGE WATER 9650
HIGH WATER 9711

Cove 1
Cove 2
Cove 3

Department of the Interior / National Park Service

United States Department of the Interior / National Park Service
SIMILAR DEVELOPMENT AT ALTERNATE SITES

BULLFROG BASIN
GLEN CANYON
NATIONAL RECREATION AREA

United States Department of the Interior/National Park Service
them at Cove 1. Utilities would have to be added and new roads constructed. This would impact many acres of undisturbed land where land that was already altered could have been reused and redeveloped. For these reasons and because the Cove 1 site does not offer strong advantages over the existing development site, Cove 1 was not selected.

**Development at Hansen Creek Canyon**

Hansen Creek Canyon is a spectacular, large, winding canyon east of Bullfrog Basin. It has direct access to the main lake channel, is extremely well-protected, and offers an enormous marina capacity. The gentle to moderate slopes to the water along the length of the canyon present excellent protected building and camping sites. This would be a superior site for a marina and service base development.

Development at this site would bring essentially the same impacts as listed for Cove 1: loss of existing investment and abandonment of a previously disturbed area. This site may have greater development potential than the existing site. However, it was decided that the best use of Hansen Creek Canyon is as a natural area that can be utilized for exploring and remote camping. The large areas of protected accessible shoreline and protected waters are a welcome change for the boater in this lake of vertical walls and open waters.

Another important factor that weighed against Hansen Creek Canyon as a major development site is that the canyon intersects at a very narrow segment of the main channel. It is felt that hazardous boating conditions would exist if large numbers of boats were continuously circulating through this intersection.

**SUMMARY**

The proposed development concept presents a guideline for future development at Bullfrog Basin. It reflects visitor and management needs and desires for a recreational experience in an extreme and sensitive environment. With these considerations in mind, care was taken to make use of existing investments, existing disturbed areas, available natural protection from the elements, and existing natural beauty. This is a powerful land, yet one that is extremely sensitive to man's intrusion. This site has been changed to initiate development of facilities that are at times utilized to maximum capacity. Let us therefore work with the land to improve the existing development and to establish a useful, beautiful, and environmentally sound recreational service base.
APPENDIXES

A: Cove Analysis and Probability Ranges of Lake Powell Water Surface Elevation

B: Visitation as Anticipated from Traffic Projections

C: Recommended Plant Materials

D: Concept Sketches
APPENDIX A: COVE ANALYSIS AND PROBABILITY RANGES OF LAKE POWELL WATER SURFACE ELEVATION
<table>
<thead>
<tr>
<th></th>
<th>COVE 1</th>
<th></th>
<th>COVE 1</th>
<th></th>
<th>COVE 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation</td>
<td>3,570'</td>
<td>3,650'</td>
<td>3,711'</td>
<td>3,570'</td>
<td>3,650'</td>
<td>3,711'</td>
</tr>
<tr>
<td>Berthing Capacity</td>
<td>422</td>
<td>660</td>
<td>708</td>
<td>307</td>
<td>395</td>
<td>471</td>
</tr>
<tr>
<td>Outboard Tieups</td>
<td>125</td>
<td>175</td>
<td>53</td>
<td>75</td>
<td>130</td>
<td>31</td>
</tr>
<tr>
<td>Total Boat Capacity</td>
<td>547</td>
<td>835</td>
<td>761</td>
<td>382</td>
<td>525</td>
<td>502</td>
</tr>
<tr>
<td>Breakwater Length (ft.)</td>
<td>700'</td>
<td>700'</td>
<td>700'</td>
<td>400'</td>
<td>750'</td>
<td>400'</td>
</tr>
<tr>
<td>Breakwater Width (ft.)</td>
<td>17'</td>
<td>17'</td>
<td>40'</td>
<td>20'</td>
<td>34'</td>
<td>25'</td>
</tr>
<tr>
<td><strong>Fetch (ft.)</strong></td>
<td>3,200'</td>
<td>3,200'</td>
<td>14,000'</td>
<td>4,400'</td>
<td>--</td>
<td>8,270'</td>
</tr>
<tr>
<td>Wind Direction</td>
<td>SW</td>
<td>SW</td>
<td>WNW</td>
<td>SW</td>
<td>SSE</td>
<td>SW</td>
</tr>
<tr>
<td>Wind Speed M.P.H.</td>
<td>52</td>
<td>52</td>
<td>52</td>
<td>45</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Average Water Depth</td>
<td>60'</td>
<td>60'</td>
<td>65'</td>
<td>45'</td>
<td>40'</td>
<td>100'</td>
</tr>
<tr>
<td><strong>Significant Wave</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height (ft.)</td>
<td>2.1'</td>
<td>2.1'</td>
<td>3.7'</td>
<td>2.5'</td>
<td>4.3'</td>
<td>3'</td>
</tr>
<tr>
<td>Period (sec.)</td>
<td>2.6</td>
<td>2.6</td>
<td>3.8</td>
<td>2.8</td>
<td>3.6</td>
<td>3.2</td>
</tr>
<tr>
<td>Length (ft.)</td>
<td>35'</td>
<td>35'</td>
<td>74'</td>
<td>40'</td>
<td>66'</td>
<td>53'</td>
</tr>
</tbody>
</table>

* Average figure for the highest one-third of the waves (frequently used for flexible structure design such as floating breakwaters).
NOTE: Lines of probability show the chance of being equal to or less than the value indicated based on a normal distribution function.

OCTOBER, 1974

PROBABILITY RANGES OF LAKE POWELL WATER SURFACE ELEVATION

BUREAU OF RECLAMATION
UPPER COLORADO REGIONAL OFFICE
SALT LAKE CITY, UTAH
APPENDIX B: YEARLY & MONTHLY VISITATION FIGURES FROM BULLFROG BASIN


BULLFROG VISITATION FIGURES

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>JAN</td>
<td>279</td>
<td>354</td>
<td>751</td>
<td>569</td>
</tr>
<tr>
<td>FEB</td>
<td>793</td>
<td>960</td>
<td>455</td>
<td>1,015</td>
</tr>
<tr>
<td>MAR</td>
<td>1,427</td>
<td>4,976</td>
<td>3,075</td>
<td>3,222</td>
</tr>
<tr>
<td>APR</td>
<td>5,609</td>
<td>6,086</td>
<td>11,237</td>
<td>7,167</td>
</tr>
<tr>
<td>MAY</td>
<td>9,640</td>
<td>18,157</td>
<td>23,936</td>
<td>13,733</td>
</tr>
<tr>
<td>JUNE</td>
<td>9,716</td>
<td>15,111</td>
<td>19,190</td>
<td>18,981</td>
</tr>
<tr>
<td>JULY</td>
<td>3,490</td>
<td>6,385</td>
<td>8,321</td>
<td>6,079</td>
</tr>
<tr>
<td>AUG</td>
<td>8,502</td>
<td>8,547</td>
<td>5,242</td>
<td>6,414</td>
</tr>
<tr>
<td>SEP</td>
<td>8,980</td>
<td>9,033*</td>
<td>6,414</td>
<td>6,414</td>
</tr>
<tr>
<td>OCT</td>
<td>3,391</td>
<td>4,415</td>
<td>1,449</td>
<td>1,660</td>
</tr>
<tr>
<td>NOV</td>
<td>642</td>
<td>1,449</td>
<td>845</td>
<td></td>
</tr>
<tr>
<td>DEC</td>
<td>364</td>
<td>410</td>
<td>047</td>
<td>845</td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>47,268</td>
<td>73,954</td>
<td>115,451*</td>
<td>61,510</td>
</tr>
</tbody>
</table>

*Note: An apparent error in addition for the month of September gives a larger total for the year than is actually given by monthly figures. Total would appear to be 91,356.
APPENDIX B: VISITATION AS ANTICIPATED FROM TRAFFIC PROJECTIONS


TRAFFIC TO BULLFROG

<table>
<thead>
<tr>
<th>Year</th>
<th>Road from Hanksville*</th>
<th>Road from Hole-in-the-Rock</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>220 A.D.T. **</td>
<td>525 A.D.T.</td>
</tr>
<tr>
<td></td>
<td>110 A.D.T. ½</td>
<td>150 A.D.T. ½</td>
</tr>
<tr>
<td></td>
<td>x 3 People/Car</td>
<td>x 3 People/Car</td>
</tr>
<tr>
<td></td>
<td>330 A.D.V.</td>
<td>450 A.D.V.</td>
</tr>
<tr>
<td></td>
<td>x365 Days/Year</td>
<td>x 365 Days/Year</td>
</tr>
<tr>
<td></td>
<td>120,450 A.Y.V.</td>
<td>260,610 A.Y.V.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Road from Hanksville*</th>
<th>Road from Hole-in-the-Rock</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>457 A.D.T.</td>
<td>525 A.D.T.</td>
</tr>
<tr>
<td></td>
<td>238 A.D.T. ½</td>
<td>150 A.D.T. ½</td>
</tr>
<tr>
<td></td>
<td>x 3 People/Car</td>
<td>x 3 People/Car</td>
</tr>
<tr>
<td></td>
<td>714 A.D.V.</td>
<td>450 A.D.V.</td>
</tr>
<tr>
<td></td>
<td>x 365 Days/Year</td>
<td>x 365 Days/Year</td>
</tr>
<tr>
<td></td>
<td>260,610 A.Y.V.</td>
<td>164,250 A.Y.V.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>260,610 A.Y.V.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>424,860 Total Average Yearly Visitation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Road from Hanksville*</th>
<th>Road from Hole-in-the-Rock</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>650 A.D.T.</td>
<td>525 A.D.T.</td>
</tr>
<tr>
<td></td>
<td>325 A.D.T. ½</td>
<td>263 A.D.T. ½</td>
</tr>
<tr>
<td></td>
<td>x 3 People/Car</td>
<td>x 3 People/Car</td>
</tr>
<tr>
<td></td>
<td>975 A.D.V.</td>
<td>789 A.D.V.</td>
</tr>
<tr>
<td></td>
<td>x 365 Days/Year</td>
<td>x 365 Days/Year</td>
</tr>
<tr>
<td></td>
<td>355,875 A.Y.V.</td>
<td>287,985 A.Y.V.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>355,875 A.Y.V.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>643,860 Total Average Yearly Visitation</td>
</tr>
</tbody>
</table>

* For Computations it is assumed that all road traffic goes to Bullfrog

** A.D.T. = Average Daily Traffic
A.D.T. ½ = Average Daily Traffic, one direction
A.D.V. = Average Daily Visitation
A.Y.V. = Average Yearly Visitation
APPENDIX C: RECOMMENDED PLANT MATERIAL

RECOMMENDED PLANTING LIST
BULLFROG BASIN DEVELOPMENT AREA

Plants to control Wind Erosion in Areas Beyond Development Disturbed by Construction: (plants not requiring irrigation)

Sandy Soil Areas (Blow Sand)
Indian Rice Grass (Orysopsis hymenoides)

Thin Soil Areas
Four-Winged Saltbush (Atriplex canescens)
Blackbrush (Coleogyne ramossima)

Both Soil Areas
Mormon tea (Ephedra viridis)
Prickly Pear (Opuntia spp.)
Shad-scale (Atriplex confertifolia)
Winterfat (Eurotia lanata)
Datil Yucca (Yucca baccata)

Plants for Transition Zone between Desert and Development Oasis: (plants requiring light irrigation)

Small Trees: 10-25’ Tall
Evergreen
Shrub Live Oak (Quercus turbinella)
Pinyon (Pinus edulis)
Utah Juniper (Juniperus osteosperma)
Double Leaf Pinion Juniper (Spimces eidulces)

Deciduous
Single Leaf Ash (Fraxinus anomala)
Rocky Mountain White Oak (Quercus gambelii)

Shrubs: 4-10’ Tall
Evergreen
Big Sagebrush (Artemisia tridentata)
Fremont Barberry (Berberis fremontii)
Pointleaf Manzanita (Arctostaphylos pungens)
Deciduous
Redbud (Cercis occidentalis)
Squawbush (Rhus trilobata)

Plants for Development Oasis: (plants requiring moderate to heavy irrigation)

Large Trees: 25-80’ Tall

Evergreen
- Rocky Mountain Juniper (Juniperus scopulorum)
- Ponderosa Pine (Pinus ponderosa) must be sheltered from winds

Deciduous
- Arizona Ash (Fraxinus velutina)
- Fremont Poplar (Populus fremontii)
- Thornless Black Locust (Robinia pseudoacacia decaisneana)
- Golden Weeping Willow (Salix alba tristis)
- Thornless Honey Locust (Gleditsia triacanthus inermis)
- American Planetree (Platanus occidentalis)
- Silver Linden (Tilia tomentosa)
- Maidenhair Tree (Ginkgo biloba)
- Peach Leaf Willow (Salix amygdaloides)

Small Trees: 10-25’ Tall

Evergreen
- Red Cedar Juniper (Juniperus virginiana)

Deciduous
- Peach Leaf Willow (Salix amygdaloides)
- Smoketree (Cotinus coggyria)
- Russian olive (Eleagnus angustfolia)

Shrubs: 4-10’ Tall

Evergreen
- Scarlet Firethorn (Pyracantha coccinea)
- Various Junipers (Juniperous, spp.)

Deciduous
- Ramanas Rose (Rosa rugosa)
- Scotch Rose (Rosa pimpinellifolia)
- Butterfly Bush (Buddleia davidii)
- Osage Orange (Maclura pomifera)
- Rose of Sharon (Hybiscus syriacus)
APPENDIX D: CONCEPT SKETCHES

The following sketches represent architectural concepts that could be utilized for various facilities at Bullfrog Basin. They illustrate the aesthetic and architectural guidelines proposed in this document and are intended to inspire, but not limit, development of specific facilities during implementation of this plan.
section through shaded walk

shade structure concept
shade for vehicles
village center concept
outdoor spaces concept
construction system concept
waterfront lodging concept

hill lodging concept
BIBLIOGRAPHY

CRAMPTON, C. GREGORY


DODGE, NATT N.

EDWARDS, WALTER MEAYERS

FOWLER, DON D. (Editor)
1972 Jack Hiller’s Diary of the Powell Expeditions, “Photographed All the Best Scenery” 1871-1875. Salt Lake City: University of Utah Press.

GOLDWATER, BARRY M.

JENNINGS, JESSE D.

LITTON, R. BURTON, JR., et al

LYKES, IRA B.

NATIONAL SCIENCE FOUNDATION, LAKE POWELL RESEARCH PROJECT
PATRAW, PAULINE M.

PORTER, ELIOT

POWELL, JOHN WESLEY
The *Exploration of the Colorado River*. (Abridged) Chicago, IL: University of Chicago Press.

U.S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE
1968 *Forest Landscape Description and Inventories—A Basis for Land Planning and Design*. R. Burton Litton, Jr. Berkeley, CA.


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

UTAH STATE OUTDOOR RECREATION AGENCY
1973 *Utah State Comprehensive Outdoor Recreation Plan*.

UTAH STATE DEPARTMENT OF HIGHWAYS
1974 Personal communication in May with L. R. Jester regarding traffic projections for the years 1980 and 1990.


WATKINS, T.H.
PLANNING TEAM

National Park Service, Denver Service Center
  Donald A. Purse – Assistant Manager, Rocky Mountain and Midwest Team
  Howard R. Wagner – A/E Manager, Rocky Mountain and Midwest Team

National Park Service, Glen Canyon National Recreation Area
  Temple A. Reynolds – Superintendent
  Joe L. Kennedy – Assistant Superintendent
  John Abbett – Ranger, Bullfrog Basin

Bullfrog Resort and Marina, Inc.
  E. R. Dumke, Jr.
  Jerry Clark
  Bob Blank

Spencer Associates, Architects & Planners
  John W. Stypula – Architect & Planner
  Harry W. Rodda – Architect & Planner
  Kathryn E. Schmidt – Architect & Planner
  Frederick J. Sharkey – Graphics Design

Theodore Osmundson & Associates
  Theodore Osmundson – Landscape Architect & Planner
  Douglas Wolfe – Landscape Architect & Planner

Metcalf & Eddy, Inc., Engineers
  Gene DeArmond – Engineer
  David Tedrow – Engineer

Dames & Moore
  H. Morgan Noble – Partner, Marina Engineer

Utah State University Foundation
  E. Paul Hullinger – Ecologist/Generalist
  Cyrus McKell – Desert Plant Ecologist
  Gar Workman – Wildlife Biologist
  Arlo Richardson – Utah State Climatologist
  Chauncey Powis – Coordination for State of Utah Highway Environmental Council

Photographs by Theodore Osmundson
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 graphics and editorial staffs of the Denver Service Center. NPS 1137