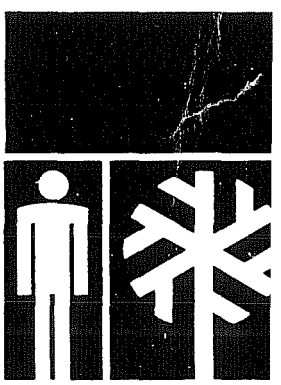
general management plan

volume 2 natural / cultural resource management

september 1980

CHANNEL ISLANDS

ANACAPA, SANTA BARBARA, SAN MIGUEL ISLANDS



NATIONAL PARK / CALIFORNIA

RECOMMENDED:

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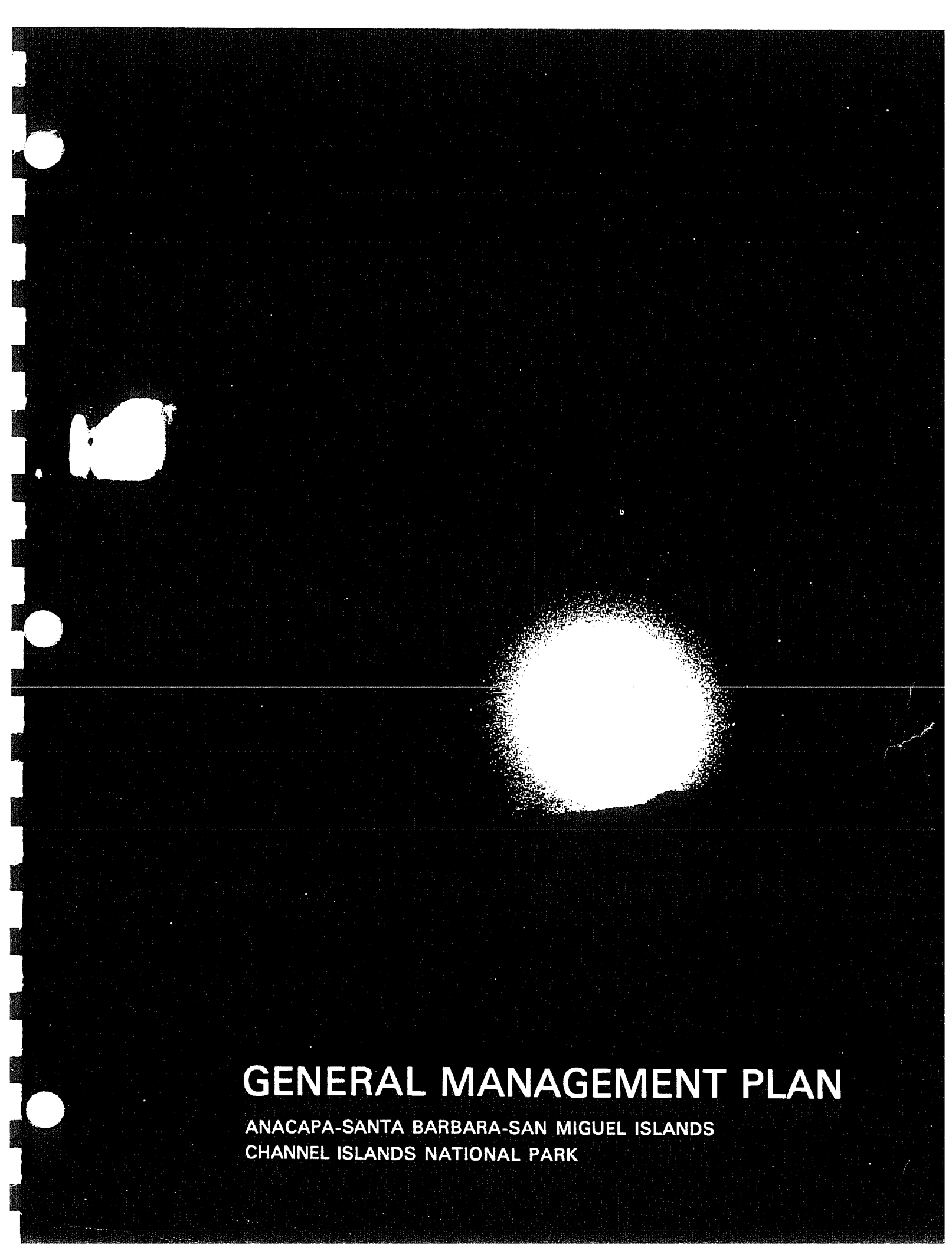

GENERAL MANAGEMENT PLAN

ANACAPA-SANTA BARBARA-SAN MIGUEL ISLANDS
CHANNEL ISLANDS NATIONAL PARK

ABSTRACT

The resource management plan for Channel Islands National Park discusses cultural and natural resources and deals primarily with currently identified problems as well as proposed solutions for the three islands currently managed by the National Park Service. Initial sections provide background information regarding the park and influences on its resources and discuss the role of research within the park.

Separate sections deal with each resource type. Specific resource problems that require management action are identified, and actions are recommended to either obtain additional information or to solve the identified problem. Impacts likely to result from the recommended actions are noted. Few alternatives are discussed for an identified problem because few alternatives were identified as feasible. Further study is required before actions with the potential for significant impacts can be undertaken.

High priority projects include those involving legal mandates or moral responsibilities, such as projects dealing with proposed or protected biota under the Endangered Species Act of 1973 and projects influencing nonrenewable cultural resources.

Numerous actions are proposed, but those of major importance include:

Continued study to gather information regarding endangered species

Eradication or control of exotic black rats on Anacapa Island

Continued study of the impacts of eradicating feral rabbits on Santa Barbara Island, leading directly toward an elimination or control program

Removal and trial eradication of exotic plant species

Initiation and continuation of monitoring of marine birds and mammals that utilize the islands, in order to recognize changes in the health or status of the population

Initiation of cooperative studies with the state of California to monitor intertidal marine resources around park islands

Monitoring of erosion

Monitoring of impacts resulting from human use of the islands

Monitoring of air and water quality of the islands

Preservation of archeological and historical sites on the islands and development of a plan to care for human remains and artifacts eroding from such sites

Following the individual resource sections, actions and their impacts are summarized, with an emphasis on impacts on endangered species. Agencies with which consultation and coordination have been conducted are identified, and their relationships to the National Park Service are discussed.

Finally, for some proposed actions, a project statement has been prepared. On these short forms, basic information (problem description, past work, proposal description, logistical considerations, funding needs) is summarized. These project statements are the basic tools by which natural science projects in the National Park Service are ranked by priority.

The project statements, assembled in a separate management program document, are available for review at park headquarters in Ventura, California, or at the National Park Service Western Region Office in San Francisco, California.

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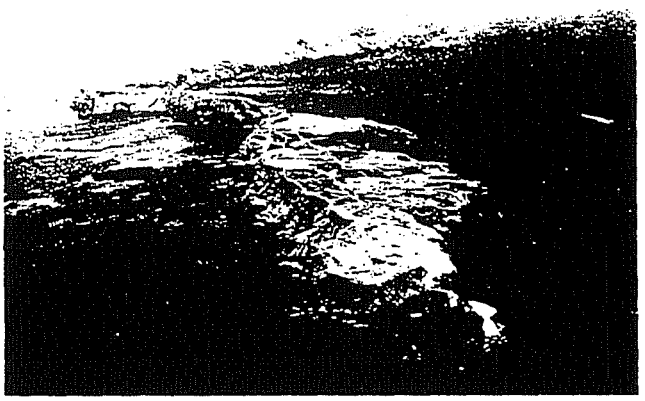
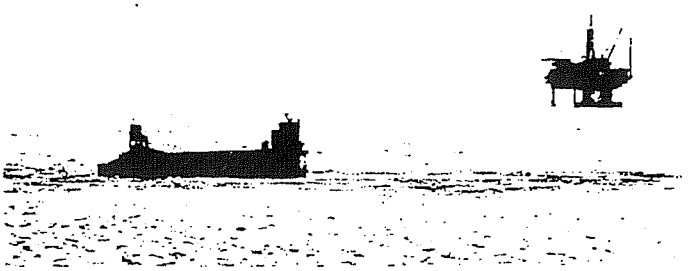
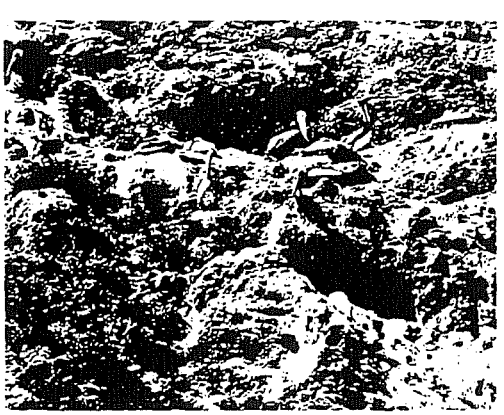
BACKGROUND







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INTRODUCTION

Resource management needs of the islands of Anacapa, San Miguel, and Santa Barbara, part of Channel Islands National Park, are addressed in this document, volume II of the General Management Plan. An addendum to this plan will be prepared to address resource management of the lands and waters added to the park on March 5, 1980. Solutions to existing problems are identified, as are areas where more information is needed before problems can be solved. Discussions of diverse biological, physical, and cultural resources are integrated here and include soils and erosion, plant and animal life, marine resources, air and water quality, paleontology, and history and archeology, as well as the continuing concerns of Native American people of the area.

The National Park Service has a responsibility to provide for public enjoyment of areas it administers, while leaving resources unimpaired. Therefore resource management actions proposed include monitoring to detect changes brought about by visitor use. This resource management plan was developed in conjunction with other portions of the General Management Plan so that visitor use will be based upon an understanding of the sensitivity of the resources and will be consistent with resource management action.

The Channel Islands are often compared to the Galapagos Islands as natural laboratories for the study of evolution and endemism. Natural evolutionary changes are occurring, but little is known about these processes. Similarly, little knowledge exists regarding the biological and physical conditions present at the time the islands were first visited by Europeans, but certainly prehistoric and more recent Native American people who lived and camped there exerted a large amount of influence on the resources, and their habitation may have substantially altered the landscape. European and American colonization and development changed the ecosystems, and some resources were so altered that restoring them to a more natural condition may prove impossible.

Hunting of marine mammals to the extent that several species were almost eliminated from the Channel Islands, introduction of domestic hoofed mammals that overgrazed native plant communities and allowed erosion of considerable areas on some islands (notably San Miguel), introduction of rabbits and rodents that damaged many native organisms and were potential hosts for serious diseases, and introduction of various grains and other nonnative plants (often coincident with farming or livestock grazing) all drastically changed the islands' natural environment.

Management problems specific to each island are discussed briefly in the following paragraphs.

ANACAPA ISLAND

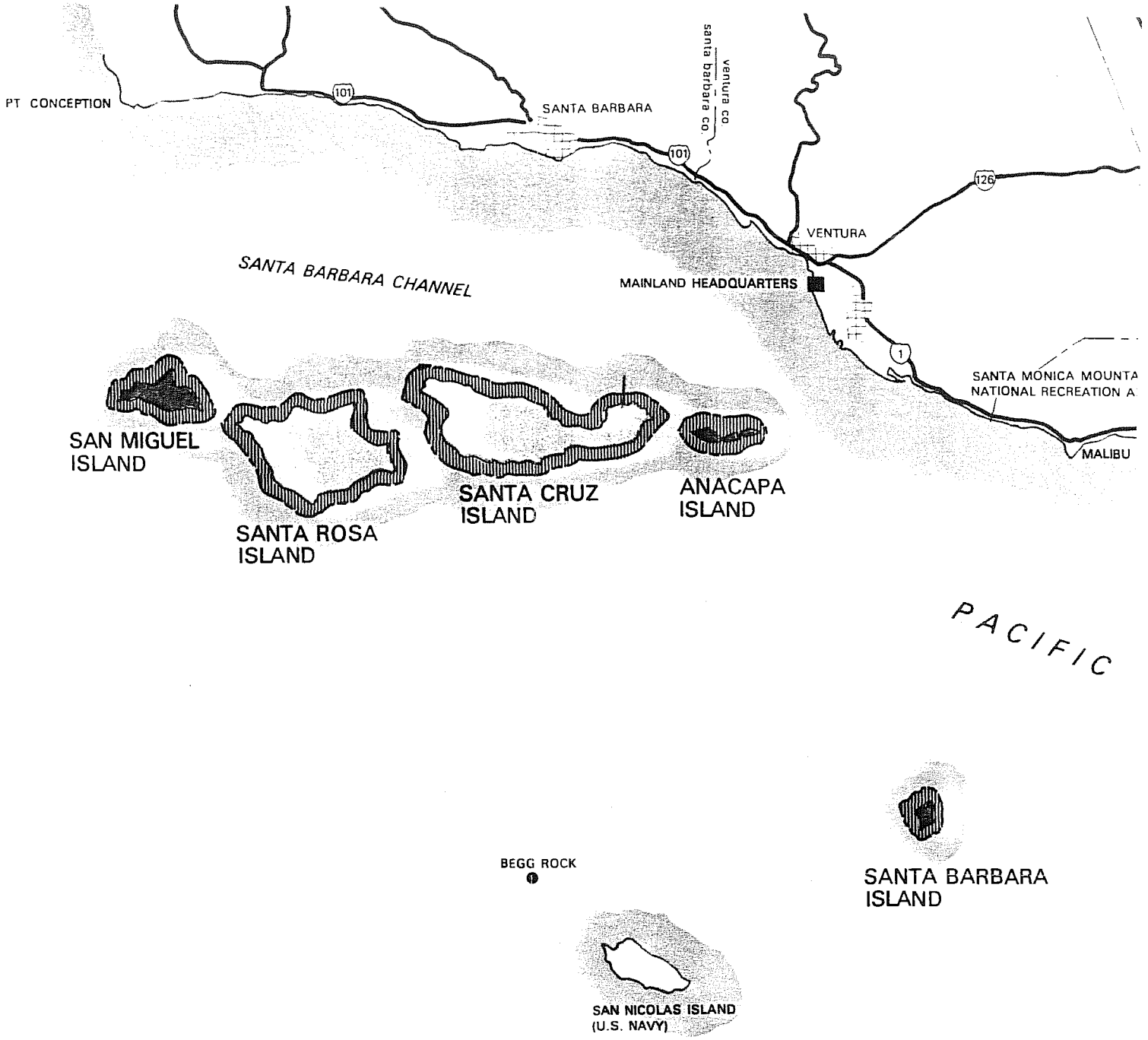
Anacapa has been altered by structures and roads, exotic vegetation that encroaches on native species, and grazing. It is overrun by rats, resulting in a decline in the native deer mouse population on East Anacapa. Some species of land birds and seabirds (bald eagle, peregrine falcon, tufted puffin) no longer nest on the island. Seals and sea lions still frequent Anacapa in moderate numbers but almost no pupping occurs, possibly as a result of increasing boat traffic. Soil slippage and erosion are problems in several areas. Archeological sites have been disturbed and vandalized and continue to be subject to damage from human use and erosion.

SAN MIGUEL ISLAND

San Miguel Island is no longer influenced by feral or nonnative animals but has, in the recent past, been host to thousands of sheep and small numbers of other ungulates; large expanses were denuded and became sand dunes as a result of overgrazing by sheep. Only recently has any vegetation stabilized these areas. Native plant communities are very small, and exotic plants are widespread. Some species of land birds and seabirds have ceased to breed as a result of this habitat alteration and human activity. Only in the past 15 years have some of the six species of pinnipeds (seals and sea lions) that historically bred on San Miguel returned to the island; the sea otter, once an important marine mammal in the Channel Islands area, is no longer found so far south. As a result of erosion, many of the large number of archeological sites on San Miguel are being seriously damaged and lost.

SANTA BARBARA ISLAND

The smallest of the Channel Islands, Santa Barbara has perhaps been the most altered, certainly in relation to its size. It has been cleared and burned for farming and grazed by livestock (currently by domestic rabbits) to the extent that the great majority of this island is covered by nonnative grasses and introduced iceplant. Some species of plants were reduced almost to the point of extinction. Loss of natural habitat has resulted in the extinction of one endemic land bird, and there is serious reduction of habitat for several species of land mollusks and the single species of lizard. Many of these plants and animals have been afforded or are proposed for protection under the Endangered Species Act of 1973. Several species of seabirds were extirpated from Santa Barbara as a result of feral house cats, although recently some of these species have again begun to nest on the island. The soils of Santa Barbara Island are very susceptible to erosion, and serious scars



NPS MANAGEMENT / FEDERAL OWNERSHIP

COOPERATIVE MANAGEMENT / STATE OWNERSHIP

PRIVATE OWNERSHIP / NPS ACQUISITION AND / OR COOPERATIVE MANAGEMENT

NORTH

0 10 20 MILES

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CHANNEL ISLANDS NATIONAL PARK / REGION

CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

have resulted from much of the past land use. Finally, Santa Barbara Island archeological sites (although fewer than those found on Anacapa or San Miguel) have been disturbed by exploitation and use of the island.

OBJECTIVES

General objectives for resource management at Channel Islands National Park are listed below.

Restore and maintain natural terrestrial, intertidal, marine, and atmospheric ecosystems.

Encourage cooperative research and resource management efforts, especially in areas of joint administration and overlapping political boundaries.

Restore altered ecosystems as nearly as possible to conditions they would be in today had natural ecological processes not been disturbed.

Protect threatened and endangered plant and animal species and their habitats and reintroduce, where possible, those eliminated from the natural ecosystems. Protect and study special status species and their habitats in a community context that considers broad habitat requirements.

Approach all resource management questions from an ecosystem standpoint that takes all biological interrelationships into account.

Establish cooperative communication with other land or resource management agencies, institutions of higher learning, museums, and the like, and encourage open communication and coordination of projects with such organizations.

Conduct and encourage natural science research to increase knowledge necessary for managing natural resources.

Identify and perpetuate all natural processes in park ecosystems.

Limit man-made sources of air, noise, visual, and water pollution within the park to the greatest degree possible, and monitor environmental quality to ensure compliance with legal standards.

Develop an awareness of threats that impact or have the potential to impact park resources. Actively respond, as a land managing agency, to these potential threats.

Permit only those types and levels of use or development that do not significantly impair natural resources, and direct development and use to environments least vulnerable to deterioration.

Encourage visitor use that complements the natural resources. Encourage resource interpretation, with the understanding that visitor knowledge of the park's resources leads to appreciation of their value and worth.

Ensure that the park staff is trained to be aware of the fragility and importance of island resources and to recognize special status animal and plant species.

Preserve, maintain, or protect significant prehistoric and historic cultural resources.

Identify, evaluate, and determine the significance of cultural resources, encompassing buildings, structures, sites, and objects.

Provide for the preservation, maintenance, or protection of these significant cultural resources.

Permit only those types and levels of use or development that do not impair significant cultural resources; direct development and use to areas least vulnerable to deterioration of cultural resources.

Communicate with local groups of Native Americans; seek their input regarding such concerns as past and proposed use of the islands, sacred areas or objects found on the islands, and potential interpretive themes.

Encourage cooperative historical and archeological research projects with educational and scientific institutions; through appropriate means (memorandums of agreement and the like), encourage such institutions and scholars to direct research toward park resource management objectives or toward interpretation of such resources.

Encourage interpretation of park cultural resources, recognizing that visitor knowledge of such resources leads to appreciation of their value and worth.

RESOURCE MANAGEMENT

The need for resource management has been recognized since formation of the national monument. It initially took the form of biological surveys by Lowell Sumner and archeological surveys by Rozaire and others. Older surveys reflect some conditions that may no longer be found on the islands; nonetheless, they provide an important information base.

One of the first resource management projects was an attempt to remove destructive exotic animals. Feral domestic sheep and burros were removed from San Miguel, but attempts to eradicate the feral rabbits on Santa Barbara have so far been unsuccessful.

To formalize the natural resource management program at Channel Islands, a Natural Resource Management Plan was approved in 1975. Of the 16 projects proposed, 3 were implemented. The plan's usefulness was limited by the need for background information on resources so that manipulative management projects could be undertaken and by the need for a logical step-by-step approach to management.

From 1977 to the present, baseline information on archeology, history, terrestrial and marine biota, and physical characteristics has been gathered. This new information is reflected in the current plan. Additionally, much baseline information concerning all of the Channel Islands has recently been gathered by the Bureau of Land Management in conjunction with background information needed on offshore oil and gas lease sales. Studies on brown pelicans and San Miguel Island pinnipeds continue under the guidance of the California Department of Fish and Game and the National Marine Fisheries Service. Very little active management of the resources has taken place in recent years.

OTHER AGENCY ACTIVITIES

In many national parks the quality of resources is threatened by visitor overuse and other internal management problems. However, at Channel Islands National Park several projects have been initiated or proposed from outside the park that have the potential to affect island resources.

The islands are located in close proximity to a densely populated, highly industrialized area. Activities of this area involve use of resources such as oil, gas, fisheries, and airspace that occur on,

over, and adjacent to the Channel Islands. Because the ocean provides food for island animals as well as marine organisms, changes in the surrounding environment assume an important role.

The following government and private party activities have the potential to affect resources of the Channel Islands.

SPACE SHUTTLE PROGRAM

The proposed launch and reentry of the U.S. Air Force space shuttle from Vandenberg Air Force Base over the Channel Islands may subject breeding populations of pinnipeds and seabirds to high level sonic boom overpressures. In addition, impacts to fragile cultural resources and geologic features may occur. Because it is unclear if or how these impacts will adversely affect natural and cultural resources, the U.S. Air Force is conducting contracted research with NPS cooperation in an attempt to provide information. As it becomes available, recommendations will be made that are consistent with NPS management objectives, guidelines, and legal responsibilities.

OIL LEASING PROGRAM

Oil exploration and operation activities in the Santa Barbara Channel and around the islands began in 1966 with lease sale 35 and are expected to significantly increase with each subsequent lease sale. As oil operations increase, so does the probability of spills, well blowouts, expected "ambient" leakage, and an increased number of oil rigs on a currently uncluttered horizon. The National Park Service recognizes the national need to develop energy sources but remains concerned about potential consequences of such activities. Recommendations for deletion from sale of many tracts in close proximity, upcurrent, or upwind from islands have been made. In addition, several projects to protect resources in the event of a spill are recommended in this plan.

OIL AND GAS SANCTUARY

In order to protect sensitive resources, the California State Legislature may designate oil and gas sanctuaries in which petroleum development is prohibited. Oil and gas sanctuaries have been established in the tidelands and submerged lands surrounding the North Channel Islands. Leasing is excluded except when wells on federal lands threaten the state's resources (drainage). The waters around Santa Barbara Island have not been designated an oil and gas sanctuary, but under the terms of the lease with the Department of Fish and Game, oil and gas leasing within the

ecological reserve is excluded except when drainage threatens the state's resource.

LIQUIFIED NATURAL GAS TERMINAL

Development sites proposed include locations on or near several of the Channel Islands. Such a facility could cause disturbance to nearby breeding pinnipeds or direct injury and death should an explosion occur. In addition, increased boat traffic as a result of such a terminal would increase the potential for collision with the increasing number of oil tankers in the waters surrounding the islands.

MARINE RESOURCES HARVEST

Present management practices allow the harvest of marine resources (e.g., kelp, anchovies, other fisheries, and invertebrates); however, many of these resources are not being sufficiently monitored to ensure adequate reserves; in some cases the impacts of harvesting and the minimal needs of complex, interrelated ecosystems are not fully known. The California Department of Fish and Game has primary jurisdiction over these resources.

ECOLOGICAL RESERVES

The Department of Fish and Game leases the tidelands and submerged lands from the California State Lands Commission, which retains authority for oil, gas, and geothermal and other mineral exploration and development under certain limited circumstances, as previously described under "Oil and Gas Sanctuary."

State ecological reserves have been established around each of the three former monument islands and contain all of the tidelands, submerged lands, and marine resources from the mean-high-tide line out to 1 nautical mile. Regulations for these areas and their enforcement are the responsibility of the California Department of Fish and Game, but NPS rangers have been deputized to aid in enforcement. These marine areas are outside the jurisdiction of the National Park Service but within the present park boundary, and their management is of considerable interest and importance to the park. Many resources managed by the park, such as marine birds and pinnipeds, rely on the surrounding waters for food sources.

RESEARCH

INTRODUCTION

It has long been recognized that research is essential to effective management of the National Park System. As stated in NPS "Management Policies" (1978): "Natural and social science information is necessary for management of the National Park System. The National Park Service will, therefore, conduct a program of natural and social science, to support management in carrying out the mission of the Service and provide accurate scientific data upon which all aspects of planning, development, and management of the units of the System may be based." However, it further states, "The Service also may permit the use of parks by qualified investigators for scientific studies when such use shall be consistent with Service policies and contribute to the attainment of park objectives," indicating the legitimacy of using parks for the conduct of independent research projects. The park staff recognizes the value of scientific research and encourages such use, within guidelines of resource protection.

Scientific collecting and research projects have been conducted on the Channel Islands since before the turn of the century. The demand is great for continued research opportunities, as might be presumed from the numerous museums and institutions of higher learning that abound in southern California. As an example of the extent to which interest in research on the Channel Islands has grown, a 1965 Symposium of the California Islands included presentation of 15 papers to an invited audience of 102 persons. In 1978 a similar symposium saw 69 papers presented to a general audience of over 500 persons.

Along with this increase of interest in the islands by researchers has come an increase in visitation by the general public, with the result that scientists and other researchers can no longer assume that their use of the islands will be the only, or even always the most legitimate, use. Pressure has been greatest on the former monument islands because they are publicly accessible. At the same time, as the three smallest islands, they are more fragile than the others.

STIPULATIONS

Although research has been carried on for years, some of it on a long-term basis, the increase in research demand has necessitated that recent projects satisfy certain stipulations. In general, natural or physical science research projects considered appropriate to the islands can be divided into the following categories.

NATIONAL PARK SERVICE RESEARCH

National Park Service research may be conducted by, for, or in cooperation with the Park Service and is management oriented. It may be carried out by NPS biologists or by researchers under contract to the National Park Service. Occasionally, long-term projects are undertaken by university personnel.

The Park Service also is able to expend funds for research in cooperation with other agencies. This is particularly appropriate to Channel Islands National Park, where several agencies may share responsibility for the same resource and where so many resources are dependent on the continued high quality of the surrounding ocean. It seems only logical and responsible to actively consider cooperative research efforts, for instance on food habits of some animal species and various interrelationships of the entire island-focused ecosystem. Written documentation in the form of a memorandum of agreement between the agencies is required for cooperative research. In addition, if collecting is required within the park, a current collecting permit (WRO Form 107) is necessary. (See appendix A for examples of the various forms.)

INDEPENDENT RESEARCH

Independent research is allowed and encouraged, especially when it relates to existing management problems. Stipulations for such research are:

> If purely observational, allowed if disturbance to the resources is negligible
>
> If disturbance of the resource is involved or if collecting is necessary, allowed only if appropriate permission and permits from other agencies have first been obtained; the research or collecting cannot reasonably be accomplished outside the park; and the proposed work will not be unduly harmful to the status of the resource being collected/studied or to any other component of the island ecosystem

Personnel involved in such research may receive such logistical support as transportation to or from the islands (if this fits in with an ongoing schedule of transportation for park personnel), permission to travel off island trail systems and, occasionally, to camp outside established campgrounds. Written permission from the superintendent as well as a current collecting permit (WRO Form 107) is required for independent research.

If any such natural or physical science projects also involve likely disturbance of cultural resources of the park, they must satisfy

stipulations listed in this section for both cultural and natural resource research, or they must be coordinated with approved cultural resource projects. Appropriate permits must be obtained.

All independent researchers must submit an annual report (Form 10-226) to the superintendent. In addition, copies of any reports or papers written as a result of work carried on in the park must be submitted to the superintendent.

Included in a supplement to this resource management plan is a list of projects to be accomplished, in priority order, as well as a statement describing the proposal. The priority list will be revised annually; projects that have been accomplished will be removed, and new projects will be added as the need is identified. A reprint of this list and these project statements will be distributed to local universities and other institutions, with the anticipation that research proposed by such institutions can be channeled toward the gathering of information needed for management.

Potential researchers are requested to initially submit a research proposal and as much information as will be necessary to evaluate their projects. Currently, if the park does not have the inhouse knowledge specific to the project area, advice is solicited in consultation with an informal network of experts in several fields. In this manner, only those projects that are clearly appropriate research uses of the islands will be allowed.

Because of the increasing pressure to conduct more research on and around the islands, there have been concerns that damage to the resources could result, even with careful screening of the legitimacy of projects. Screening now involves the identification of duplication of previous or ongoing projects. It may also be necessary to actively seek consolidation of similar or overlapping projects.

Although all of these considerations have been addressed under present research application procedures, they have not been formalized. Suggestions have been made by members of the scientific community that a more formalized application process be initiated. Aside from the extra knowledge of the proposed project an application would offer, a detailed format might discourage the less serious researcher from applying. Increasing research pressure does indicate the necessity of more careful certification of future research projects. Interviews may be conducted if more information is needed. Future evaluation will consist of review of proposals by NPS Western Region experts and scientists from the NPS Cooperative Project Study Unit at the University of California, Davis, to ensure that a proposal is scientifically valid. Since representatives from several disciplines will comment on each proposal, potential impacts to other resources will also be

identified. Proposals will also be evaluated on the basis of whether they simply duplicate previous projects. A copy of the correspondence sent by the park to potential researchers is contained in appendix A.

CULTURAL RESEARCH

Independent cultural research is allowed within the park. However, since field research (particularly that involving collecting or excavating) carries the great possibility of destroying an essentially nonrenewable resource of limited quantity, greater limitations are placed on such projects. Independent researchers shall have current Archeological Resources Protection Act permits. In general, research will be encouraged to correspond to active cultural resource management concerns and NPS objectives in both interpretation and management.

As is stated in the NPS "Management Policies": "Non-Service proposals for archeological research in parks involving excavating or collecting shall:

> Provide a research design closely defining the scope and methodological basis of the proposed work.
>
> Establish that the research is essential to the acquisition of data directly related to current significant anthropological concerns that cannot reasonably be accomplished by investigation of archeological resources outside the park.
>
> Establish that sufficient institutional commitment and capability exist to fully recover, analyze, synthesize, and publish the results of the work; to meet curatorial responsibilities for the archeological materials and artifacts removed; and to provide for appropriate preservation of the in situ remains.
>
> Establish that the principal investigator has a serious, long-term commitment to the archeological resources proposed for the study.

"All archeological research proposals shall comply with the requirements of Executive Order 11593, Section 106 of the National Historic Preservation Act of 1966, and the provisions of the Antiquities Act of 1906, and the Archeological Resource Protection Act of 1979 (36 CFR 1215)."

On a case by case basis, qualified representatives from local Native American groups may be contracted to act as onsite advisors during independent research projects.

All researchers will be expected to employ the best currently available concepts, methods, and techniques. They must submit copies of all resulting documents including interim and final reports, papers, presentations, publications, and theses to the superintendent. In addition, they will supply copies of all field notes. This information will remain in the park, and any such documentation that has not been made available to the public by the researchers will not be given further distribution without consent of the author.

Publication or distribution of certain types of archeological information is restricted under the Antiquities Act of 1906 and the Archeological Resource Protection Act of 1979, and such information is exempt from the Freedom of Information Act. Restrictions will be stated in the appropriate permit and NPS review, and approval may be required prior to publication or distribution.

Any artifacts that are collected in the park will remain the property of the National Park Service and must be placed in a collection that is agreed upon by the Park Service.

Cultural resource projects that may jeopardize natural or physical resources must satisfy stipulations for both cultural and natural resource research or they must be coordinated with approved natural resource projects. Appropriate permits must be obtained.

IMPACTS

Although the need for research is documented throughout this plan, the presence of researchers and research activities will have some general impacts.

Research may require some disturbance of island resources for small excavations, installations of equipment, or collecting. While manipulative research is generally prohibited, some minor impacts on island resources may occasionally be a necessary and valid part of research. Off-trail use is often necessary when sampling or observations must be carried out in remote areas. Excessive foot traffic could result in trampled vegetation, disturbed archeological sites, and possibly erosion, and could delay vegetational recovery on the islands. Resources other than the one under study may be unknowingly disturbed by researchers lacking knowledge of and sensitivity to resources outside their field. Unauthorized collecting of resources encountered during field work may occasionally occur, since most researchers are not supervised. To mitigate these potential impacts, all field researchers will be made aware of the

sensitivity of the wide variety of resources that should not be disturbed as well as the general areas of both archeological and biological sensitivity. In some instances, a multidisciplinary team may be required to ensure recognition and protection of resources other than the ones being studied.

Researchers staying on the islands, in most instances, are required to be in the campground, as are other overnight visitors. Since the campgrounds are small and have a capacity limit, the presence of researchers could result in fewer spaces for general campers on a given day. On the other hand, this might result in informal information exchange between researchers and visitors.

RESOURCE MANAGEMENT PLAN

PLAN ORGANIZATION

This plan addresses cultural as well as natural resources and is organized by type of resource. The following format is followed throughout the plan, although not all sections apply to each resource topic.

The Description sections briefly summarize background information, with only enough detail to provide an understanding of the actions and their impacts. Several resource studies (see "Bibliography") undertaken as part of the general management planning contain most of the information highlighted in this section.

Contained in the Objectives sections are specific objectives for the management of each resource--the basis for the management actions proposed. They are more specific than the general management objectives listed in the previous section.

Guidelines for Management sections will point out sensitive areas and resources in particular need of protection; suggest policies, special directives, and regulations; and identify potential problems that can be solved through conscientious day-to-day management.

The Actions sections include design of programs for future action; experiments and trial programs; management manipulation of resources (such as exotic species eradication programs); monitoring over the long term; and studies to fill in information gaps. Specific actions are denoted by a "bullet" in the margin. In most cases a funding source is needed to carry out the action, but some actions can be accomplished by the resources manager or under his supervision. Some studies would best be undertaken by others or in cooperation with another agency.

In the Impacts sections, the consequences of actions on resources, visitors, and management are discussed. Many of the actions proposed are studies, which inherently have few impacts.

The "Summary of Actions and Impacts" chapter emphasizes the cumulative impacts of the various separate actions and discusses specific impacts and management actions affecting threatened or endangered species.

THE RESOURCES

VEGETATION

DESCRIPTION

Most of the information in this section was summarized from the report by the Santa Barbara Museum of Natural History (1979).

The vegetation of all of the islands has been extensively altered and is in various stages of recovery from overgrazing, farming, military use, and introduction of exotic species. Despite past disturbances, native and naturalized vegetation provide spectacular springtime scenery, especially when showy giant coreopsis, iceplant, and goldfields are all in bloom. Island flora includes many common mainland species, but environmental conditions--fog, high winds carrying salt sprays, maritime Mediterranean climate with wet winters but dry summers, and most importantly, isolation from a large land mass--have shaped a distinctive island vegetation.

Anacapa Island

The topographic diversity of Anacapa results in a more varied assemblage of plant communities than would be expected for its size. Grasslands, shrub communities, and even woodlands of limited distribution are found.

Middle and West Anacapa probably appear now much as they did prehistorically, with the exception of the presence of weedy species, and have recovered from their history of sheep ranching. They are rich in native perennial bunchgrasses and have extensive stands of giant coreopsis. Deep, moist canyons on north-facing slopes of West Anacapa contain a small oak woodland with the most significant native trees on the three islands, and stands of island chaparral.

In contrast to Middle and West islands, East Anacapa Island has been considerably disturbed and is covered by annual grasses and planted iceplant; it was once covered by a mosaic of native perennial grasslands and giant coreopsis communities. Inaccessible bluffs on East Anacapa still contain undisturbed communities.

San Miguel Island

Although San Miguel is much larger than the other two islands, it is less floristically diverse. The rolling terrain does not offer as wide a variety of habitats as do some of the other Channel Islands. In addition, San Miguel is still recovering from a period when severe overgrazing, cultivation, and drought combined to nearly denude it. While vegetative cover is gradually increasing, many

areas still consist of unstabilized (blowing) sand and erosion pavement, an exposed hardpan layer where soils have been completely eroded away. Areas stripped of native plants invited invasion and colonization by weedy species, which now comprise a large portion of the vegetation. Shrub species such as lemonade berry and island mallow that were grazed have been greatly reduced or eliminated. Several chaparral species, collected historically, are also missing from the present flora. Recovery has been slow, especially in areas where topsoil was completely removed and only a pavement persists.

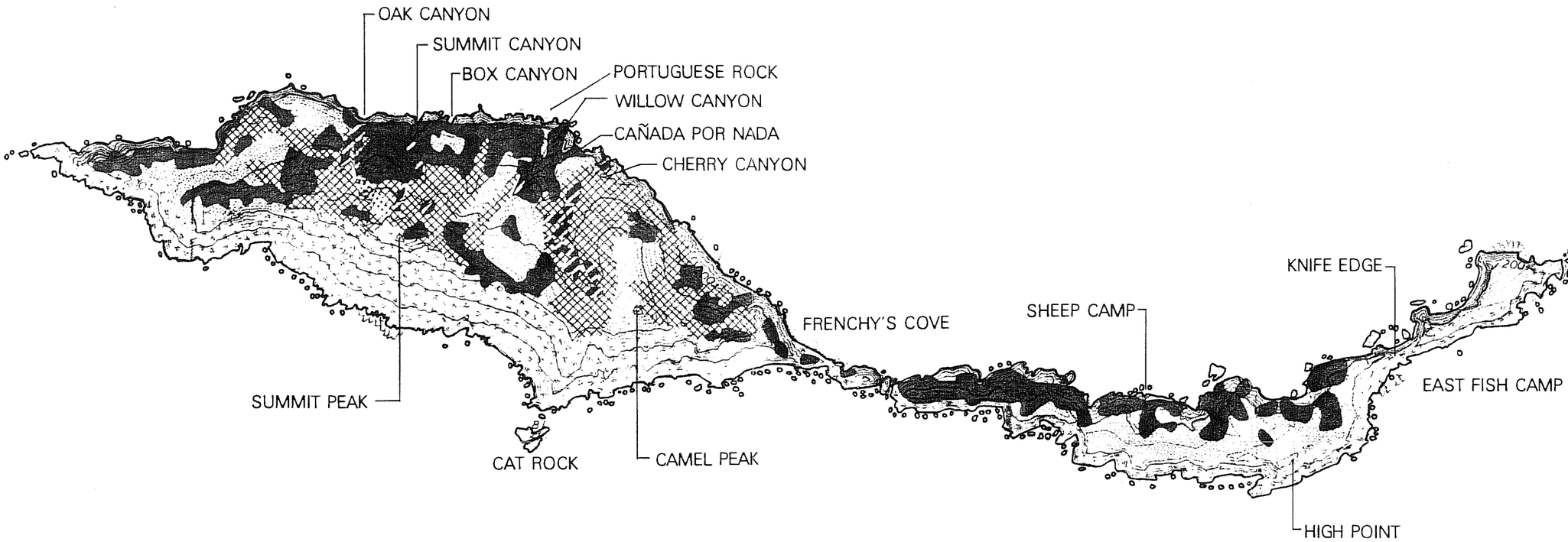
San Miguel is the only one of the three islands that has well-developed beach and coastal dune vegetation. Sandy dunes and characteristic dune vegetation extend to the interior of the island, where winds have carried sands far inland. On interior dunes, lupine sometimes occurs in nearly pure stands and may be important in the stabilization process of dunes and in the recovery of island vegetation in general.

Introduced annual grasses cover most of the island, and while native bunchgrasses do occur, they do not dominate large areas. A variety of shrubs, mostly low and prostrate in form, are scattered throughout the grasslands. Rushes and salt grass dominate low, moist depressions in grassland areas. Iceplant covers only a small portion of the island but is locally dominant where soils have been denuded.

Santa Barbara Island

While this island was probably once dominated by giant coreopsis on the well-drained terraces and north-facing canyon slopes, native perennial grasslands on heavy deep soils, a variety of shrubs in hardpan areas and on bluffs, and maritime cactus scrub on the driest sites, changes brought about by man have greatly modified the vegetation. The flora of Santa Barbara Island has been ravaged for at least 130 years by introduced grazing animals (including rabbits that still forage island plants), exotic plants, and agricultural and military use. As a result, introduced crystalline iceplant dominates large areas in carpetlike mats, giant coreopsis has been greatly reduced to distinct stands, introduced annual grasses dominate grassland areas, and shrub dominance has been reduced. A maritime cactus scrub community occurs on warm south-facing slopes of canyons and sea cliffs but is characterized by fewer cactus and shrub species than similar communities on other islands. The nearly vertical sea cliffs provide a refuge for native plants that have been eliminated or reduced in more accessible areas.

Today, the combined forces of rabbits and iceplant are still actively preventing reestablishment of native species. They continue to threaten a number of species of reduced population and limited distribution.



COASTAL BLUFF:

SEA-CLIFF PHASE

COREOPSIS PHASE

ICEPLANT PHASE

COASTAL SAGE SCRUB

ISLAND CHAPARRAL

ISLAND GRASSLAND

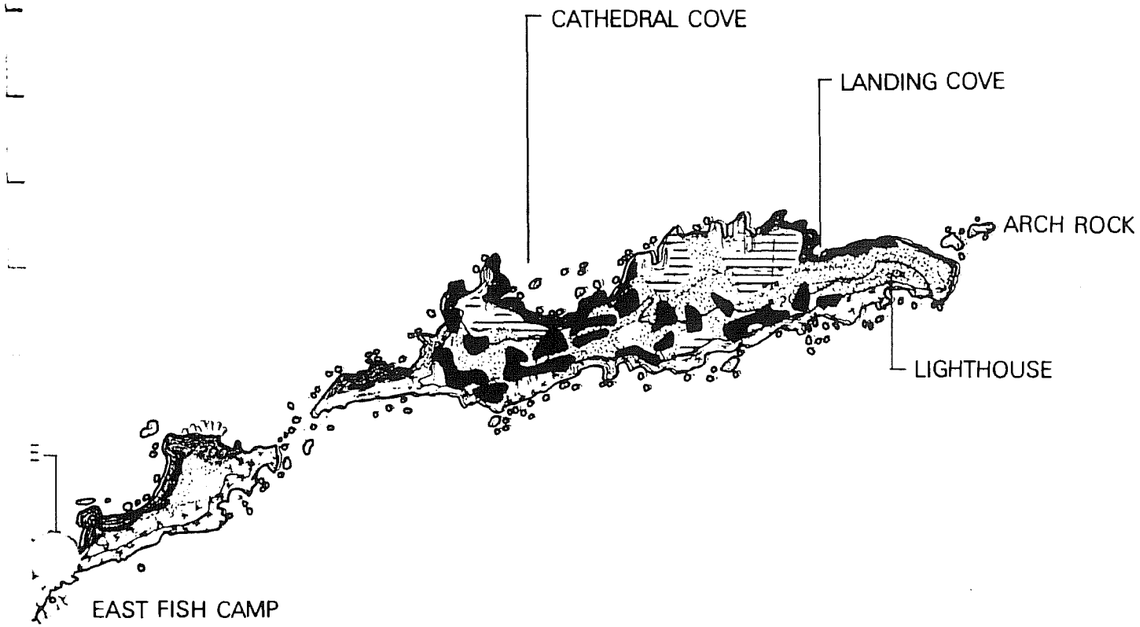
ISLAND WOODLAND

ONSHORE TRANSITIONAL AREA

MALEPHORA ICEPLANT

E EUCALYPTUS GROVE

BARE AREA



INT

NORTH

0 ½ MILE

0 ½ KILOMETER

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DSC	AUG 80

VEGETATION

ANACAPA ISLAND

CHANNEL ISLANDS NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR /
NATIONAL PARK SERVICE

VEGETATION
SAN MIGUEL ISLAND

CHANNEL ISLANDS NATIONAL PARK
UNITED STATES DEPARTMENT OF THE INTERIOR /
NATIONAL PARK SERVICE

NORTH

0 — 1 MILE
0 — 1 KILOMETER

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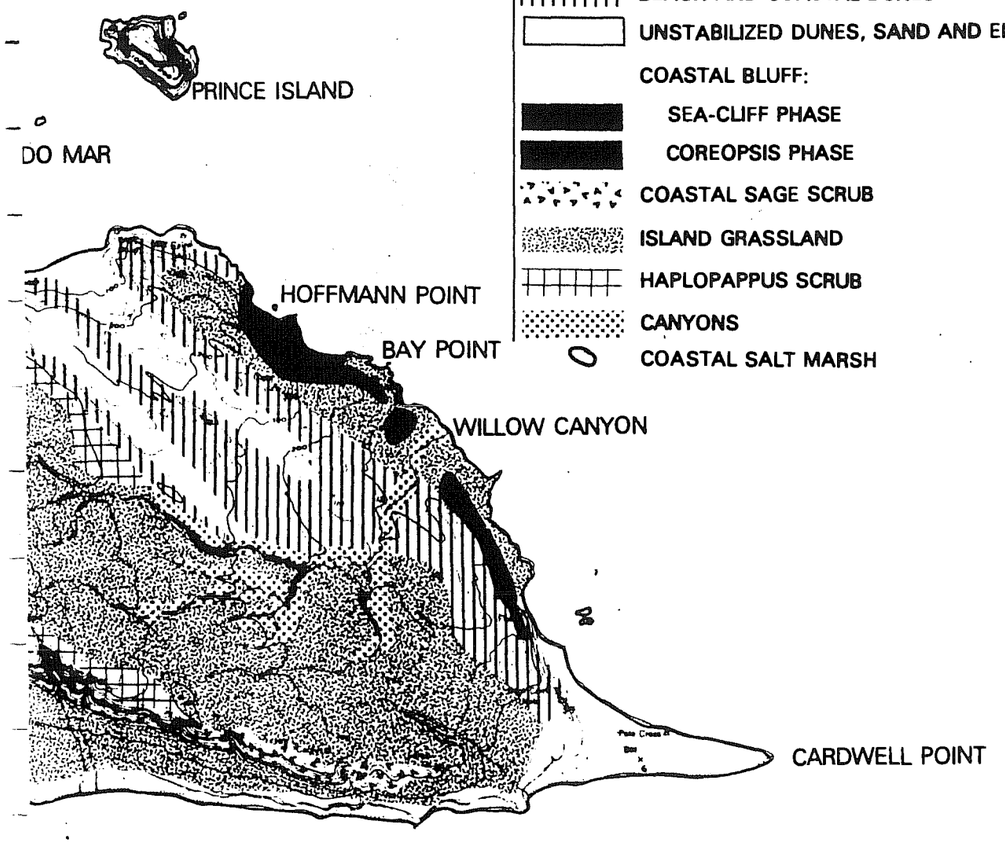
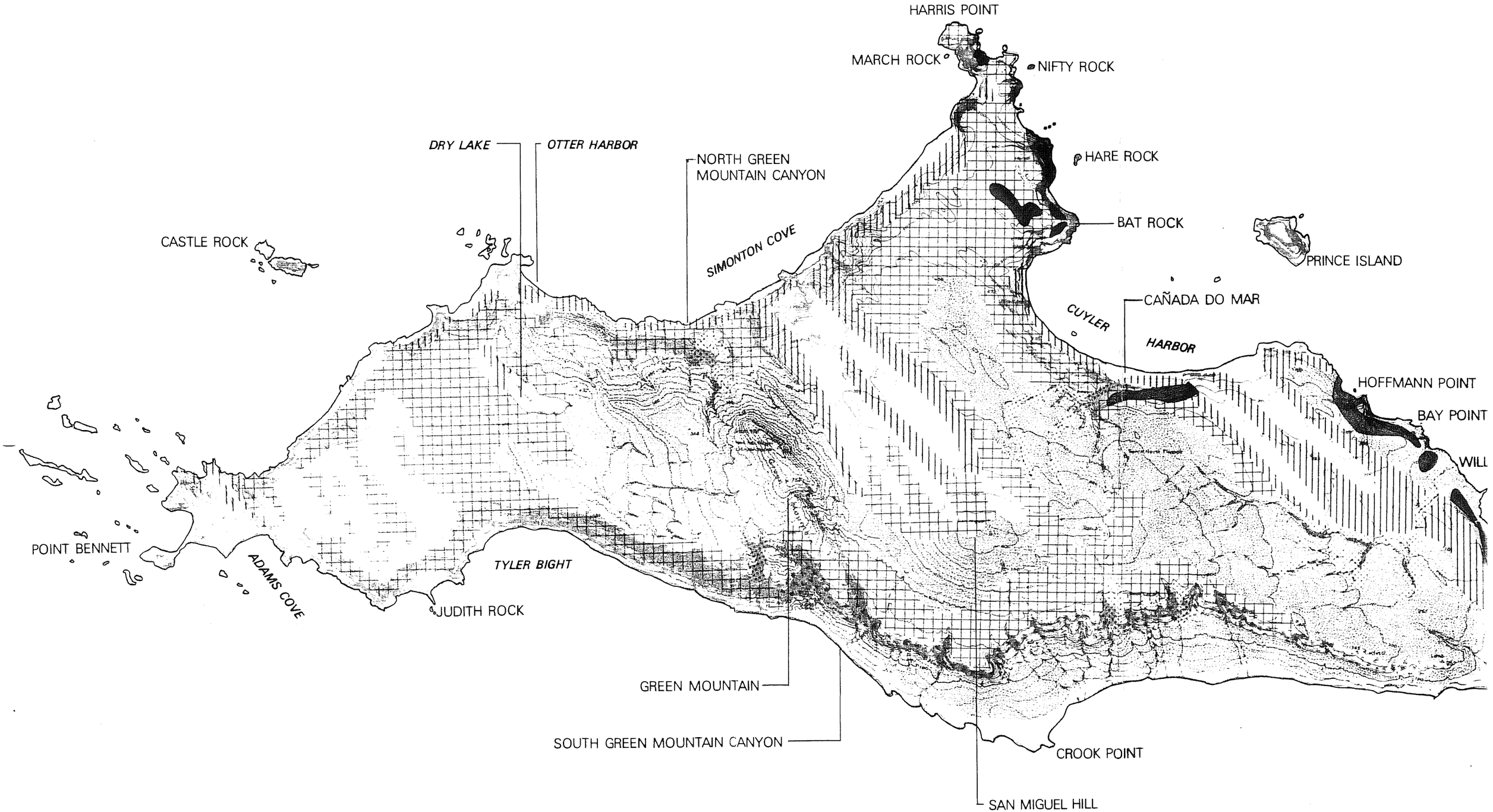
DSC | AUG 80

- BEACH AND COASTAL DUNES
- UNSTABILIZED DUNES, SAND AND EROSION PAVEMENT
- COASTAL BLUFF:
  - SEA-CLIFF PHASE
  - COREOPSIS PHASE
- COASTAL SAGE SCRUB
- ISLAND GRASSLAND
- HAPLOPAPPUS SCRUB
- CANYONS
- COASTAL SALT MARSH




HARRIS POINT
MARCH ROCK
NIFTY ROCK
HARE ROCK
BAT ROCK
PRINCE ISLAND
DRY LAKE
OTTER HARBOR
NORTH GREEN MOUNTAIN CANYON
SIMONTON COVE
CASTLE ROCK
CAÑADA DO MAR
CUYLER HARBOR
HOFFMANN POINT
BAY POINT
WILL
POINT BENNETT
ADAMS COVE
TYLER BIGHT
JUDITH ROCK
GREEN MOUNTAIN
SOUTH GREEN MOUNTAIN CANYON
CROOK POINT
SAN MIGUEL HILL

Exotic Plants

A large exotic flora covering major portions of the islands has been introduced, with nonnative taxa comprising roughly 29 percent of the total number of species recorded for Santa Barbara, 23 percent of San Miguel's flora, and 20 percent of Anacapa's flora. Exotic species are aggressive competitors for available light, moisture, and nutrients and can use a wide array of offensive measures, such as releasing toxic substances, to invade areas formerly occupied by native species. There has been a change in species composition and ground cover during historical time. Now many exotic species have become naturalized and persist tenaciously as part of the local flora.

Historical human use of the islands has resulted in disturbance through cultivation, construction, and grazing. These activities, especially during dry years, opened habitat and allowed successful colonization of opportunistic annual grasses and weeds. Most weedy species were introduced by visitors and settlers, either accidentally or by planting grains and crops during the late 1880s and early 1900s. Weeds are still being introduced onto the island through human activity.

The most noxious exotics on the islands are three species of iceplant. They are very successful weeds because they accumulate salts in their tissue. When they die, the salts are released into the soil, creating salt levels that exceed the tolerance of most plants and effectively eliminating them. Areas of high clay soils and low precipitation, as are found on Santa Barbara Island, provide ideal conditions for the spread of iceplant because of reduced leaching of toxic salts. On the other hand, iceplant does not have such an advantage on San Miguel Island with its well-leached sandy soils.

Special Status Species

A number of native plants that are restricted in numbers and/or geographic distribution are found on the three islands. These plants include island endemics (plants that are found on one or more of the Channel Islands but nowhere else), species that are threatened as a result of past activities, and species that are on the edge of their range. Table 1 lists endemic plants; plants identified by the California Native Plant Society (CNPS) as very rare and endangered, and rare but not endangered; and plants designated or proposed for designation by the U.S. Fish and Wildlife Service as threatened or endangered and under protection of the Endangered Species Act.

The relatively large number of rare and endemic plants, when compared with the known flora of the islands (200 taxa for

Anacapa, 200 for San Miguel, and 99 for Santa Barbara), is the result of geographic isolation of island populations from populations on the mainland and on other islands. Distributions may more easily become limited on a small island where disturbance can threaten an entire population and where chances for reestablishment across the ocean barrier are remote.

The National Park Service has a legal responsibility to protect plant species and their habitats listed on the federal endangered and threatened species list; at present only one plant from the former monument islands, the Santa Barbara live-forever (Dudleya traskiae), is listed. The National Park Service protects species (and their habitats) that have been proposed for federal listing, as well as those identified by CNPS as species that have restricted ranges or numbers. Special care must be taken in the future so that these species, their habitats, and their associated communities will not be further threatened and so that management will aid in their recovery.

OBJECTIVES

While an ultimate management objective is to return island vegetation to a condition reminiscent of the period before European man began altering the islands, the complete recovery of the vegetation and elimination of exotic species may well be an unrealistic goal. Erosion has carried away topsoil so that in some areas there is no substrate for native plants to colonize, salts have changed the physical and chemical condition of the soil so that reestablishment of native plants will be very difficult, and some exotic species have naturalized and become so widespread in a variety of habitats that it would be impossible to eliminate them without disturbance of the remaining resource values. More realistic objectives for vegetation management during the life of this plan are to:

Protect areas that still contain native plant communities and special status species

Increase the natural appearance of the islands

Safeguard against the introduction of new exotic species and, when possible, stop the spread of existing destructive exotic species

Promote the stabilization of eroding areas with native plants

Promote the recovery of island vegetation through natural succession over time

Eliminate exotic grazing pressures on vegetation

GUIDELINES FOR MANAGEMENT

Identify and protect native plant communities and special status species.

Bunchgrass communities on Middle and West Anacapa; woodland communities on West Anacapa; sea cliffs surrounding Santa Barbara and Anacapa; giant coreopsis stands on all of the islands; and canyon, coastal salt marsh, and dune communities on San Miguel are plant communities that are worthy of special protection because they are remnant populations, or particularly sensitive, or unique. Activities that take place in these areas, whether for development, research, or visitor use, need to be carefully evaluated to determine any effect on these communities and located to avoid any potential impact.

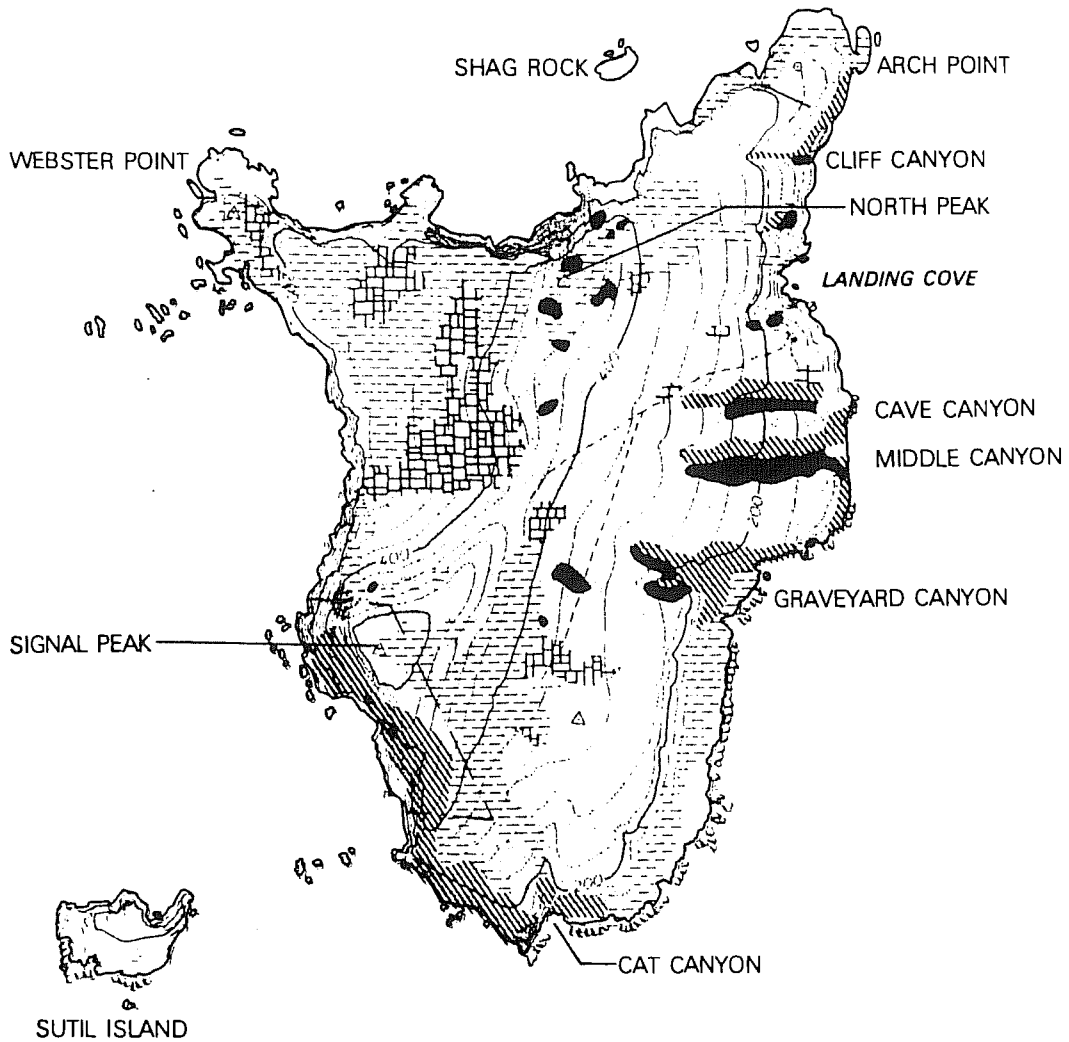
Similarly, all plant species of special status, as designated in table 1, will be protected along with their habitat from any destructive activities that could threaten their continued existence. Site-specific surveys will precede all development to ensure that no special status species or critical habitat will be affected by either surface disturbance or changing patterns in visitor use.

Extinguish all fires.

The chance of lightning-caused fire is slight, but there is the potential for accidental human-caused fires. Fire alone would not significantly damage island vegetation; however, vegetation on Santa Barbara and San Miguel islands is just beginning to recover from past uses. Fire could temporarily destroy vegetation and accumulated organic matter and accelerate or initiate erosion. Therefore, the current fire-suppression policy will continue and all fires, man-caused or natural, will be extinguished with the least possible damage to the landscape. If fires do occur, natural revegetation will be relied upon for recovery.

If required, transplant stock from the same island.

Planting of disturbed areas will be approached with caution. Any seed or stock for planting must come from the same island to avoid contamination of island gene pools. The difficulty of obtaining material and the destruction that could be caused by collection of plant material for cultivation in a nursery might make all but limited or experimental planting unfeasible.



COASTAL BLUFF:
SEA-CLIFF PHASE
COREOPSIS PHASE
ICEPLANT PHASE
SEA-BLITE PHASE
COASTAL SAGE SCRUB
MARITIME CACTUS SCRUB
ISLAND GRASSLAND
BARE AREA

NORTH

0 ½ MILE
0 ½ KILOMETER

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DSC | AUG 80

VEGETATION
SANTA BARBARA ISLAND
CHANNEL ISLANDS NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR /
NATIONAL PARK SERVICE

ACTIONS

Exotic Plants

- Control or eradicate some exotic species.

The following species are either pests and destructive to native plants and natural resources or can be relatively easily removed to obtain a more natural landscape appearance.

Iceplant--Remove seedlings (Malephora crocea on East Anacapa and Mesembryanthemum crystallinum and M. nodiflorum on all three islands) by hand in areas of new occurrence where soil characteristics have been minimally modified by their presence. Select areas devoid of sensitive resources that could be affected and that have a low potential for erosion when the plants are removed. Choose flat areas that will not result in disturbance to native plants, increased erosion, or siltation. Keep careful records of man-hours spent, costs, amount of disturbance to other resources, and kinds of species colonizing the area so that the effectiveness of the program can be evaluated.

Initiate experimental reseeding of former iceplant areas with native bunchgrasses in areas with suitable environmental characteristics (areas probably once dominated by grasses), if a seed source can be obtained on the same island.

Other Weeds--Eradicate the following species (of local distribution) by hand:

tocalote (Centaurea melitensis) - Santa Barbara

flax-leaved fleabane (Conyza bonariensis) - Santa Barbara and Anacapa

horse weed (Conyza canadensis) - all three islands

pampas grass (Cortaderia atacamensis) - San Miguel

Italian ryegrass (Lolium perenne) - Santa Barbara

spiny clotbur (Xanthium spinosum) - San Miguel

Continue periodic removal in conjunction with other botanical surveys and monitoring.

Trees--Eradicate some planted trees. Cut at the ground surface and remove palms in Cuyler Harbor and pines in Nidever Canyon on San Miguel. On East and Middle Anacapa

allow exotic trees and shrubs to remain as part of the historic scene as long as they do not increase in distribution.

- Initiate an eradication study.

  Conduct a field study that will specifically address the problem of exotic plant species and the costs and benefits of eradication.

  Define the potential effects on native plants, animals, and on soil erosion of both the continued presence of exotics and of eradication methods.

  Consider a variety of alternative techniques for eradication, including chemical, biological, and manual controls, as well as an integrated control approach. Determine through experimentation the feasibility and benefits of each.

  Examine the islands periodically for increases in range or new occurrences of exotics, and eliminate new occurrences immediately.

- Allow some exotic plants to continue as a part of the naturalized vegetation.

  Some species have become naturalized, integrated with the native flora, and so widespread in a variety of habitats that it would, at present, be impossible to eliminate them without widespread erosion. Such plants include wild oats (Avena) and other annual grasses. Do not attempt to control such exotic species, but allow native species to recover through time.

Exotic Herbivores

- Remove all rabbits from Santa Barbara Island to eliminate grazing pressures on native vegetation.

  With the exception of rabbits on Santa Barbara, all exotic herbivores have been removed from the former monument islands. There is a discussion of specific management actions for study and eradication in the "Rabbits" section.

Special Status Species

- Monitor special status species.

Monitor the distribution and abundance of identified species to detect changes in status and any new pressures that may be threatening them. In particular, monitor the original island mallow (Lavatera assurgentiflora) population near Point Bennett on San Miguel Island. This plant, proposed for endangered status by the Fish and Wildlife Service, is being disturbed by seals and sea lions. If monitoring determines that this population is being threatened, consider protective measures such as fencing to aid seedling reestablishment.

Refine and update distribution maps for special status species as new occurrences are noted. Encourage studies on the taxonomy, biosystematics, ecology, and life history of island endemics and rare and endangered taxa.

Transects

- Monitor plant cover transects that have been established on all three islands.

Determine changes in visitor use impacts, monitor recovery of island vegetation, identify changes in species composition, detect new weeds so that they can be eliminated, and note any changes in the interfaces between exotic and native vegetation. For the existing transects, establish priorities for reading so that transects in areas of human impact, in formerly denuded areas being recolonized on San Miguel, and along the interfaces of introduced iceplant and giant coreopsis on Santa Barbara will be monitored annually. Read other transects biannually or less frequently.

Community Mapping and Species Lists

- Update, correct, and refine species lists and mapped vegetation communities.

As vegetation dynamics change and more is known about island flora, update vegetation maps every 10 years using current aerial photography and field studies. If significant changes are noted, update maps at more frequent intervals.

IMPACTS

The successful reversal of the dominance of exotic species, even in limited areas, will aid in the return of the islands to more natural cover. A reduction in exotic species will allow a mosaic of native annual and perennial vegetation and more shrubby species to

flourish. Some exotic species such as introduced annual grass species are impossible to eliminate at this time; however, the landscape formed by exotic grass species in combination with native plants will have a natural appearance. Over time, plant composition will shift toward a higher percentage of native species, with the probable exception of areas on Santa Barbara Island that are completely dominated by iceplant. The removal of the planted trees, now highly visible, will allow return to a more natural-appearing landscape of the areas in which they are found; in addition, removal of the palm trees from San Miguel Island will allow the continuation of natural rates of spring flow in the Cuyler Harbor area.

Hand removal of iceplant and other noxious weeds in newly colonized areas and at the edge of populations will check exotic species spread and will promote recovery of the natural vegetation. Soils in newly colonized areas will not become physically and chemically altered by high concentrations of salts from iceplant and will return to more normal conditions.

Accelerated erosion, loss of island soils, and siltation of canyons could accompany the removal of stabilizing exotic vegetation, especially iceplant because it occurs in dense continuous mats. To mitigate this potential impact, removal will occur in flat areas with low erosion potential. Hand removal of scattered weedy species will not increase erosion significantly.

Minimal trampling of native vegetation will result from additional research, monitoring of transects, removal of weedy species, and a number of other field studies and actions proposed throughout this plan. The off-trail research will cause breakage of aboveground plant parts and could disturb small areas that may then be colonized by exotic species.

Fire suppression will prevent both temporary damage to vegetation and long-term deterioration of resources resulting from erosion. Natural fires are of very low frequency and do not play a role in the management of island vegetation.

Native vegetation on Santa Barbara Island will have a chance for recovery when rabbits are removed. Rabbit populations have been a factor in the decline in density and vigor of stands of giant coreopsis, historically more prominent on the island than at present. Other native and nonnative plant species that provide rabbit forage will recover and increase in numbers and range, and the potential for extinction of rare species will be reduced. See "Rabbits" for other impacts related to rabbit eradication.

LAND SNAILS

DESCRIPTION

The information in this section was summarized from the report by the Santa Barbara Museum of Natural History (1979).

The three islands currently contain habitat for eight native land snail species; an additional five fossil snails are known to have occurred in the past. Tiny Santa Barbara Island supports the highest diversity of land mollusks of the three islands, with six living and three fossil snail species. Snails are found only where there is adequate shelter (vegetation, soils, and rocks); a source of calcium for shell building; and moisture, which triggers activity following the onset of winter rains.

Most of the snails on the islands are herbivorous. Two species, Durant's snail and Shepard's snail, are known to prey upon other snail species but do not appear to greatly reduce native populations. Other native predators of snails include deer mice, island foxes, western gulls, and possibly alligator lizards and various beetles. Introduced rats are major predators of snails on Anacapa and may be responsible for reduced ranges of snails on that island.

Some species have been so reduced in distribution and abundance that their continued presence on the islands is threatened. Man has greatly altered snail habitat through introduction of exotic plants that have competed with and reduced preferred native plant habitat, and exotic animals that have altered habitat and initiated erosion. Collectors also removed thousands of snails for study, display, and profit. Several snails have been proposed for designation as threatened or endangered by the U.S. Fish and Wildlife Service. Recent study has revealed several other species that should also be considered for such status. These species are listed in table 2.

OBJECTIVES

Preserve all native snails, living and fossil, and promote the recovery of species that have been reduced in abundance and distribution by man's activities.

GUIDELINES FOR MANAGEMENT

Prohibit nonessential off-trail foot traffic and carefully evaluate new trails.

Table 2. Land Snails of Channel Islands National Park* (Santa Rosa and Santa Cruz islands excluded)

SPECIES	DISTRIBUTION BY ISLAND: Santa Barbara Island	Anacapa Island	San Miguel Island	ABUNDANCE AND DISTRIBUTION	STATUS
Helminthoglypta ayresiana (Ayer's snail)			X	Widespread Common	
Helminthoglypta ayresiana sanctaecrucis		X		EA,MA - Restricted Scarce WA - Widespread Common	EA,MA, threatened (proposed, SBMNH)
Micrarionta facta (Concentrated snail)	X			Limited Scarce	Endangered (proposed, USFWS)
Micrarionta tryoni (Tryon's snail)	X			Diminished Widespread Common	Threatened (proposed, USFWS)
Haplotrema duranti (Durant's snail)	X			Restricted Scarce	Endangered (proposed, SBMNH)
Pristiloma shepardae (Shepard's snail)		X		Restricted Common	Threatened (proposed, SBMNH)
Milax gagates (Greenhouse slug)		X		Unknown Introduced slug	
Binneya notabilis (slug snail)	X			Restricted Rare	Endangered (proposed, USFWS)
Sterkia clementina (Clemente blunt-top snail)	X			Localized Scarce	Endangered (proposed, SBMNH)
Vertigo californica catalinaria (California blunt-top snail)	X	X		Widespread Common	
Vertigo californica longa	X	X	X	Widespread Common	

*Adapted from SBMNH, 1979.

Trails that cross sensitive snail areas have been closed and off-trail foot traffic through these critical areas, even for legitimate research, has been greatly curtailed. All requests for off-trail use are being evaluated on a case by case basis. Any new trails will not affect critical habitat of special status snail species. Recent work directing water flow across rather than down trails allows the maintenance of natural flow to drainage areas, important to snail habitat for the retention of adequate moisture levels.

Prohibit rock rolling and turning on Santa Barbara Island for any purpose.

Prohibiting rock turning will protect snail habitat and island night lizard habitat as well. The superintendent will establish a special regulation to prohibit rock moving by the park staff, researchers, and visitors.

Protect native perennial plants that provide habitat for snails.

As discussed in the "Vegetation" section, such protection and restoration will aid in the recovery of snail species that are threatened or endangered and rely on the presence of suitable vegetation.

Alert researchers in other fields to the very sensitive snail habitat.

Identify snail habitat on Santa Barbara and West Anacapa so that snails will not be unknowingly disturbed.

ACTIONS

- Monitor the distribution and abundance of all snail species proposed for special status.

  For some species, such as the Clemente blunt-top snail, very little information is known because they are minute in size and are easily overlooked. Refine knowledge of snail distributions--especially slug snail, Clemente blunt-top snail, Durant's snail, and Shepard's snail--based upon additional information now available on vegetation cover, so that necessary habitat can be defined. Monitor these species to note new pressures that could have detrimental effects, and take corrective actions immediately.

- Plot the distribution of dead snails to obtain a better idea of the extent of their former range.

Old shells of Tryon's snail and Concentrated snail are found on the surface of the soil of Santa Barbara Island over a wider area than where they now occur. These larger areas of potential habitat can also be protected to encourage recovery of the snails in areas of former occurrence. Shell distribution may also provide information useful in plotting past vegetative cover.

- Conduct a study to determine the extent of competitive interaction between snails and ants.

  Introduced ants on Santa Barbara Island may competitively exclude Concentrated and Tryon's snails from certain areas. Wherever ants occur, snails are not found. The distribution of ants will be plotted as part of the study. If a detrimental interaction can be documented, a plan will be formulated for eradication of the ant population.

- Initiate field and laboratory studies on food preferences and life histories of the macropulmonates--Ayre's snail on San Miguel Island and Tryon's snail on Santa Barbara Island--and on the carnivorous snails--Durant's snail on Santa Barbara Island and Shepard's snail on West Anacapa Island--to determine prey preference.

  These species are all proposed for special status by either the Fish and Wildlife Service or invertebrate experts, but information on their food preferences is inadequate.

IMPACTS

Habitat for snails will be protected with enforcement of management actions such as the regulation to prohibit rock turning. The studies proposed will contribute more information upon which to base future management decisions, ultimately aiding in the recovery of snail species whose continued existence is threatened. Restoration of native perennial plant cover through rabbit removal or exotic plant removal will increase the areas of suitable habitat that may be recolonized by snails.

As with any research effort, some inadvertent disturbance of resources may accompany off-trail foot traffic.

Research activities in very sensitive areas on Santa Barbara Island may cause more harm to snail populations than the additional information is worth. All traffic, including research efforts, in critical snail habitat must therefore be carefully evaluated.

INSECTS AND RELATED INVERTEBRATES

DESCRIPTION

Little is known about terrestrial arthropods on the Channel Islands with the exception of a preliminary listing of species that have been collected. A relatively high degree of endemicity is expected.

ACTIONS

- Determine the distribution and abundance of the globose dune beetle (Coelus globosus).

  The beetle has been reported from San Miguel and Anacapa islands and has been proposed as an endangered species by the U.S. Fish and Wildlife Service. Define sensitive and/or critical habitat.

- Monitor and assess the damage caused by scale insects to prickly pear cactus on Anacapa Island.

  Cochineal scale (Dactylopius), originally introduced to destroy the prickly pear cactus on adjacent Santa Cruz Island, has spread to Anacapa and is now atacking prickly pear cactus in the park. Regular monitoring of the extent of this damage and that caused by an associated fly, Volucella, which attacks weakened prickly pear, will aid park management in determining whether a control effort is necessary to protect the cactus.

- Expand basic knowledge of the terrestrial arthropods of the islands by encouraging collection and identification by independent researchers.

ISLAND NIGHT LIZARDS

DESCRIPTION

Information for this section was summarized from reports by the Santa Barbara Museum of Natural History (1979) and Wilson (1979).

The island night lizard (Xantusia riversiana) is a species endemic to the Channel Islands; it is found only on Santa Barbara Island , the associated Sutil Island, and San Nicolas and San Clemente islands.

It has been designated as a threatened species by the Fish and Wildlife Service under the Endangered Species Act, as well as a fully protected animal by the state of California.

A reduction in habitat for the island night lizard on Santa Barbara Island occurred as a result of fires and farm and ranching activities. Introduced rabbits that graze native vegetation and induce erosion continue to disturb lizard habitat. Vegetation is important because it provides shelter, refuge, and food. The night lizard is generally associated with the maritime cactus scrub community and particularly with California boxthorn and cactus. It feeds on fruits of plants and insects. Undisturbed rocks provide important shelter.

The only estimate available for Santa Barbara Island indicates that the population ranges between 550 and 700 individuals; it is based upon the amount of suitable lizard habitat that was thought to be available (Wilson, 1979). The night lizard population is of low density and has a slow growth potential because females do not mature sexually until their third to fourth year, and reproduce only every other year.

OBJECTIVES

Stringently protect the remaining population of the threatened island night lizard, as well as its preferred habitat.

GUIDELINES FOR MANAGEMENT

Establish a special regulation to prohibit rock turning.

Because island night lizards may not return to areas where rocks have been disturbed, a special regulation will prohibit rock movement by management staff, researchers, and visitors on Santa Barbara Island. This regulation will not only benefit the island night lizard, but a number of snail species as well.

Conduct future studies in the field, disturbing as little habitat as possible and coordinating with the Fish and Wildlife Service.

ACTIONS

- Determine the distribution and abundance of the island night lizard.

  Additional study of the biology of the island night lizard on Santa Barbara and Sutil islands will address population size, habitat preference, critical habitat, distribution, density, home

range, reproductive success, longevity, and factors that affect population. Recent vegetation mapping has refined cover types for Santa Barbara Island allowing a better estimate of the distribution and abundance of island night lizards based on suitability of habitat. However, more definitive information is needed. Future studies should consider substrate as well as vegetation. These studies should precede other management actions that could have any effect on the island night lizard.

IMPACTS

Recognition of habitat requirements and protection of this species will aid in its recovery. Study of this species, which is easily disturbed by some collecting and study methods, will be difficult without some environmental manipulation (such as pits for live collection) that could adversely affect other island resources. Study methods that would reduce lizard populations will not be allowed.

OTHER REPTILES AND AMPHIBIANS

DESCRIPTION

The only amphibian present on the three islands is the slender salamander (Batrochoseps pacificus), which is found on Anacapa and San Miguel islands. Also found on both of these islands is the alligator lizard (Gerrhonotus multicarinatus). In addition, the side-blotched lizard (Uta stansburiana) is found on Anacapa and the western fence lizard (Sceloporus occidentalis) on San Miguel. Little is known of the status of any of these species.

ACTIONS

- Determine the status of the various species of amphibians and reptiles found on Anacapa and San Miguel islands through a study of the abundance, habitat, and food requirements of these species.

ENDANGERED RAPTORS

DESCRIPTION

Much of the information in this section was summarized from Kipp (1979).

Man has been directly responsible for the disappearance of at least two raptors that once nested on the Channel Islands. The bald eagle (Haliaeetus leucocephalus) was once fairly common and nested at one time or another on all of the Channel Islands. The population was resident and nonmigratory; the eagles fed on a variety of fish, birds, mammals, and carrion. The species was greatly reduced by human harassment (shooting, egg collecting, nest destruction and disturbance, removal of young from nests, trapping, and poisoning) and began to disappear in the 1930s. By the late 1950s, coinciding with the introduction of DDT into the southern California environment, the bald eagle no longer nested on or visited the islands. The bald eagle is considered endangered throughout California by the U.S. Fish and Wildlife Service. A few individuals, mostly immature birds, are still seen around the islands briefly each year.

The peregrine falcon (Falco peregrinus) was also once a common permanent resident of the Channel Islands. These falcons may have nested on all of the islands--actual nests were reported on all but San Clemente and San Nicolas. They fed exclusively on avian prey and were most common in the vicinity of colonies of small pelagic birds. Until the 1940s, peregrines were considered to be fairly common on the islands and adjacent mainland, but by 1955 the Channel Islands population was extinct. As with the bald eagle, human harassment and the effects of DDT probably contributed largely to the peregrines' disappearance. They were also dependent upon bird populations as a food source--populations that may have, in turn, been reduced by DDT contamination. The peregrine falcon is considered endangered by the Fish and Wildlife Service. A few migrants are seen around the islands almost every year.

If, in fact, DDT was ultimately responsible for the extinction of these species, the reduction of this poison that has occurred since 1972 to a lower but persistent level in the marine environment may permit their reestablishment. The nearest breeding population of bald eagles is in northern California and reintroduction would require manipulative techniques. Peregrines, on the other hand, occur on the mainland nearby, and their population is slowly recovering Recolonization of the islands from this mainland population may occur naturally.

OBJECTIVES

Encourage successful reestablishment of the bald eagle and recolonization of the peregrine falcon into historical habitat on the Channel Islands to aid in the recovery of these two endangered species.

ACTIONS

- Conduct a study in cooperation with the bald eagle recovery team (established by the Fish and Wildlife Service) to determine the feasibility of bald eagle reintroduction to the Channel Islands. The study should:

  Determine which islands or portions of islands have adequate habitat to support bald eagles for a future release program and where the eagles would have a reasonable chance for successful colonization

  Determine the availability of reintroduction stock. The most likely stock of young birds that could be transported to the islands is from northern California

  Determine, in cooperation with the Fish and Wildlife Service, potential impacts on island fauna from reintroduction of the bald eagle

  Examine and follow the progress of other bald eagle reintroduction programs, especially those proposed for Santa Cruz Island

  Devise a plan, if suitable habitat is determined to be available, in coordination with the Fish and Wildlife Service and the bald eagle recovery team for reintroduction of the bald eagle to a specific island

- Actively encourage the peregrine falcon to utilize the islands, if it recolonizes the islands naturally, through stringent protection of new use areas from visitors. Cooperate with other agencies that may attempt to reintroduce peregrine falcons to the islands.

IMPACTS

Eventual use of the Channel Islands by these raptors will reopen habitat and aid in the recovery of the bald eagle and the peregrine falcon, both considered endangered. The reintroduction feasibility study proposed will not have any impacts itself, but if chances for success are good, the study may be followed by reintroduction of

the bald eagle. To obtain stock, young may have to be removed from nests in another area, resulting in some harassment of an endangered species. The presence of a large avian predator may reduce some animal populations that are used as food sources (fish, birds, and mammals). In the case of San Miguel Island, some reduction in the island fox population could, but is not likely to, result. If peregrine falcons are successfully encouraged, a reduction in small pelagic bird populations (such as auklets and Xantus' murrelets) will result.

Some restriction of visitor use will be required if areas now used by people begin to be used by endangered birds. A reduction in the kinds of uses allowed or closure of certain areas that are now open to visitors could result. If a reintroduction program is successful, however, visitors will have the opportunity to view these scarce and magnificant birds in one of the only areas of coastal southern California capable of maintaining a breeding population.

OTHER LAND BIRDS

DESCRIPTION

Of the approximately 200 land and shore birds that have been sighted on the three islands, only a small number nest there. Table 3 lists the land bird species known to nest on each island.

Recent alteration of the habitats on the islands has had mixed effects. The majority of the bird species have probably experienced a loss of preferred food and shelter from the restriction of the scrub habitats (in fact, one endemic subspecies, the Santa Barbara Island song sparrow, is extinct as the result of drastic reduction of the brushy habitat on that island). In general, the most sensitive habitat for land birds is the areas on the islands where brush or trees are found; for the three islands, these areas are primarily in canyons.

Few species use the nonnative grasslands to any appreciable extent. Major exceptions are the horned lark and the western meadowlark, grassland species that have no doubt profited from the vegetational changes. Also, hawks and owls use the grasslands for a large amount of their hunting for insects and rodents.

Because the three islands are small and in some cases provide only limited habitat, some of the larger birds, particularly hawks and owls, are subject to intermittent periods of disappearance from a

Table 3. Land Bird Species Known to Have Nested in Channel Islands National Park (Santa Rosa and Santa Cruz islands excluded)

SPECIES	Anacapa	San Miguel	Santa Barbara
Bald Eagle	*	*	*
Red-tailed hawk	X	X	
Peregrine falcon	*	*	*
American kestrel	X	X	X
Mourning dove	X		X
Barn owl	X	X	X
Costa's hummingbird			X
Allen's hummingbird	X	X	
White-throated swift	X		
Black phoebe	X		
Western flycatcher	X		
Horned lark		X	X
Barn swallow	X	X	
Common raven	X	X	X
Bewick's wren	X		
Rock wren	X	X	X
Loggerhead shrike	X	X	
Common starling	X	X	X
Hutton's vireo	X		
Orange-crowned warbler	X	X	X
Western meadowlark	X	X	X
House finch	X	X	X
Rufous-crowned sparrow	X		
Song sparrow		X	*
Chipping sparrow	X		

X Species that may at least potentially breed in any given year.

* Species that are not likely to breed in the near future.

particular island. In many cases this is a natural process. Turnovers of land birds on the islands are discussed in Jones (1975) and Jones and Diamond (1976).

The only exotic resident bird on the islands is the starling (Starnus vulgaris). It is unknown what effect this competition for habitat has on native birds.

The islands, particularly Santa Barbara, are well known for their land bird migrations, and several organized birding groups visit in spring and fall. Since most of the migrating birds stay within giant coreopsis stands and brushy canyons, birders want access to these areas, but because of the fragility of other resources, especially within the Santa Barbara Island canyons, trails through sensitive areas have in many cases been closed. Decisions on future access to accommodate a birding public will be evaluated from the point of view of impact to other sensitive island resources.

OBJECTIVES

Protect and encourage the reestablishment of favorable land bird habitat on the islands, recognizing the particular importance of aboreal and brushy areas.

Remove feral mammals that affect land birds.

Encourage use of the islands by birders in a manner that emphasizes the interrelationships between land birds and fragile resources.

ACTIONS

- Encourage a qualified group (such as the Audubon Society) to undertake an annual bird census on the islands.

  Such information will complement censuses of breeding and migrating birds by independent researchers.

- Study the status of starlings on the islands.

  Investigate the degree of competition between this species and native land birds and determine whether eradication of this species from the islands should be considered.

ISLAND FOXES

DESCRIPTION

Information found in this section was summarized from a report by the Santa Barbara Museum of Natural History (1979).

The San Miguel island fox (Urocyon littoralis littoralis) is a diminutive form of gray fox. Each of the six largest Channel Islands supports its own endemic subspecies, and the entire species is considered rare by the California Fish and Game Commission. The island population on San Miguel is currently estimated at between 150 and 500 individuals. The health of the population is very good at the present time.

Island foxes, where they have not been disturbed, are quite tolerant of humans and occasionally allow very close approach. They have been known to eat garbage and may develop scavenging habits when in contact with humans.

OBJECTIVES

Maintain the good health of the island fox population on San Miguel.

GUIDELINES FOR MANAGEMENT

Minimize contact between humans and foxes.

Given the opportunity, foxes may scavenge on human food refuse. If a problem develops because of increased human use, visitors, staff, and research personnel will be directed to keep food in fox-proof storage containers.

ACTIONS

- Monitor the health and status of the fox population to detect any change.

  If changes are noted, steps may be taken to more actively manage this species and its habitat.

- Encourage research by others into the biology of the San Miguel Island fox.

  Information is needed on seasonality of diet, home range, density in different habitats, recruitment, longevity, long-term population fluctuations, parasites, and diseases.

BLACK RATS

DESCRIPTION

Information in this section was summarized from a report by the Santa Barbara Museum of Natural History (1979).

All three Anacapa islands and San Miguel Island have populations of black rats (Rattus rattus). They have colonized most of the suitable habitat of Anacapa but are currently restricted on San Miguel to the naturally refuse-strewn beaches of the northwest shore. Rat populations were probably introduced by shipwrecks or, in the case of East Anacapa, possibly by the landing of supplies. Rats are highly successful because they are capable of becoming established in a wide variety of habitats, both in association with man and in natural areas; have opportunistic feeding habits; are highly competitive and aggressive; and possess the potential for a high reproductive rate.

On the Channel Islands, rats feed on plants, intertidal invertebrates, deer mice, carrion (birds and other vertebrates), and lizards. Water is obtained from both open water (standing water and springs) and succulent vegetation. Rats are most common in areas of dense vegetation, but they also use piles of debris, abandoned burrows, and the edges of building foundations for cover.

Rats are prey for owls and sometimes hawks, but predation alone is not an effective population control. Rats have a strong competitive advantage over deer mice, which occupy the same habitat, and are probably responsible (directly or indirectly) for the depleted mouse population on East Anacapa. Black rats may be responsible for the reduction of populations of land mollusks, lizards, intertidal organisms, and land and sea birds through predation or competition. They are also carriers of diseases harmful to humans and animals such as the island fox.

OBJECTIVES

Eradicate rats from Anacapa and San Miguel islands. If eradication proves impossible, reduce and maintain the population at a low level. Choose control methods that have the least possible effect on other island resources.

ACTIONS

- Discourage black rats by reducing man-made harborage.

  When facilities such as toilets and trash containers are repaired or replaced on Anacapa and San Miguel, use rodent-proof facilities. Remove debris such as piled wood, rubble, and roof tiles from old buildings on East Anacapa. Remove unnecessary construction material instead of storing it on the islands. A reduction in camping use levels on East Anacapa, as proposed in this General Management Plan, could also have the effect of reducing rat populations by reducing litter and the availability of human food.

- Initiate an eradication program on East Anacapa Island.

  Ensure that the following criteria will be met: methods must be effective, be selective for rats, and have the least possible effect on native mouse populations and other forms of plant and animal life; methods should be safe for visitors; and the program should be inexpensive and simple to maintain.

  Determine status of deer mice--Carefully evaluate the status of the endemic deer mouse (Peromyscus maniculatus anacapae) on East Anacapa Island before any control program for rats is initiated there. Deer mouse populations are at present very low on the island. Although recovery of the mouse population is expected when competition from rats decreases, control methods for rats are bound to have some effect on deer mice because these species occupy similar habitat. The deer mouse population is so depleted that there is a chance that rat control efforts will threaten or possibly extirpate these mice from East Anacapa. Therefore, an effort to capture a breeding group of mice for later reintroduction will be made before rat control efforts begin.

  Determine impacts of rat eradication methods on nontarget species--Investigate the impacts of the program described below on avian predators through literature review and laboratory tests prior to initiation of the program.

  Initiate rat eradication program--Implement the rat eradication plan developed by SBMNH in 1979 (utilizing poison bait just prior to breeding seasons). The rodenticide recommended for use is pival, an anticoagulant that induces fatal internal hemorrhaging by preventing production of a blood clotting agent and by causing damage to capillaries. The effects of the poison are cumulative, and rodents must feed several successive

days on the poison bait before it is fatal. Of the anticoagulants available, pival was chosen because it is the least acceptable to mice and has few known side effects on other animals and humans.

A bait station consisting of a tripod support for a suspended inverted bottle containing a liquid solution (pival) will dispense the poison at a height easily reached by rats but not by mice. In cliff areas where self-supported bait stations are impractical, paraffin bait blocks will be suspended. Mice as well as rats will have access to these bait blocks. Bait stations will be placed at intervals of 100 feet, based on the estimated home range of rats. Extensive eradication efforts will be most effective just prior to active breeding seasons, late February to March and late July through August. Bait stations will be set up for a minimum of three weeks.

Use of poisonous bait must be approved by the director of the National Park Service and will be in accordance with all laws governing its application.

Monitor and evaluate--Monitor the amount of bait taken from each station and the activity around the stations. Following the trial program, evaluate the success of the control method, economic costs, and any adverse effects on native fauna. Effectiveness will be evaluated by comparing treatment and post-treatment trapping success.

If the program proves successful, refinements of the methodology will be made based on what has been learned by the trial program, after which it will be continued on East Anacapa Island and initiated on Middle and West Anacapa islands.

- Design an eradication program specific to San Miguel Island, using experience gained through the Anacapa program.

The rat population on San Miguel Island is currently restricted to a narrow range along the northwest shore. No sign has been observed in other areas, and rats have not yet colonized the plateau. It is expected that when rats achieve a certain population size, they will cross the area of sparse vegetation above the northwest shore and move into dense vegetation in the northeastern portion of the island. It is important to implement an eradication program while the rats' range is still limited. The eradication program described for Anacapa Island may not be directly applicable to San Miguel because the endemic island fox could be accidentally poisoned. However, experience gained from the trial Anacapa program will be

incorporated into the design of an effective program specific to San Miguel Island that will have minimal effects on the island fox.

IMPACTS

Control efforts will greatly reduce the rat population on East Anacapa Island. The threatened endemic deer mouse population will have a chance for recovery if enough of a natural or captured population remains to recolonize the island. The competitive advantage that rats have over deer mice and possibly over small ground-nesting birds will be removed when the rat population is reduced and mice and birds may therefore increase in number. The potential for transmission of dangerous diseases to humans will be reduced. Rat food sources, which include native plants and animals (insects and marine intertidal organisms), will become more abundant.

Pival, the anticoagulant considered for use, is one of the safest rodenticides that is effective against rats. Because several successive feedings are required before the bait is fatal, bait shyness will be avoided.

Even though pival is one of the least acceptable poisons to mice, some deer mice found in low numbers on East Anacapa Island will be unavoidably poisoned along with rats, especially through use of cliff bait stations that use paraffin blocks accessible to both mice and rats. Pre- and post-treatment trapping to determine the effect of the program will also inadvertently kill some deer mice. Secondary accidental poisoning of nontarget predator species (hawks and owls) by pival has been thought unlikely because experimental work on domestic fowl indicated that multiple doses were required for detrimental effects to occur and that birds seem fairly resistant to anticoagulants; subsequently it was reported that hawks may in fact be susceptible to secondary poisoning. Future studies will clarify the extent of these impacts. The direct poisoning of some birds that reside in the areas is a possibility. Danger to visitors, even unsupervised children, from the poison bait is remote and unlikely because all visitors will be warned by island rangers, multiple doses are required, and an antidote (vitamin K) will be available.

During placement of bait stations, maintenance of bait stations, and monitoring activity, foot trampling could disturb native plant and animal species and archeological sites. Field personnel will be made aware of the identity of flora and fauna and of the location of cultural sites that should be avoided during transportation, placement, and monitoring of stations in order to keep disturbance to a minimum. A small amount of plant pruning may be required in order to correctly place bait stations. Minor plant removal will only

temporarily affect vegetation, as long as areas of sensitive species are avoided. Placement of bait stations and subsequent monitoring on East Anacapa Island may conflict with nesting activity of western gulls and cormorants during summer control periods and Xantus' murrelet and land birds during early spring control periods. Nesting success for disturbed species could be reduced.

Frequent bait stations, even if unobtrusively placed, will visually degrade the island and temporarily reduce its value as a scenic resource. The presence of bait stations will present an opportunity to inform visitors of resource management actions and the damage to natural systems that can take place when exotic species are thoughtlessly introduced to an island. Dead and dying rats may be encountered by visitors and could detract from an otherwise enjoyable visit.

Because of inaccessible cliff areas, restrictions imposed by the ecological sensitivity of the islands, and limitations of the control methods available, it is highly doubtful that complete rat eradication is possible on Anacapa Island. If eradication efforts fail to completely eliminate the rat population, surviving animals will begin reproducing at their most efficient rate, and continuous control efforts over an indefinite period of time will be required to keep rat populations at low levels. Dedication to the project and an annual expenditure of personnel, time, and money will be necessary for control. Continued disturbance of other sensitive resources when placing bait, some poisoning of native mice as well as rats, continued expense and personnel needs, and visual degradation from the presence of bait stations will occur annually or more often. Overall, however, biotic conditions will be more natural and survival of native species will be enhanced.

Further environmental documentation will be prepared prior to implementation of an eradication program.

RABBITS

DESCRIPTION

Most of the information in this section was summarized from a report by the Santa Barbara Museum of Natural History (1979).

Rabbits (Oryctolagus cuniculus) have been introduced twice on Santa Barbara Island. The first release of Belgian hares occurred sometime after 1918 and prior to World War II. The second variety, the New Zealand red rabbit that persists today, was released in

1941. Prior to World War II, predation by feral house cats and hunting activity had some controlling effect on the rabbit population. In the 1950s the population increased dramatically, and reduced the number of giant coreopsis plants and the associated understory.

The rabbit population fluctuates in relationship to the rainfall, which affects the availability of vegetation. During dry years the plants are significantly impacted, not only because food sources are limited but also because rabbits may obtain much of their water requirement from plants with high water content. Plants such as the rare live-forever and giant coreopsis sustain increased foraging damage during dry years.

Rabbits can adjust to a wide range of habitats and conditions, impacting the food chain, which includes endangered species, within the natural ecosystem. While preferred foods are grazed back quickly, a variety of plants can be utilized even though they have low nutritive value. On Santa Barbara, these include saltbush, iceplant, live-forever, morning glory, clover, California box thorn, wild cucumber, sagebrush, giant coreopsis, and Malacothrix. In the past, rabbits contributed to the population reduction of giant coreopsis and live-forever--the latter once thought to be extinct--and, along with drought and fire, contributed to the extinction on the island of two passerine birds, the house finch and song sparrow.

The rabbits have one and sometimes two litters per year. The breeding season can last as long as six months, with three or more litters produced during an exceptionally favorable year. Minimum population estimates calculated for 1971 to 1974 ranged between approximately 185 to 475 rabbits. During favorable years, the rabbit population could number in the thousands. About 40 percent of Santa Barbara Island is considered to be rabbit habitat. North and Signal peaks and their slopes, and Cave, Middle, and Graveyard canyons have shown evidence of rabbit activity.

Sporadic control efforts conducted since 1948 include hunting, trapping, use of strychnine-coated bait, and contact poison. These methods were unsuccessful because of steep sea cliffs and burrows that provide safe rabbit harborage. The population recovered after each control effort.

Initial consultation with the California Department of Fish and Game, the U.S. Fish and Wildlife Service, and other interested organizations about potential impacts of the proposed eradication of exotic island species has been accomplished, and consultation will continue. (See appendix G.) Information on the ranges, populations, habits, and susceptibility of each species has been taken into account.

OBJECTIVES

Eliminate the feral rabbit population from Santa Barbara Island.

Control the population at a level not detrimental to island resources, if eradication proves infeasible.

Prohibit use of eradication or control methods that will have a significant adverse effect on any native species.

ACTIONS

- Initiate a multifaceted rabbit eradication/control program, and carefully monitor its impacts on other island resources. Such a program must:

  Implement as soon as possible any feasible effective eradication/control program that has a minimal impact on other species.

  Not allow the population to rebuild after the reduction effort has been initiated.

  Be timed to ensure maximum effectiveness, that is, tie control into the breeding season to reduce reproductive potential and also sequence controls so that one does not negate others by increasing the wariness of some individuals.

  Use an integrated control--more than one technique--so that individuals resistant to one method may succumb to another.

  Evaluate methods that would have an effect on nontarget organisms, and restrict the use of any that might pose problems. Use of poisons or other controlled substances must be approved by the director of the National Park Service and will be in accordance with all laws governing their application.

  Develop a site- and method-specific strategy and indicate dates, methodology, areas to be covered, needed equipment and supplies, personnel, and costs.

IMPACTS

Removal of rabbits will allow the island to return to more natural conditions by reducing grazing and browsing pressure of an exotic species. Vegetation that constitutes habitat for land birds, lizards, and snails will be preserved. No additional extinctions of island plants or animals will result from habitat destruction caused by rabbits.

The feral rabbit population on Santa Barbara Island will be greatly reduced.

Visitors will have reduced opportunity to observe this animal.

During the program, foot traffic will increase in off-trail areas, in turn increasing vegetation trampling and possibly initiating erosion. Personnel will be informed of the potential damage they could cause to fragile resources so damage can be minimized. Control efforts on North and South peaks and in some canyon areas have the potential of disturbing important habitat of land snail species proposed for special status. However, eradication of rabbits in this sensitive area will ultimately benefit the same snail species by allowing recovery of vegetation that provides habitat for such mollusks as the Concentrated snail and Tryon's snail.

Indirect impacts on other animals through the use of chemicals cannot be evaluated at this time because the action is not at present method-specific. All indirect effects on other organisms will be evaluated as part of the study to determine appropriate eradication/control techniques. However, no eradication or control method will be allowed that has the potential to significantly adversely affect any native species.

OTHER LAND MAMMALS

DESCRIPTION

Other land mammals on the islands include the deer mouse (Peromyscus maniculatus) and, possibly, various species of bats. The status of the latter is uncertain, and it is unknown if any actually live on the three islands.

The status of the deer mouse varies considerably from island to island, ranging from abundant on Santa Barbara Island (where they are very important as a food source for predatory birds and exert some pressure themselves as predators on the eggs of some bird species) to rare on East Anacapa Island (where it is suspected that pressure from the common nonnative black rat is the reason for this extreme scarcity). Its status on East Anacapa is scheduled to be monitored prior to attempting rat eradication there.

Feral cats have inhabited at least Anacapa and Santa Barbara islands (and it seems unlikely that there have not been some on San Miguel Island, given the number of settlers). They are known to be potentially destructive to birds and are suspected of eliminating various species of seabirds on Santa Barbara Island around the turn of the century. There is no current evidence of cats on the three islands.

GUIDELINES FOR MANAGEMENT

Continue the no-pet policy.

> Prevent, by not allowing pets on the three islands, establishment of additional nonnative species that have affected bird and small mammal populations in the past, and introduction of diseases and parasites that could affect native fox populations on San Miguel Island

Eliminate any new feral mammal introductions.

ACTIONS

- Determine the species, abundance, seasonal status, distribution, and preferred habitat of bats on the park islands.

PINNIPEDS

DESCRIPTION

The following information has been summarized from several background reports: Bartholomew and Odell (1973), Delong (1975), LeBoeuf et al. (1976), Bonnel et al. (1979), Johnson (1979), Morrison (1979), and Seagars (1979a). Additional detail regarding specific background information and more extensive literature reviews may be found in these sources.

The California Channel Islands support a larger and more varied population of seals and sea lions than any other area in the world that is conveniently accessible to major centers of human population. These marine mammals represent a major scientific resource and a significant recreational attraction. Species belonging to six genera of pinnipeds (seals and sea lions) of two different families occur on these islands. Breeding here are the northern (Steller) sea lion (Eumetopias jubata), the California sea lion (Zalophus californianus), the northern fur seal (Callorhinus ursinus), the harbor seal (Phoca vitulina), the northern elephant seal (Mirounga angustirostris), and occurring but not currently breeding, the Guadalupe fur seal (Arctocephalus townsendi).

The Channel Islands and their offshore waters are a haven for pinniped populations. Historical and archeological sources have shown that populations were once both much larger and much smaller than those present today. As a result of seal hunting activities in the last century, the northern elephant seal and the Guadalupe fur seal were reduced to small relict populations. Most populations have recovered significantly over the last several decades. Breeding and pupping occur almost exclusively on the islands at this time. The Channel Islands area offers significant characteristics that the intensively developed mainland area now cannot--protection from predators and human disturbance in a setting of continental shelf waters sufficiently productive to support the seasonal concentrations of pinnipeds.

While specific areas and seasonality of use have been documented, researchers are just beginning to identify interrelationships between seasonal abundance, patterns of hauling out, and distribution of prey species. Factors besides the availability of food that contribute to traditional use of specific sites include proper exposure to cooling wind, freedom from human disturbance, substrate composition, and the preferences of the animals themselves.

Traditional seasonal usage of the Channel Islands and locations of special importance to pinnipeds are summarized in tables 4 and 5. Maps of the three islands show traditional hauling/breeding grounds on each of the three islands. The following graph illustrates the seasonal scenario of pinniped use and haul out on San Miguel Island. These numbers are not absolute and depend on population trends, food availability, and climatic and other annually variable environmental conditions.

Species Accounts

California Sea Lion--This is the most conspicuous and abundant pinniped in the coastal waters of southern California and Mexico. They haul out throughout the year on all eight of the Channel Islands; 44 percent of the total world population and pup production occurs here. Ninety percent of all Channel Islands breeding occurs on San Miguel and San Nicolas islands. Current average population for the southern California Channel Islands is estimated to be 38,000 animals; this is considered to be a stable population size given the present environmental conditions.

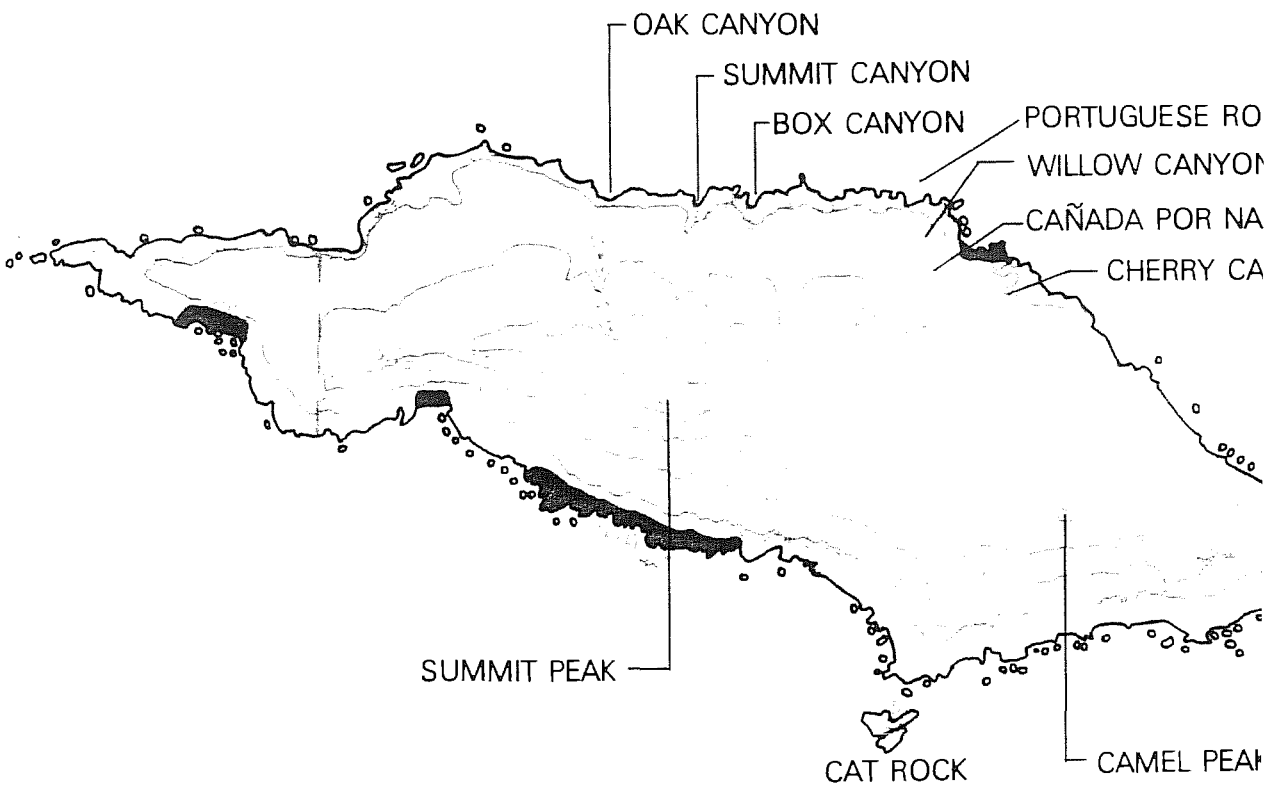
Breeding occurs both on sandy beaches and rocks between May and September. Important in the choice of a rookery site is the requirement that an area be undisturbed by human activity.

On land, California sea lions react to natural and human-caused disturbance in a characteristic manner: At the sight of a human or in response to auditory stimuli (i.e., sonic booms or gull cries), they panic and attempt to reach the water. Depending on the intensity of disturbance, they may startle to the point of a massive stampede where crushing and/or abandonment of newborn pups may result, as well as injuries to other animals. Chronic disturbance to an area will result in abandonment for breeding/hauling purposes.

Northern (Steller) Sea Lion--This is the largest of the eared seals in the northern hemisphere. Formerly (1920s) more abundant than the California sea lion, it has recently undergone a population decline throughout its range. The Channel Islands are at the southernmost limit of its breeding range. Formerly breeding on San Miguel, Santa Rosa, and possibly Santa Cruz islands, and numbering about 2,000, northern sea lions now breed only on San Miguel and numbers have declined to less than 30 animals. Breeding activities begin in May, and the animals usually depart by September. It appears that they may prefer even more exposed, wet, windy, and rocky areas than do other sea lions. They react as do California sea lions to human disturbance.

Table 1. Special Status Plant Species

SPECIES	DISTRIBUTION SBa = Santa Barbara SMi = San Miguel EA,MA,WA = East, Middle, West Anacapa	ENDEMIC[1] SPECIES	CNPS[2]	USFWS[3]	ABUNDANCE[4] (Santa Barbara Botanic Garden, 1979)
Artemisia californica var. insularis	SBa	X			
Astragalus miguelensis	MA,WA,SMi	X	R		SMi-Common MA, WA-Few
Astragalus traskiae	SBa	X	VR		Occasional
Calystegia macrostegia subsp. macrostegia	SBa,EA,MA,WA,SMi	X			
Castilleja hololeuca	MA,WA,SMi	X	R		SMi-Occasional Scattered MA-Scattered WA-Scattered
Ceanothus megacarpus subsp. insularis	WA	X	R		Few
Dichondra occidentalis	SMi		VR	E(P)	Occasional
Diplacus parviflorus	WA	X	R		Few
Dudleya greenei	SMi	X			
Dudleya traskiae	SBa	X**	VR	E(L)	Few
Eriogonum arborescens	EA,MA,WA	X	R		EA-Occasional MA,WA-Scattered Common
Eriogonum giganteum subsp. compactum	SBa	X**	VR	E(C)	Occasional
Eriogonum grande subsp. grande	EA,MA,WA		R		EA-Occasional MA,WA-Scattered
Eriogonum grande subsp. rubescens	SMi	X	R		Scattered
Eriophyllum nevinii	SBa	X	R		Occasional
Erysimum insulare	EA,WA,SMi		VR	T(C)	EA,WA-Rare SMi-Scattered to Occasional
Eschscholzia ramosa	SBa	X	VR	E(C)	Rare
Galium angustifolium subsp. foliosum	EA,MA,WA	X			
Galium buxifolium	SMi	X	VR		Few
Galium californicum subsp. miguelense	SMi	X	R		Few
Gilia nevinii	SBa,WA	X	R		SBa, WA-Few
Haplopappus detonsus	MA,WA	X	R		MA-Rare WA-Scattered
Helianthemum greenei	SMi	X	VR		Rare
Hemizonia clementina	EA,WA	X	VR		SBa-Scattered EA-Scattered MA-Scattered
Heuchera maxima	WA	X	R		Scattered
Lavatera assurgentiflora	WA,MA,SMi	X	R	E(P)	WA,SMi-Rare MA-Extirpated
Lotus argophyllus subsp. ornithopus	SBa	X	R		Few
Lotus scoparius var. dendroideus	EA,MA,WA,SMi	X			EA,MA-Occasional WA-Scattered
[Mahonia pinnata subsp. insularis] - extirpated	WA	X	VR	T(C)	Extirpated
Malacothrix foliosa	SBa,EA,WA	X	R		EA,WA-Rare SBa-Common
Malocothrix incana	SMi		R		Common
Malacothrix indecora	SMi	X	R		Rare
Malacothrix squallida	MA	X	R		Rare
Orobanche parishii subsp. brachyloba	SMi		VR	T(C)	Occasional


OAK CANYON
SUMMIT CANYON
BOX CANYON
PORTUGUESE RO
WILLOW CANYON
CAÑADA POR NA
CHERRY CA
SUMMIT PEAK
CAT ROCK
CAMEL PEAK

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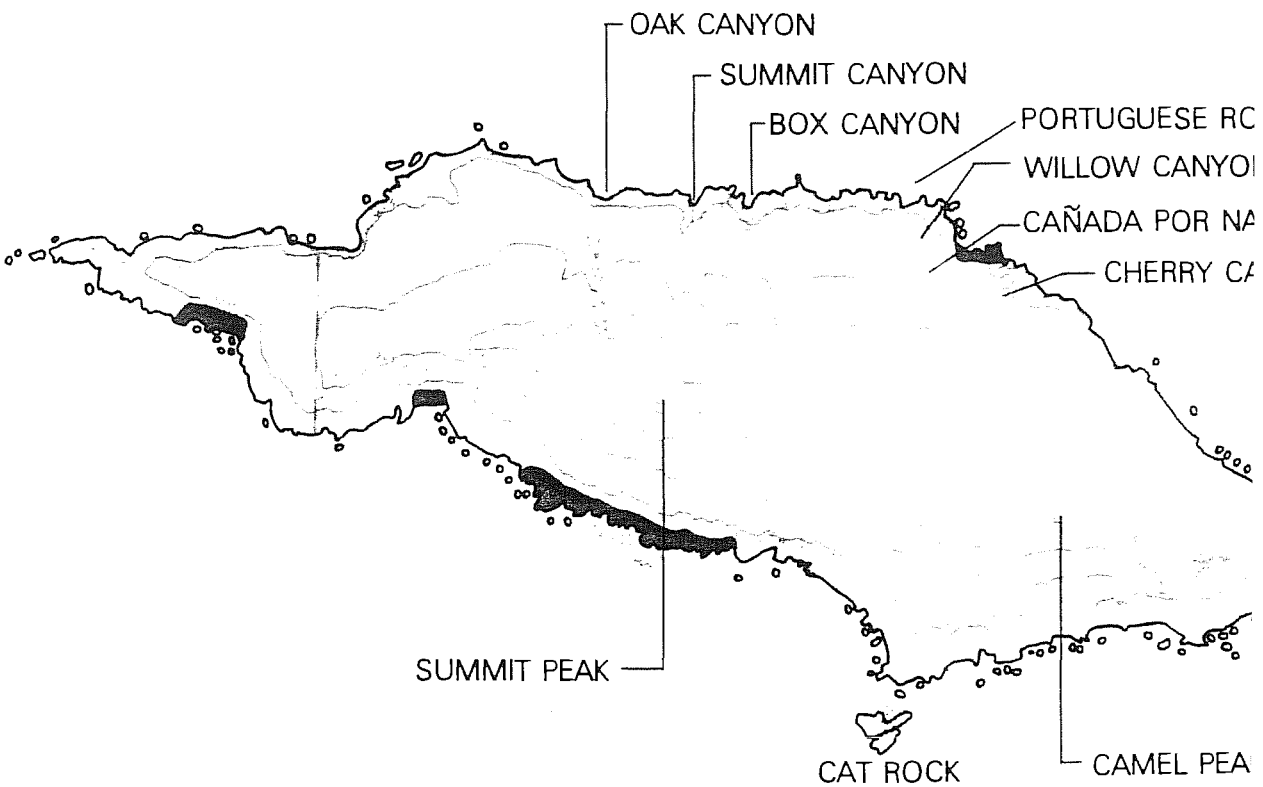
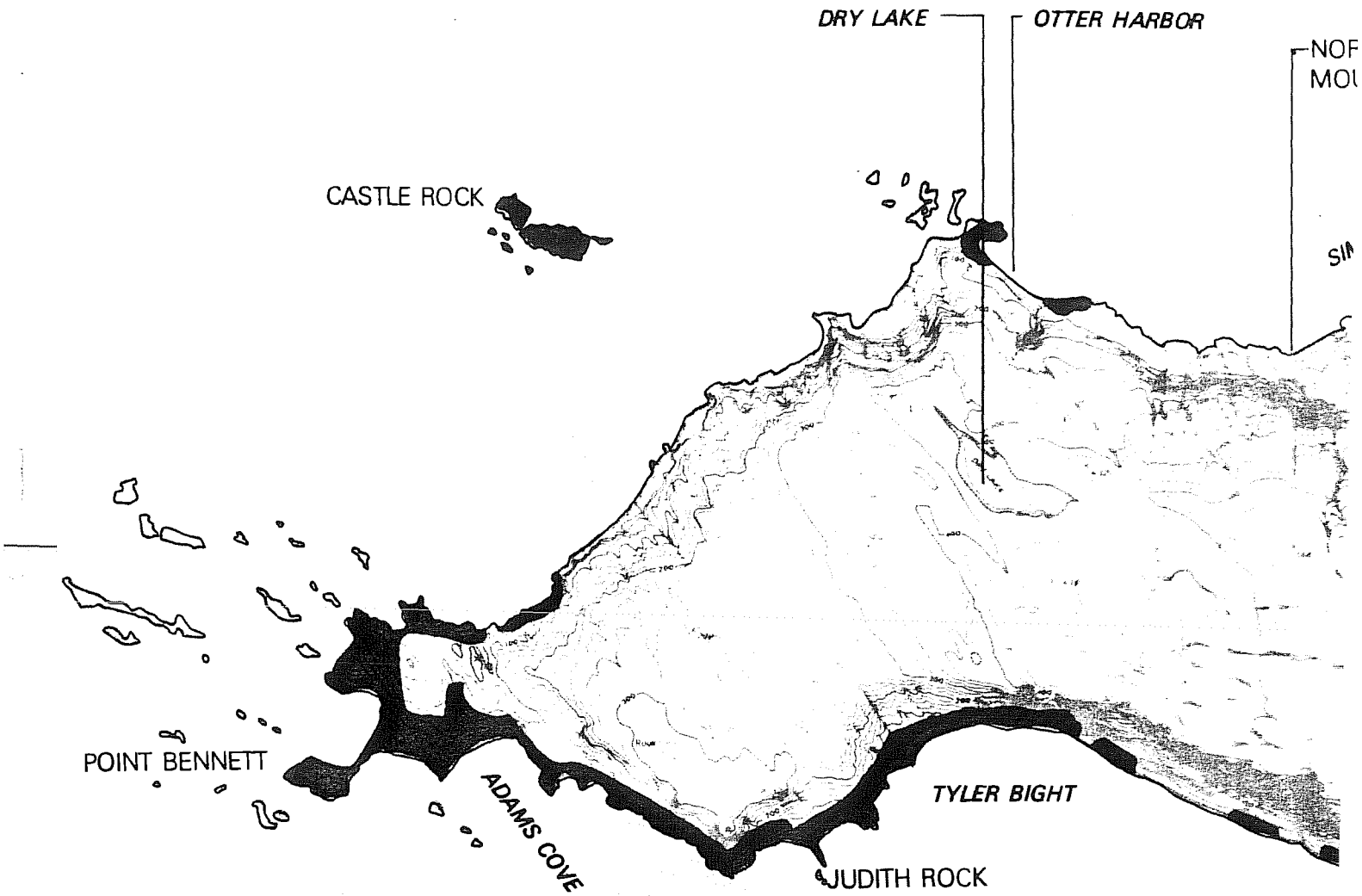
Dudleya greenei	SMi	X			
Dudleya traskiae	SBa	X**	VR	E(L)	Few
Eriogonum arborescens	EA,MA,WA	X	R		EA-Occasional MA,WA-Scattered Common
Eriogonum giganteum subsp. compactum	SBa	X**	VR	E(C)	Occasional
Eriogonum grande subsp. grande	EA,MA,WA		R		EA-Occasional MA,WA-Scattered
Eriogonum grande subsp. rubescens	SMi	X	R		Scattered
Eriophyllum nevinii	SBa	X	R		Occasional
Erysimum insulare	EA,WA,SMi		VR	T(C)	EA,WA-Rare SMi-Scattered to Occasional
Eschscholzia ramosa	SBa	X	VR	E(C)	Rare
Galium angustifolium subsp. foliosum	EA,MA,WA	X			
Galium buxifolium	SMi	X	VR		Few
Galium californicum subsp. miguelense	SMi	X	R		Few
Gilia nevinii	SBa,WA	X	R		SBa, WA-Few
Haplopappus detonsus	MA,WA	X	R		MA-Rare WA-Scattered
Helianthemum greenei	SMi	X	VR		Rare
Hemizonia clementina	EA,WA	X	VR		SBa-Scattered EA-Scattered MA-Scattered
Heuchera maxima	WA	X	R		Scattered
Lavatera assurgentiflora	WA,MA,SMi	X	R	E(P)	WA,SMi-Rare MA-Extirpated
Lotus argophyllus subsp. ornithopus	SBa	X	R		Few
Lotus scoparius var. dendroideus	EA,MA,WA,SMi	X			EA,MA-Occasional WA-Scattered
[Mahonia pinnata subsp. insularis] - extirpated	WA	X	VR	T(C)	Extirpated
Malacothrix foliosa	SBa,EA,WA	X	R		EA,WA-Rare SBa-Common
Malocothrix incana	SMi		R		Common
Malacothrix indecora	SMi	X	R		Rare
Malacothrix squallida	MA	X	R		Rare
Orobanche parishii subsp. brachyloba	SMi		VR	T(C)	Occasional


OAK CANYON
SUMMIT CANYON
BOX CANYON
PORTUGUESE RC
WILLOW CANYO
CAÑADA POR NA
CHERRY CA
SUMMIT PEAK
CAT ROCK
CAMEL PEA


DRY LAKE
OTTER HARBOR
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CASTLE ROCK
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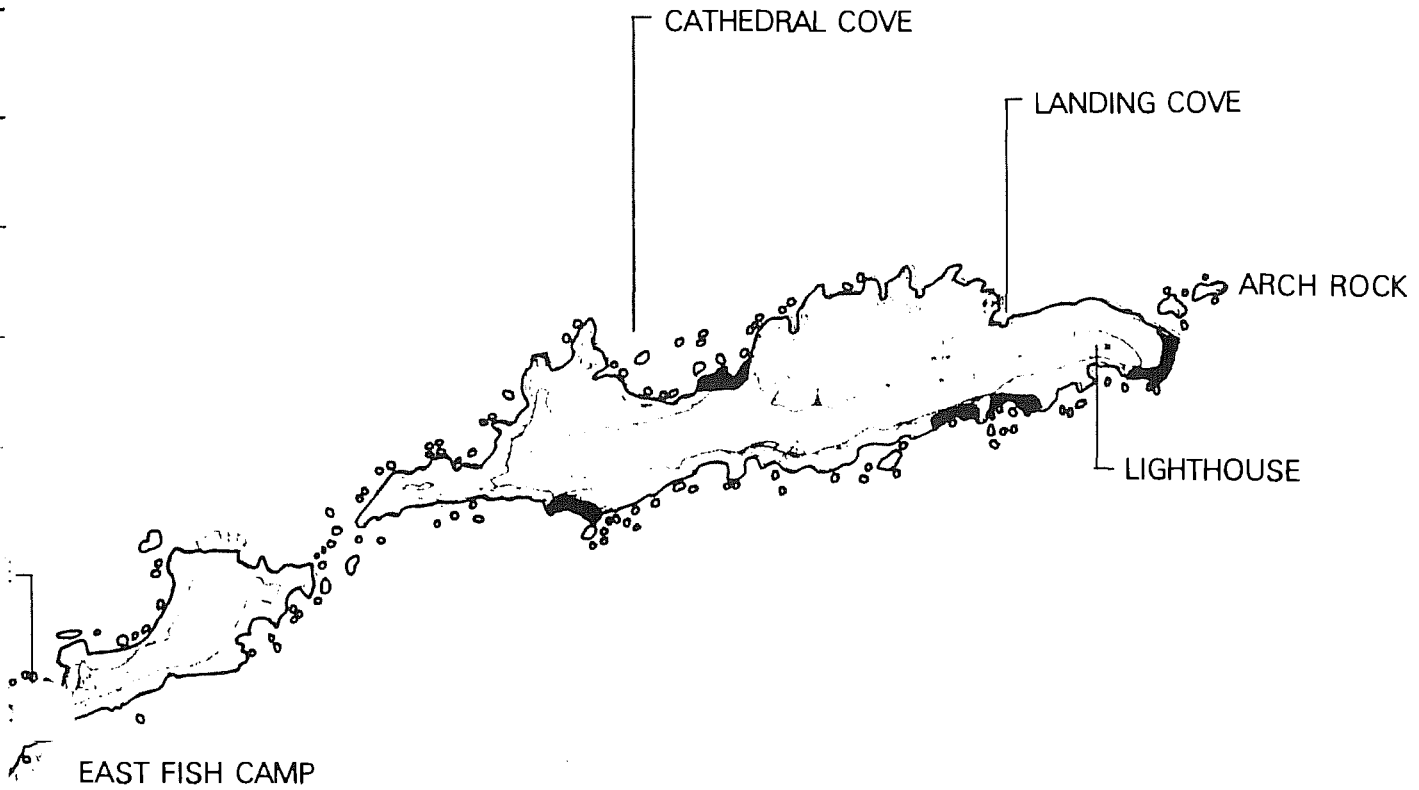
ADAMS COVE
TYLER BIGHT
JUDITH ROCK
GREEN MOU
SOUTH GREEN MOUNTAI



NT

SPECIES OF PINNIPED

- **HARBOR SEAL**
- **CALIFORNIA SEA LION**

NORTH

0 ½ MILE

0 ½ KILOMETER

159 | 20009A
DSC | AUG 80

PINNIPED HAULING/ BREEDING GROUNDS

ANACAPA ISLAND

CHANNEL ISLANDS NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR /
NATIONAL PARK SERVICE

PINNIPED HAULING/ BREEDING GROUNDS

SAN MIGUEL ISLAND

CHANNEL ISLANDS NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

NORTH

0 1 MILE

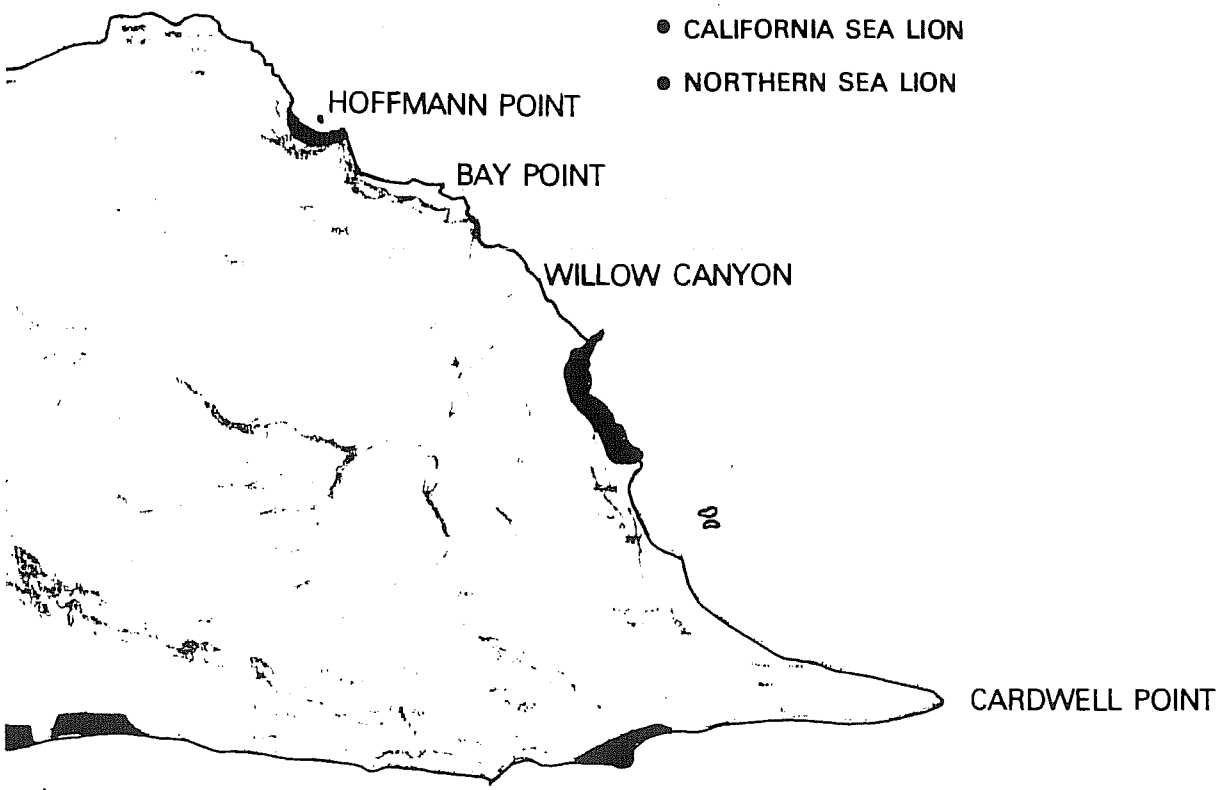
0 1 KILOMETER

159 | 20017A

DSC | AUG 80

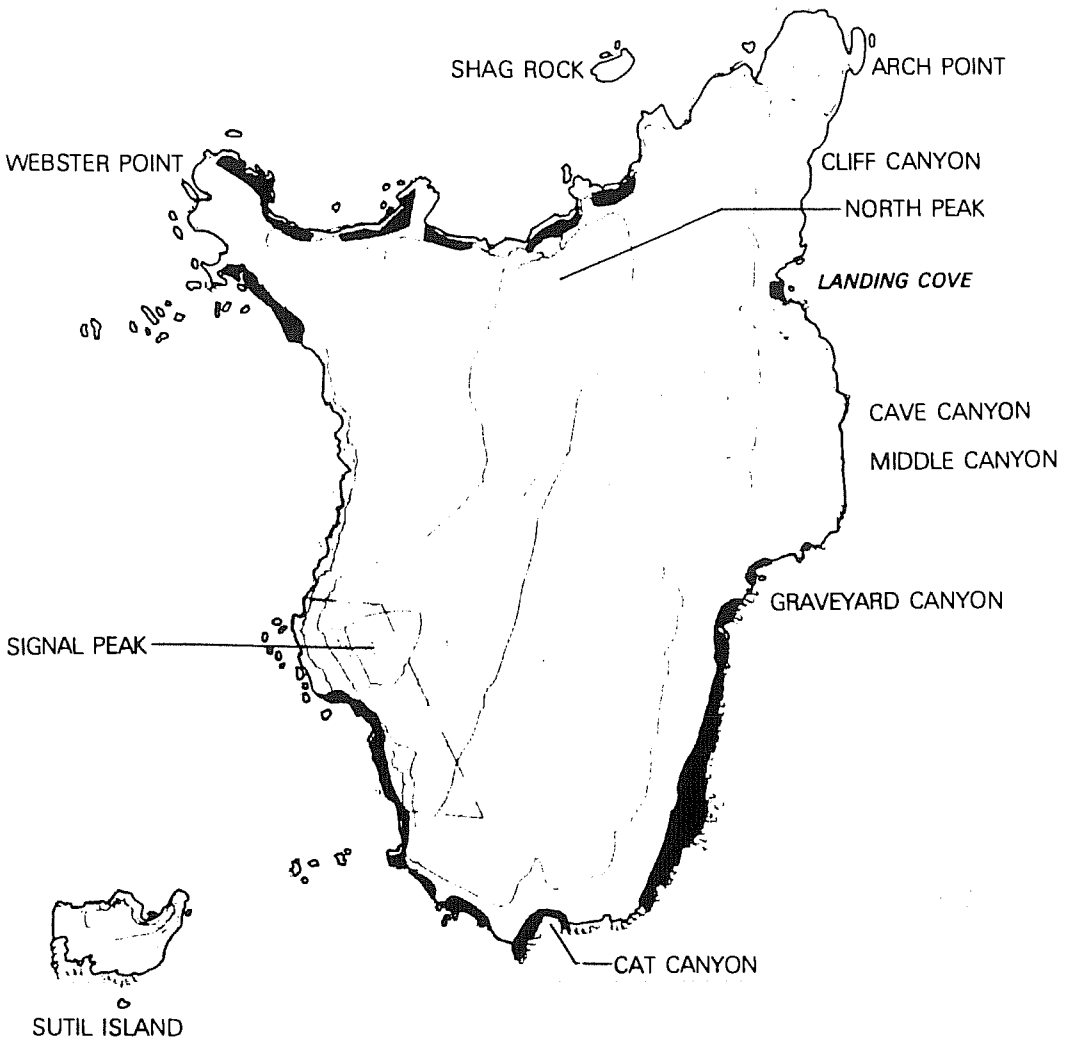
PRINCE ISLAND

)O MAR



SPECIES OF PINNIPED

- GUADALUPE FUR SEAL
- HARBOR SEAL
- NORTHERN ELEPHANT SEAL
- NORTHERN FUR SEAL
- CALIFORNIA SEA LION
- NORTHERN SEA LION



SPECIES OF PINNIPED

- NORTHERN ELEPHANT SEAL
- HARBOR SEAL
- CALIFORNIA SEA LION

NORTH

0 ½ MILE

0 ½ KILOMETER

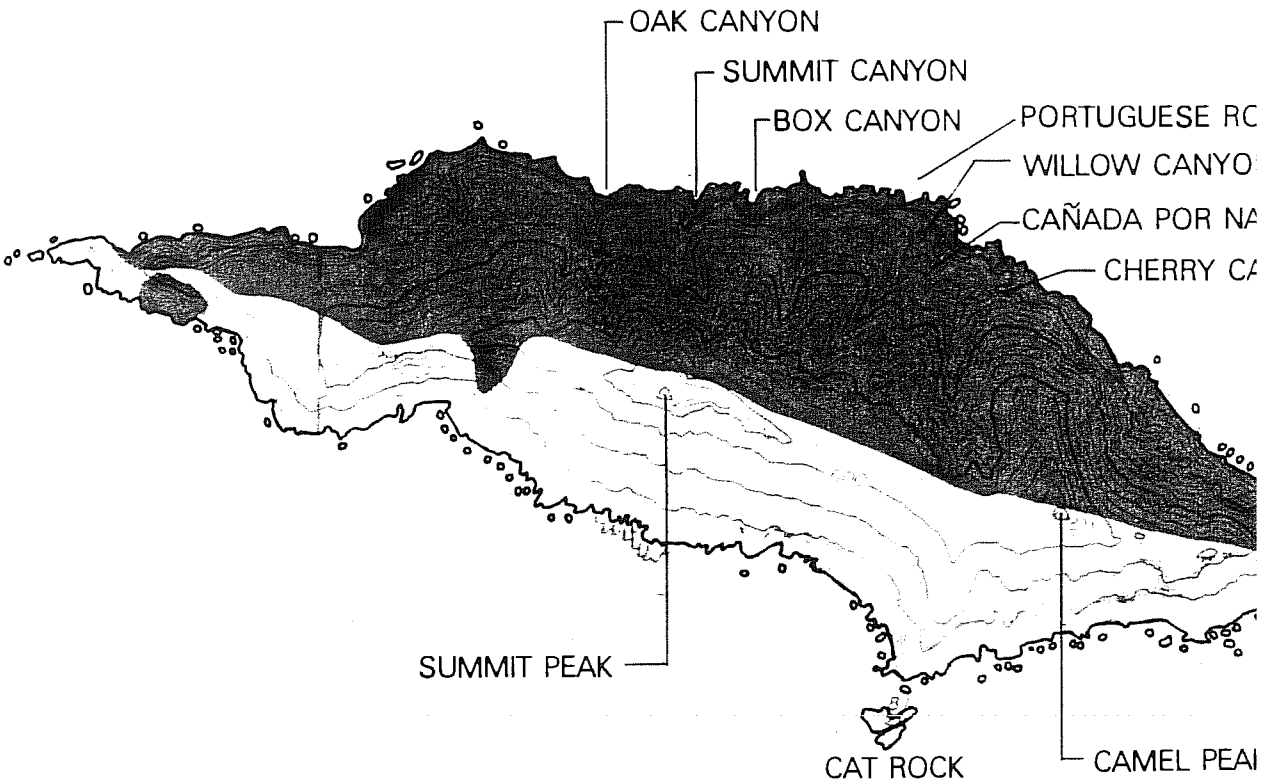
159 | 20013A
DSC | AUG 80

PINNIPED HAULING/ BREEDING GROUNDS

SANTA BARBARA ISLAND

CHANNEL ISLANDS NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE


OAK CANYON
SUMMIT CANYON
BOX CANYON
PORTUGUESE RC
WILLOW CANYO
CAÑADA POR NA
CHERRY CA
SUMMIT PEAK
CAT ROCK
CAMEL PEAI

RELATIVE SEASONAL ABUNDANCE OF PINNIPEDS ON SAN MIGUEL ISLAND
(after numerous sources)

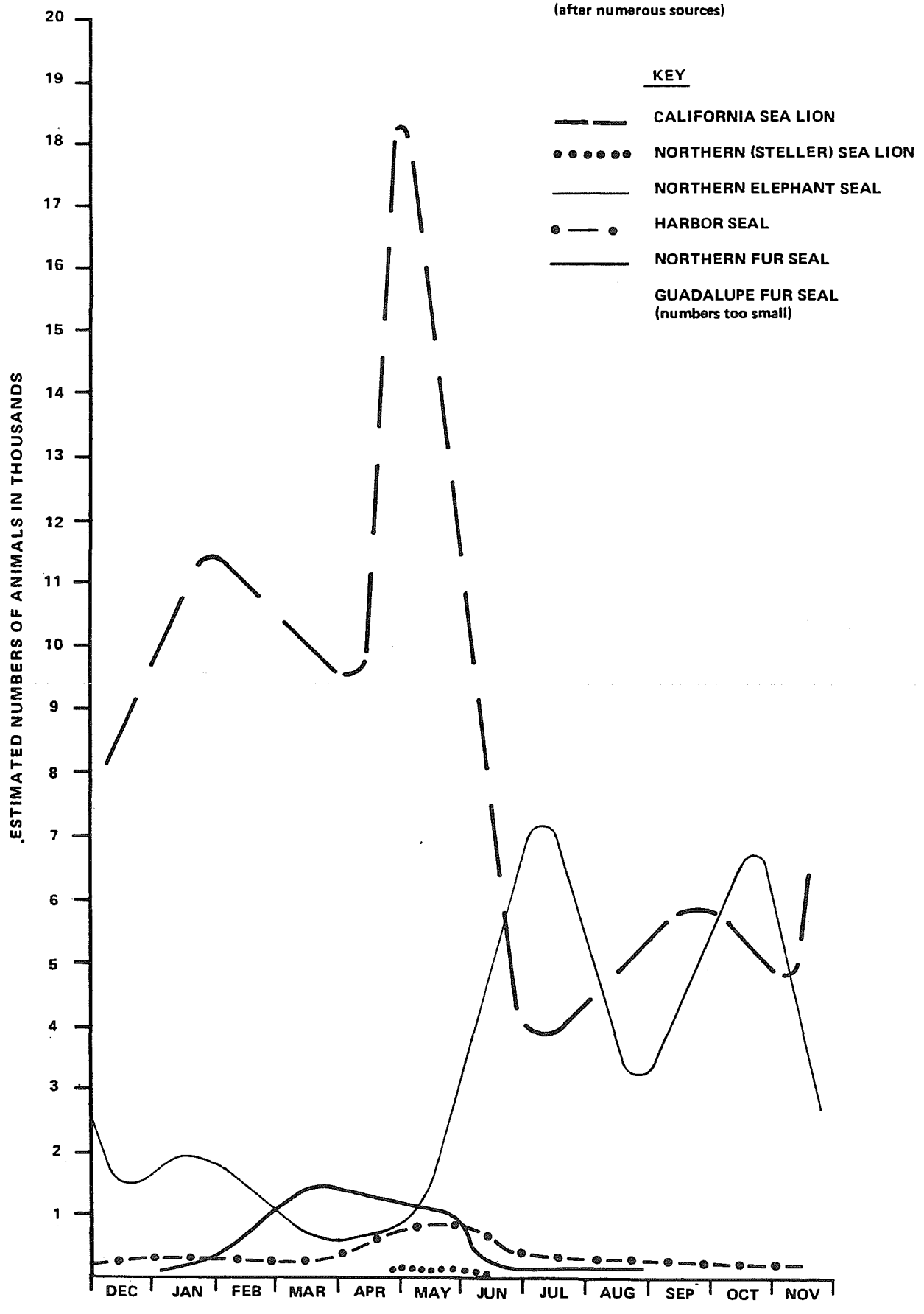


Table 4. Summary of Season-by-Season Activities of Pinnipeds in the Southern California Bight (SCB). (Source: LeBoeuf et al., 1979)

	SPRING (March through May)	SUMMER (June through August)	FALL (September through November)	WINTER (December through February)
California sea lion	Population builds as males return to the SCB from the north and females enter from the south; some premature pupping in mid-spring; males establish territories and pups are born in late May.	Breeding season; greatest numbers on land; foraging females form large rafts in feeding areas near rookeries; most pups born in June on San Miguel and San Nicolas islands; numbers decrease in August.	Post-breeding season dispersal; numbers decline on land as males move north and some females and young move south. Animals become more widely dispersed at sea; increased use of southern waters.	Influx of males into the SCB (Probably from the south). However, lowest total numbers on land. Animals widely dispersed with low density at sea
Northern elephant seal	Weaned pups depart rookeries adult females and juvenile males haul out for molting; yearlings arrive in the SCB from Mexican rookeries; peak numbers on land.	Sub-adult followed by adult males haul out for molting. fewest animals on land; most animals at sea.	Few animals on land. Arrival of some yearlings from Mexican rookeries; molt by young of the year and some juveniles.	Breeding season; males haul out in December and establish dominance hierarchy; females arrive and pups are born in January and February. Great numbers hauled out on the sand beaches of San Miguel Is.
Northern fur seal	Pelagic migrants return to the Bering Sea; animals of the San Miguel Island colony seen in increasing numbers on land; males establish territories in late May.	Breeding season; greatest numbers seen on land. Pups born in July and August on Castle Rock and Adams Cove rookeries. Seen at sea near rookeries and to the west.	Post-breeding season dispersal; decreasing numbers seen on land; rare at sea	Fewest animals seen on land. Pelagic migrants from the Bering Sea arrive offshore; most fur seals seen at sea.
Harbor seal	Pupping and breeding season; greatest numbers seen on land; largest herd size; pups seen in most herds and on most islands.	Post-breeding season dispersal numbers decline on land; herds are smaller and widely distributed within the SCB.	Few seen on land; herd size small; widely distributed.	Continued low numbers on land in early winter. By February, numbers begin to increase and a few pups are born.
Steller sea lion	Rare in the SCB; numbers increase on land; males establish territories on San Miguel Island, Castle Rock and Richardson Rock.	Breeding season; greatest numbers seen on land; pups born on Richardson Rock.	Numbers decline in early fall; extremely rare in late fall.	Still rare. However, numbers increase slightly in January.
Guadalupe fur seal	Casual visitor to the SCB; males may be seen on San Miguel, San Nicolas, and San Clemente Islands; very rare.	Breeding season for this species on Isla de Guadalupe, Mexico. Males seen in small numbers on San Miguel. No pupping in the SCB.	Rare but may be present in the SCB. None seen in fall in this study.	One male seen over the Santa Rosa Ridge. Rare in the SCB.

Table 5. Locations in the Southern California Bight (SCB) of Special Importance to Pinnipeds. (Source: Bonnel, 1979)

Location	Use
San Miguel Island (SMI)	This island is the single most important rookery and hauling ground of the pinnipeds in the SCB
Point Bennett	The broad sand flats area at the west end of SMI is the largest pupping ground and hauling ground of California sea lions and northern elephant seals in their range; it is a major pupping ground of northern fur seals, a pupping ground of Steller sea lions, and the only location in the SCB where the Guadalupe fur seal consistently hauls out in the summer
Tyler Bight to Cardwell	The south side of SMI is a pupping ground point and hauling ground of northern elephant seals and harbor seals in the winter and spring; juvenile California sea lions haul out in Tyler Bight during the summer breeding season
Harris Point	Major pupping ground and hauling ground of harbor seals
Simonton Cove	Major pupping and hauling ground of harbor seals at westernmost end of beach
Castle Rock	Near the west end of SMI, this large offshore rock is used as a pupping ground and hauling ground for California sea lions, northern fur seals, and Steller sea lions
Richardson Rock	Hauling ground of California sea lions on feeding forays; occasional use by Steller sea lions; pups were born here in summer 1975
Santa Barbara Channel	Important foraging area for California sea lions from San Miguel Island; also used to unknown extent by animals from San Nicolas Island
Ventura Shelf (to 500 m)	Seasonally important feeding ground in the depth contour late autumn
Midchannel 10 km south of Goleta Point	Important year-round feeding ground
San Miguel Is. shelf (to 500 m depth contour)	Important local feeding ground and staging area for feeding forays into offshore water
All waters west of San Miguel Is. and Point Conception out to, and including, Rodriguez Seamount	Important feeding ground and migratory pathway for California seal lions and northern fur seals
Santa Barbara Island	Pupping ground and hauling ground for California sea lions, northern elephant seals, and harbor seals; most areas along the shoreline with exception of Landing Cove are used by pinnipeds
Santa Barbara Is. shelf to 500 m depth contour	Important foraging area and migratory pathway for California sea lions
Anacapa Island	Hauling ground of California sea lions and harbor seals on the south side of the three small islands; no pups seen, but probably harbor seal pupping ground
Anacapa Passage	Substantial use by California sea lions as feeding ground and pathway for travel between San Nicolas Is. and eastern Santa Barbara Channel

Northern Fur Seal--Fur seals, like sea lions, are members of the eared seal family. They are distinguished from sea lions by their thick dark coat (a very dense layer of insulating underfur and a thinner, coarser layer of guard hairs) and their relatively large rear flippers.

The only breeding ground in the eastern Pacific Ocean south of the Alaskan Pribilof Islands is located on San Miguel Island. This population is currently estimated to be greater than 2,000 animals, a significant increase from the 100 individuals recorded when the colony was discovered in 1968. The San Miguel Island population feeds pelagically (in the open ocean) and opportunistically near shore on spawning species of fish.

Because of their dense fur, extremes in heat may influence breeding behavior. This sensitivity further increases their susceptibility to human disturbance. Frightened animals may suffer heat prostration if immediate access to water is not available. Oil from natural seeps or accidental spills has been shown to lessen significantly the insulative qualities of seal fur, resulting in an increased metabolic rate (Kooyman, Gentry, and McAlister, 1976).

Some fur seals are present almost year round at Point Bennett, San Miguel Island. The population increases dramatically in May and June as a result of the onset of the breeding season and peaks from late July to early August. Shortly after this, the population begins to decline. By October and November, females and their pups depart for pelagic overwintering. Only a very few northern fur seals are found on San Miguel between December and March.

Guadalupe Fur Seal--By far the rarest pinniped occurring on the Channel Islands, the Guadalupe fur seal presently hauls out on San Miguel and occasionally on San Nicolas.

While decimation by early fur sealing has obscured the history of occurrence, it is reasonable to assume from archeological studies that this fur seal was once abundant on the islands. Currently breeding only on Guadalupe Island off Baja California, Mexico, immature and small individuals frequently haul out during the breeding season (May to July) on San Miguel Island. There is a distinct probability for recolonization of San Miguel as a breeding population. The Guadalupe fur seal is subject to disturbance by humans and by oil coating the fur, as is the northern fur seal.

Very little is known about food habits, but it has been hypothesized that the Guadalupe fur seal feeds even nearer the shore of breeding and hauling islands than does the northern fur seal.

This species is listed by the state of California as rare and endangered and is being considered for proposal for endangered status by the National Marine Fisheries Service, Division of Marine Mammals. Formal designation is expected in 1980.

Northern Elephant Seal--A member of the family of earless seals (Phocidae), this is the largest (up to 6,000 lbs) pinniped in the northern hemisphere. Elephant seals molt once a year (every year of their lives) at varying times, depending on age and sex. This often requires a period of extended haul out so that the animals can remain dry.

Reduced to the brink of extinction in 1879 by hunters for their oil, the entire world population is now estimated to be some 47,000 animals. Because the present population has expanded from a small group and has low genetic variability, it is highly susceptible to disease.

Breeding grounds are located off the west coast of North America from the Point Reyes peninsula near San Francisco to Isla Cedros off Baja California, Mexico. Ten rookeries are used, nine on offshore islands. In order of size these include Isla de Guadalupe, San Miguel Island, Islas San Benito, Ano Nuevo Island and the adjacent mainland beach, San Nicolas Island, Isla Cedros, Southeast Farallon, Santa Barbara, and Los Coronados islands. While many colonies are increasing rapidly in size, the population on Santa Barbara Island is probably no longer expanding. Although elephant seals may be present on the islands throughout the year, the numbers and composition with respect to age and sex are variable.

Of particular interest is the inability of elephant seals to move quickly to the water when disturbed by man. This inability contributed to its near total extermination but also makes the elephant seal an unusually attractive subject for scientific study.

Harbor Seal--The harbor seal is the smaller member of the family of true, or earless, seals that inhabits the Channel Islands area. They are the only spotted pinniped occuring in this area.

Breeding colonies probably occur on all of the Channel Islands, although this status is unclear. The breeding season is between February and May. Harbor seals are believed to be relatively sedentary, forming small, stable, local populations. Some migration between islands may occur but has not been documented.

Harbor seals feed opportunistically in nearshore waters. They may be utilizing fish resources within the kelp beds surrounding the islands. However, further study is needed to document this.

Harbor seals generally haul out only on the most secluded beaches, rocks, and mud flats available, usually avoiding areas inhabited by other species of pinnipeds or seeking to avoid areas that are chronically disturbed by the activities of man. They are much more wary than any other pinniped of the Channel Islands area and can be approached closely only with great caution. Disturbed females will often "abandon" their young, returning to their pups after the cause for disturbance has departed. This behavior sometimes results in human attempts to "save" harbor seal pups, and sometimes contributes to their demise.

The present population of harbor seals on the Channel Islands is estimated to be about 2,000 animals. The largest numbers occur on San Miguel and Santa Rosa islands. Conflicting, incomplete, and inconsistent study methods make absolute population size determinations difficult. Recent documentation of population increases may be only the result of improved technique and intensified effort.

Island Accounts

San Miguel Island--San Miguel Island supports a greater diversity of pinnipeds than any other location in the world. Six species utilize the island in a seemingly coordinated manner, alternating breeding and haul out periods in a way that results in a continuous concentration of pinnipeds at preferred sites. Only limited areas are completely vacant throughout the year; most beaches and rocky areas have at least some pinniped utilization throughout varying times of the year.

A combination of factors characterize San Miguel Island as ideal pinniped habitat: cool weather, abundant fish resources, and--most important--the absence of human disturbance. The shore of San Miguel is highly variable, offering preferred choices for all species known to occur with any frequency along the California coastline.

Santa Barbara Island--While this is the smallest of the California Channel Islands, it ranks third in importance to pinnipeds. Three species are present: California sea lions, northern elephant seals, and harbor seals. These occur throughout the year with varying abundance. Because this

island is located approximately in the middle of the Channel Islands group, a continuous stream of animals passes by, hauls out, and stops to breed. The seasonal occupation of this island has several population fluctuations not seen on other islands.

Most of Santa Barbara is ringed by precipitous cliffs having little or no beach. The remainder of the shore is composed of several very different habitat types including rocky, exposed shelves; semiprotected cobble fields; broad, flat, sandy/dirt hauling areas; and isolated offshore rocks.

Anacapa Island--Anacapa is the second smallest of the California Channel Islands and is of relatively minor importance to pinnipeds. Because of its proximity to the mainland coast and identity as part of Channel Islands National Park it receives heavy boat traffic close to the shoreline around the entire periphery of the island, especially during late spring and throughout the summer. The shoreline consists of narrow beaches or rocky shelves backed by steep, towering cliffs. Most of the beaches are almost completely submerged during periods of high tides. Limited habitat and heavy human visitation combine to make Anacapa somewhat less desirable than other islands for stable pinniped populations. California sea lions haul out (and may breed) on this island. Breeding populations of harbor seals also occur here, predominantly on the southern sides of all three islets.

OBJECTIVES

A number of management objectives specifically related to the biological and behavioral needs of pinnipeds have been identified through extensive research and basic data collection. These objectives include the following:

Encourage species diversity and abundance of pinniped populations to return to the levels that may have occurred prior to the activities of European man and that were based upon habitat and food availability.

Allow natural processes and population fluctuations to occur with as little human intervention as possible.

Increase public understanding and appreciation of pinniped resources through education and nondisturbing observation.

Discourage or prohibit, especially during breeding seasons, any activities or programs that result in pinniped disturbance and do not contribute to management of the species.

Develop a conscious, vigilant concern and awareness for actions potentially detrimental to pinniped welfare.

Ensure that a regular systematically coordinated resource monitoring /research program is developed to provide basic information for pinniped resource management--this program is to be coordinated through and in agreement with the National Marine Fisheries Service or its designated agents.

GUIDELINES FOR MANAGEMENT

Expand interpretive programs to increase public understanding, enjoyment, and supervised observation of pinniped populations.

Ensure that pinniped research activities in Channel Islands National Park are consistent with previously described research policies and guidelines.

While the appropriateness and approval of research projects will be determined on a case by case basis through formal review procedures (see "Research" section), projects will conform to the above objectives. Generally, pinniped research emphasis will be placed upon studies that cannot take place at any other location, provide management information, and/or are observational as opposed to those that entail prolonged high intensity disturbance.

Continue designation of beaches and offshore rocks identified as traditional pinniped hauling and/or breeding areas as sensitive areas, with appropriate use.

These areas are identified on the preceding maps. General visitation during critical periods will not be allowed, and management-approved research will be permitted on a limited basis. Sensitivity to human presence is dependent upon a number of variables that include species, distance, topography, season, presence of gulls (alarm calls), and, more ephemerally, weather and time of day. Present observation sites and those identified in the General Management Plan have been established through evaluation of the preceding factors that influence sensitivity. Location of any future observation sites will be evaluated on a site-specific basis.

In order to prevent disturbance to pinnipeds, current California regulations prohibit a sea approach to the area around Point Bennett closer than 300 yards. In the absence of scientific evidence that closer habitual approach could be allowed, this distance will be encouraged around all areas identified as sensitive for pinnipeds.

Continue prohibition of commercial pinniped capture on park islands.

While National Marine Fisheries Service (NMFS) policy does allow commercial capture by permit, a current (draft) memorandum of agreement between the National Park Service and National Marine Fisheries Service prohibits these activities on San Miguel Island. Island capture operations can contribute to premature births, nonselective capture, significant land-based disturbance, modification of the multispecies community, and possible mortality and other detrimental effects. The legitimate demand for pinnipeds for display and most research purposes can be met through the services of any one of a number of pinniped rehabilitation centers located on the California coast.

Use park rangers to assist in protection of marine mammals through both interpretive programs and law enforcement activities.

Currently the National Park Service has primary jurisdiction and management responsibility only on the land of the islands. But through an agreement with the California Department of Fish and Game and a memorandum of agreement (draft in process) with the National Marine Fisheries Service, park rangers have been granted authority to enforce the Marine Mammal Protection Act of 1972, the California Fish and Game code, and other applicable California laws in waters within 1 nautical mile around the islands (state ecological reserves). As time, staffing limitations, and primary management responsibilities permit, park rangers will continue to cooperatively protect the resources surrounding the islands, utilizing the same low key and professional approach encouraged by NPS law enforcement policy guidelines.

Continue efforts toward development of cooperative agreements with other governmental agencies in order to provide increased pinniped protection in areas immediately adjacent to NPS jurisdiction.

As a means of reducing disturbance to pinnipeds on San Miguel Island, a boating closure zone has been established as part of the state of California's San Miguel Island Ecological Reserve. This closure prohibits boats within 300 yards of the island shoreline around Point Bennett from a line drawn between Castle Rock to Judith Rock. Now a year-round closure, recent proposals to allow opening for commercial fisheries during less sensitive, nonbreeding periods (March to April and October to December) were introduced in mid-1979. If approved, the seasonal opening of this area will be closely monitored by the National Park Service, National Marine Fisheries Service, and state to ensure no disturbance of

pinnipeds. State cooperation will be sought to designate additional areas of pinniped sensitivity as seasonal boating closure zones within the ecological reserves that surround the three islands.

Encourage cooperative agreements toward jointly funded management research. While special effort will be made in areas of concurrent management responsibility, continued efforts will be made to establish cooperative projects with public, private, and educational institutions.

Obtain information needed for management of pinnipeds.

It is apparent that while much information is available with regard to management of pinniped resources, many unknowns still exist. Resource management at Channel Islands National Park will require the following:

Data concerning the status and population of pinnipeds

An ongoing awareness as to the health of these populations (e.g., pup production, incidence of mortality)

An understanding of pinniped resource needs and awareness of any changes of their availability (e.g., food resources, undisturbed breeding areas, pollutant levels, etc.)

An awareness of impacts of park activities on pinnipeds (e.g., developments, level of visitation)

ACTIONS

In order to implement the above guidelines and management objectives, a number of actions are suggested. These actions include projects for immediate staff action, funded ongoing or problem-specific projects, projects performed by outside agencies that provide needed NPS information, and encouragement of non-NPS-supported projects that may provide incidental management related information. Priorities and project designations may change over short periods of time due to the degree of support available from cooperating agencies and institutions.

Immediate Staff Actions

- Establish clearly delineated air corridors.

Establish for all park islands air corridors for administrative and research use, based upon avoidance of sensitive resources and areas. Charts illustrating the designated routes will be prepared, distributed to charter firms and military personnel, and hand carried to pilots by NPS personnel on all administrative flights.

- Develop a response to action plans of other agencies for cleanup in the case of oil spills near the islands.

  Investigate commercial and governmental responsibilities and existing contingency plans. Determine the role of NPS personnel in implementing a step by step plan. Assemble such information into an available package easily accessible to island rangers and administrative staff.

- Encourage the state of California to adopt and/or extend seasonal boating closure zones within ecological reserves around all park islands in order to protect pinniped activities.

  Areas on San Miguel Island to be considered for such designation (at least during breeding seasons) include: Castle Rock, Otter Harbor, Hoffman Point Cove, east side Harris Point from the north tip to Bat Rock, Crook Point area, and east of Judith Rock along Tyler Bight. In general, the distances of these zones should be consistent with previously established regulations (300 yards); however, these may vary according to species present, season, or other factors. For example, a greater distance (e.g., 500 yards) may be more appropriate for the harbor seal areas at Hoffmann Point Cove, Otter Harbor, and Harris Point.

  Potential areas for designation on Santa Barbara Island include Southeast Rookery and the area from Webster Point to the east side of Elephant Seal Cove.

  Similar areas on Anacapa are locations from the south side of West Anacapa from the west tip to Cat Rock, along the harbor seal areas on the south side of Middle Island, and California sea lion haul outs on the south side of East Island.

- Designate all of the shoreline, sand flats, and dunes of the Point Bennett area below the cliffs and west of a line between Judith Rock and Castle Rock as a research natural area.

  Restrict public visitation and research activities. This area has the world's most diverse pinniped rookery with the largest populations along the North American coast south of Alaska's Pribilof Islands. The large numbers of seals and sea lions present throughout the year are highly sensitive to any human disturbance.

This area will be subject to all terms in the (draft) memorandum of agreement between the National Marine Fisheries Service and the National Park Service and the October 1976 agreement between the U.S. Navy and the National Park Service.

Resource Monitoring and Problem-Specific Projects (NPS)

- Initiate a program to monitor pinniped populations on all park islands.

  The proposed study would involve two phases: a triennial aerial photographic census and periodic ground counts and observations. (Observations would include mortality, pup production, and incidental behavioral observations.) This program should begin as soon as possible and terminate when appropriate agencies begin regular programs.

  The National Park Service receives information regarding the status and health of breeding pinniped populations within Channel Islands National Park from federal and state agencies involved with management of and research into these populations. However, additional research is needed to determine population status and health of pinniped stocks on Santa Barbara and Anacapa islands. The status of the California sea lion on Anacapa Island and the harbor seal on both Anacapa and Santa Barbara islands also requires more research. In the absence of monitoring programs from other agencies, the National Park Service will initiate and continue programs designed to provide information valuable to management of those resources within its administration.

- Initiate a study of the biology of the harbor seal on Anacapa, Santa Barbara, and San Miguel islands

  While the biology of the harbor seal on the Channel Islands is broadly understood through inference and interpolation of the results of studies performed elsewhere along the northern Pacific coast, very little knowledge specific to the harbor seal on the Channel Islands is available. This wary animal, highly sensitive to human disturbance, has been overlooked or often completely missed by researchers.

  Basic data needed on harbor seal biology on the Channel Islands includes accurate and complete locations of hauling and breeding areas (Santa Barbara and Anacapa islands, especially); seasonal and daily use of those areas; population dynamics--pup production and mortality, frequency of disturbance--both natural and resulting from human activities;

food habits and breeding habits (where and when); and patterns of movement.

This project will be of five-year duration, although it could be terminated or jointly funded at such time as other federal and/or state agencies initiate a program.

For the first two years, primary study will involve initial literature review, identification and observation of breeding and hauling site locations, frequent census taking, behavioral observations, (human/seal, incidental seal/seal), and opportunistic collection of physical data from already dead animals. A limited tagging program will be implemented to collect information regarding daily and seasonal movement patterns (both intra-island and inter-island) important in relation to patterns of visitor use. Nonbreeding seasonal work will study changes in numbers, locations of haul out, and will further establish annual patterns. Incidental observations to be taken throughout the year will include data relating to premature births, causes of mortality, and food habits.

Observations for the following three years will be made on an infrequent basis, providing for continued population census and estimates of pup production, and completing studies of human/seal interactions and tagging.

An aerial photographic census will be run on a triennial basis throughout the project. Although aerial census observations consistently underestimate harbor seal populations, ground counts will be taken at the same time for comparison. When ground-to-air truth values and new knowledge of harbor seal locations are combined, future use of aerial census (when coupled with low intensity field observations) should provide accurate data for management purposes.

- Study the interaction of human visitation and disturbance with pinniped activity.

This study could be a component in either of the two previous studies. However, if neither of those are initiated, this project should be implemented separately. Disturbance can come from visitors on both land and sea.

This project proposes seasonal research to study human-caused disturbance to pinnipeds and will occur on Anacapa Island from May to September, the period of heaviest visitation. Observations will be made to determine the frequency and degree of disturbance to both California sea lions (East Island) and harbor seals (East, Middle, and West). An attempt will be made to compare areas of high (East Island) and relatively

moderate (Middle or West islands) visitation. In addition, a comparison of midweeks, weekends, and holidays will further identify degrees and periodicity of disturbance.

Conditions from these observations will aid in management decisions regarding the impact of current visitation levels, determining site-specific allowable distances between visitors and pinnipeds, and formulating recommendations regarding establishment of closure zones within park lands and state ecological reserves. Because of the fluctuation and high frequency of visitor use, the data should encompass a broad spectrum of disturbance activities. Conclusions and recommendations should, therefore, be somewhat applicable to other areas within park jurisdiction. Because behavioral characteristics of pinniped populations may vary from one island to another, disturbance studies will also be conducted on islands other than Anacapa.

- Cooperate in other agency projects with specific NPS management implications.

  Many of these studies could be cooperatively funded; if not funded by appropriate outside agencies, projects could be funded by the National Park Service.

- Implement a field study in cooperation with the space station, U.S. Air Force designed, to monitor the impacts of space shuttle sonic booms.

  Current U.S. Air Force contracted studies are recording ambient noise levels and animal response to sonic booms on San Miguel Island. These studies should provide baseline information useful for management recommendations regarding frequency and pathway of shuttle launches and reentries.

  Should space shuttle overflights occur near or over the islands, a monitoring program will be designed to measure boom intensity and record pinniped response. Observations will be made by mechanical recording devices, photographs, and direct field observation. Impacts on other resources such as seabirds and caliche will also be studied.

- Encourage an intensified effort of cooperative studies of marine mammal/fishery interactions within the waters surrounding the Channel Islands.

  The California Department of Fish and Game is initiating NMFS contracted studies to identify potential pinniped/fisheries conficts along the entire coast of California. Initial effort planned for the Channel Islands area is low. Studies will

focus on the documentation of fishing effort and occurrence of marine mammal/fisherman interactions.

The National Park Service encourages an intensified effort, particularly to include an additional number of boat observers in the Channel Islands area. Studies should be designed to record information regarding fisheries abundance, annual recruitment, harvest impact, and other factors that may influence the abundance of pinniped food resources around each island. In addition to the influence of sport fisheries, the impact of commercial fisheries (with special emphasis on anchovy and hake) needs to be examined.

The interrelationships and dependence of pinnipeds on fish stocks and pinniped feeding ranges must be determined on an island by island basis in conjunction with this study of available pinniped food resources.

These studies should be coordinated with NMFS pinniped studies on San Miguel, University of California (Irvine) seabird research on Santa Barbara Island, and U.S. Fish and Wildlife Service and California Department of Fish and Game pelican studies on Anacapa Island. The information will then serve as a useful basis for making fisheries management recommendations toward successful perpetuation of pinniped and seabird stocks.

- Cooperate with and encourage the National Marine Fisheries Service to intensify studies designed to monitor breeding colony expansion and population dynamics of the northern elephant seal on San Miguel Island.

  An annual pup count is undertaken once a year by NMFS biologists to determine the pup productivity and sites of breeding activity. Current timing and duration of study make it difficult to detect new area expansion by peripheral males and females and may miss newborn pups--signs of the potential recolonization of an area.

  Design monitoring studies to determine if potential expansion areas include beaches currently used by park visitors, the time scales, and the consequences of this expansion.

- Encourage projects that provide incidental management information.

  These are non-NPS-funded projects operated by outside agencies on an ongoing basis. Many of these studies provide basic data needed for NPS management responsibility incidental to their primary goal and may be currently underway. A brief discussion of these programs follows.

Behavioral Studies of California Sea Lions and Northern Fur Seals on San Miguel Island--Breeding behavior of these species is contrasted. Roles of various age classes and individuals can characterize the status and stability of populations (NMFS).

Food Habit Studies--Opportunistic samples of vomitus and scat from pinnipeds (especially California sea lions and northern fur seals) are currently collected to determine occurrence and percent composition of prey species. More intensive effort is encouraged in order to provide a more thorough understanding of pinniped resource needs.

Interspecific Interactions and Use of Space--The following questions need to be addressed: Is breeding and haul out space a limited resource? Is competition for that space resulting in changes of species occurrence? (This especially applies to interactions between northern elephant seal/harbor seal, northern sea lion/California sea lion, and California sea lion/northern fur seal.) Will species occurrence and interactions precipitate a change in species composition? What visitor management implications will these changes have? (Incidental NMFS studies.)

Medical Studies Conducted Incidental to Other Programs--Continue to encourage studies to monitor disease, pesticide, and heavy metal levels related to disease symptoms, isolation, and high levels of mortality. (NMFS, Naval Ocean Systems Center, California State University at Long Beach.)

IMPACTS

Most of the actions proposed are studies that have few if any impacts.

Establishment and use of air corridors will reduce disturbance (stampeding, crushing of young) to hauled out pinnipeds from aircraft noise. No significant change in aircraft fuel consumption will result from this action.

An awareness and cooperation in implementing an oil spill contingency plan will provide for a coordinated response in the event of a spill. This will allow for a shorter response time, potentially resulting in less oil fouling damage to wildlife or in faster rehabilitation and higher survival rates than would otherwise be possible.

Research projects proposed will have some general impacts. Observational studies will require the location of small observation blinds in isolated undeveloped areas that may be visible to some visitors. Any blinds would be removed at the termination of the study. Occasional disturbance to pinnipeds may result from research operations. A tagging program will cause short-term disturbance to isolated groups of harbor seals. The program will be scheduled to cause only minimal disruption to pupping/breeding activities. Identification of sensitive areas will restrict visitors from certain beach areas, discouraging viewing of wildlife at a close range and resulting in a less intensive visitor experience but providing increased protection to the resource.

SEA OTTERS (Enhydra lutris)

DESCRIPTION (of the Potential Resource)

The following information has been summarized from background reports by the California Department of Fish and Game (1976), Todd and Kenyon (1972), U.S. Fish and Wildlife Service (1978), and Woodhouse et al., (1978).

Prior to their eradication by Russian and American fur hunters, sea otters were distributed along the length of the northern Pacific coast of North America and south into central Baja California. Evidence from archeological investigations and historic accounts indicate that sea otters were formerly abundant around most of the California Channel Islands. By 1900 the California otters were thought to be extinct. However, a small remnant population persisted in the Point Sur area. Since a "rediscovery" of this group by the scientific public in 1938, the population has significantly expanded in number and range. An established population is still absent from the Channel Islands, although the thick kelp beds and rich marine life offer suitable habitat.

Distribution

The present distribution of sea otters includes a series of disjunct populations that occur around the Alaskan islands and mainland coast; introduced groups in British Columbia, Washington, and Oregon; and the central California population. The present range of the California population (about 2,000 animals) extends along the coast from Santa Cruz south to Avila Beach (10 miles south of San Luis Obispo). Solitary animals have been reported from Trinidad Head to San Diego, including several of the Channel Islands.

Distribution within the range is not even. Densities are much higher at the edges of the range (the "migrant front") than in the central portion. These groups usually consist of subadult and excess young males. Expansion into new areas by these animals may be related to food availability or to the result of natural tendencies to pioneer.

Should current management policies continue, expansion of the sea otters' range will be dependent upon the migration rates of animals at the migrant fronts. Southern range expansion rates average about 1.6 miles/year; however, these may vary depending on habitat type and availability of prey species. The spreading rate may increase significantly through sandy bottom areas, or slow over long ocean distances. It is very cautiously estimated (given present management philosophies and spreading rates) that the sea otter could establish a population naturally on the Channel Islands within 20 to 30 years.

Management Problems

Human activities that are changing the environment will no doubt affect sea otters. Oil pollution of waters occupied by sea otters probably would be fatal to them. This is of special importance in the waters of the Santa Barbara Channel, where natural seeps occur and extensive oil development is underway. Pesticide residues have been found in California sea otters, but the effect on them is unknown.

The sea otter is protected by the Marine Mammal Protection Act of 1972. In California the sea otter population is listed as threatened under the Endangered Species Act of 1973; the state also lists it as a completely protected animal.

Conflict exists over management of the sea otter population off the coast of California. Sea otters reduce the abundance of their prey species, some of which are desired by commercial and sport fishermen. Sea otters are opportunistic feeders, eating nearly all food items available including abalones, sea urchins, crabs, clams, assorted other invertebrates and, occasionally, small fish inhabiting kelp beds. Their high metabolic rate contributes to extensive feeding activities. Figuring a 25 percent daily body weight consumption rate, an average California sea otter consumes approximately 5,000 pounds of food annually. While some groups prefer that the abundance and range of sea otters be limited, preservation groups would like sea otters reestablished throughout their historic range. A request to the federal government for return of sea otter management to the state of California was issued in 1976.

(Potential) Habitat

In general, sea otters favor ocean waters adjacent to rocky coasts near points of land, or large bays where kelp beds occur. Kelp can serve an important function as a safe anchorage for sea otters during periods of inclement weather. However, the presence of kelp beds is not a prerequisite, as large groups of sea otters are permanent residents in areas where kelp is absent. Areas with extensive underwater reefs are particularly preferred. California sea otters rarely come ashore but have been observed ashore along the central California coast. Extensive sea otter habitat is currently unoccupied around all of the California Channel Islands. Anacapa Island is encircled by a broad shallow apron of rocky reefs; however, intensive public use has resulted in lowered densities of palatable invertebrates and fish. Especially rich forage is present around San Miguel Island, largely because of limited human accessibility. Santa Barbara Island is surrounded by dense extensive kelp beds and rocky reefs.

OBJECTIVES

It is the policy of the National Park Service to reestablish native species. Therefore the National Park Service will encourage and cooperate with the California Department of Fish and Game and other agencies in reintroducing or allowing repopulation of sea otters.

ACTIONS

- No actions directly relating to sea otter repopulation are proposed. Encourage and participate in cooperative studies designed to collect baseline data regarding present (pre-otter) nearshore marine resources.

  Some preliminary studies conducted by the California Department of Fish and Game, Bureau of Land Management, private institutions, and educational institutions have been initiated. However, more intensive studies designed to document long-term, location-specific changes are needed for the Channel Islands. Numerous permanent sampling stations within a variety of habitats around the islands should be studied over time. This would allow documentation of changes occuring within the distribution and abundance of floral and faunal elements of the intertidal and subtidal zones.

  These studies will provide data useful in assessing the impact of sea otters on the marine environment, should they become established, through comparison of data from the pre- and

post-otter ecosystem. From these assessments, recommendations, based on scientific understanding, for the management of sea otters and marine resources (especially fisheries related) can be made for the Channel Islands.

MARINE BIRDS

DESCRIPTION

The following information has been summarized from background reports by Hunt et al. (1979); Hunt, Pitman, and Jones, in press; Rindlaub (1979); Seagars (1979b); and Barratt and Hunt (1979); and from extensive consultation with professional seabird biologists.

The California Channel Islands serve as roosting and nesting grounds for a significant and diverse population of marine birds. Collectively these islands constitute a major seabird breeding area of the eastern north Pacific, the largest such area in the United States south of the Farallon Islands. Populations of marine birds that are currently breeding on the Channel Islands include representatives of 7 families, including 13 species. Tables 6 and 7 list species present, their breeding distribution, and nesting seasons on the Channel Islands.

The rich, offshore waters of the Channel Islands serve as a significant foraging area for these breeding species as well as for a huge but short-term population of migrant seabirds. These migrants include shearwaters, loons, grebes, albatross, storm-petrels, fulmars, and others.

Table 6. Nesting Season* of Marine Birds Breeding on the Islands and Offshore Rocks of Channel Islands National Park (Santa Rosa and Santa Cruz islands excluded)

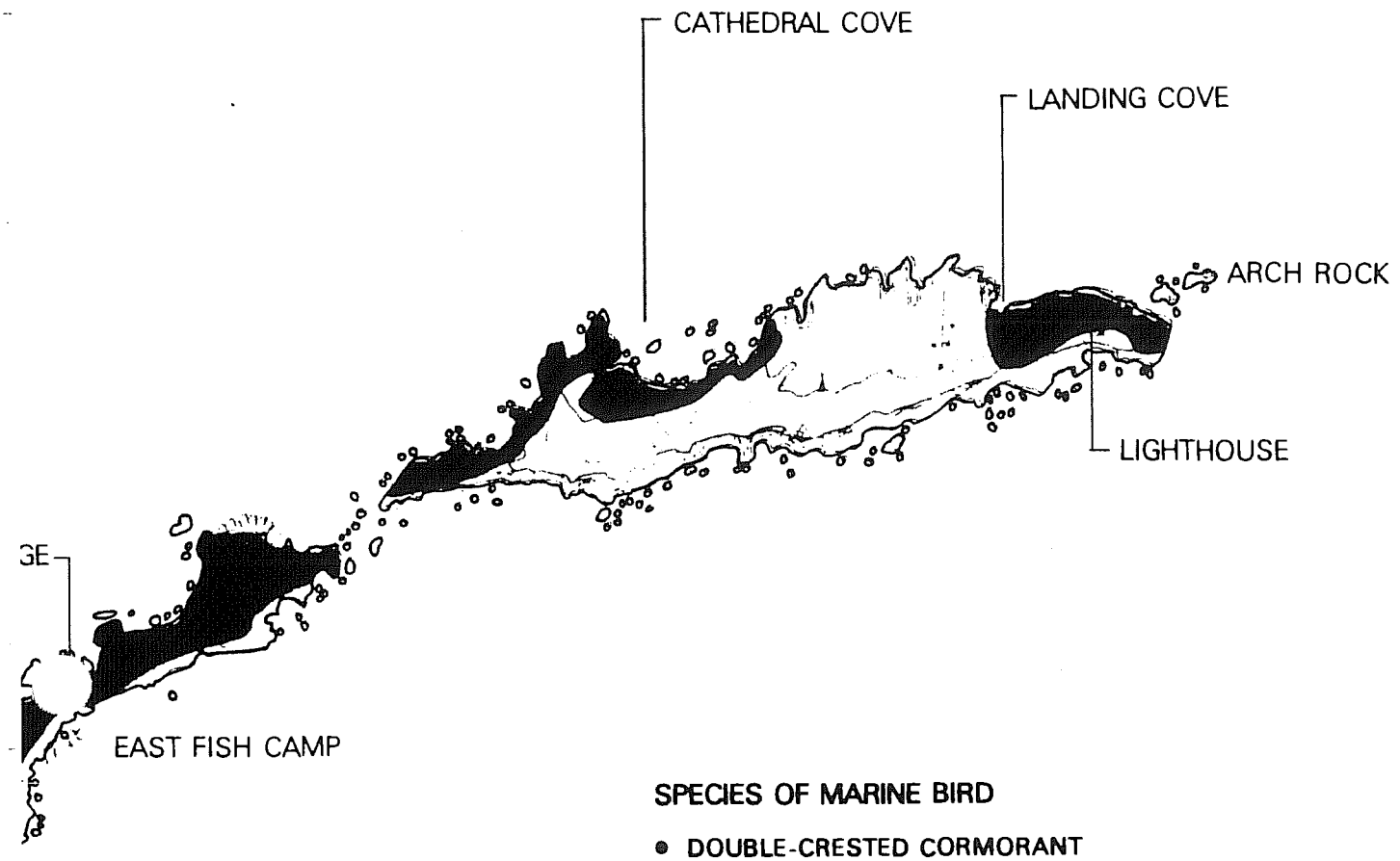
SPECIES	DATES
Leach's storm-petrel	May - 5 September
Ashy storm-petrel	May - 27 July
Black storm-petrel	22 May - 13 August
California brown pelican	January (late) - August
Double-crested cormorant	March - August (late)
Brandt's cormorant	April (mid) - August
Pelagic cormorant	March - August
Black oystercatcher	May - August (third week)
Snowy plover	April - August
Western gull	January (late) - July (late)
Pigeon guillemot	May - August
Xantus' murrelet	February - June (late)
Cassin's auklet	February - August

*Nesting season is defined as the time period extending from nest building through chick fledging. Values are best estimates from Hunt et al. (1979). Actual courtship and breeding activities may begin earlier or extend later due to environmental fluctuations or disturbance-related events.

Table 7. Maximum Number of Seabird Pairs Estimated to Breed on Channel Islands National Park 1975-1976. (Santa Rosa and Santa Cruz islands excluded)
Source: Hunt et al. (1979)

	East Anacapa	Middle Anacapa	West Anacapa	San Miguel	Castle Rock	Prince Island	Santa Barbara	Sutil Island	Shag Rock
Leach's storm-petrel	-?	-?	-?	?	+?	2+	?	?	?
Ashy storm-petrel	-?	-?	-?	+?	100	900	125	25	?
Black storm-petrel	-?	-?	-?	0	0	0	60	15	?
California brown pelican	0	0	417	0	0	0	0	0	0
Double-crested cormorant	0	0	15	0	0	75	10	60	0
Brandt's cormorant	0	2	1	27+	916	907	73	93	0
Pelagic cormorant	0	2	1	100	34	20	2	2	0
Black oyster-catcher	10 on 3 islands			24	3	3	6	2	-?
Snowy plover	-?	-?	-?	25	-?	-?	?	-?	-?
Western gull	100	2,400		30	50	500	1,162	75	9
Pigeon guillemot	5 on 3 islands			200	100	150	45	15	?
Xantus' murrelet	1+	?	?	+?	+?	75	5,000	75	15
Cassin's auklet	-?	-?	?	10	1,000	10,000	75	35	0

Key: -? probably not present
+? probably present
? status undetermined



SPECIES OF MARINE BIRD

- DOUBLE-CRESTED CORMORANT
- WESTERN GULL
- XANTUS' MURRELET
- BROWN PELICAN

NORTH

0 ½ MILE

0 ½ KILOMETER

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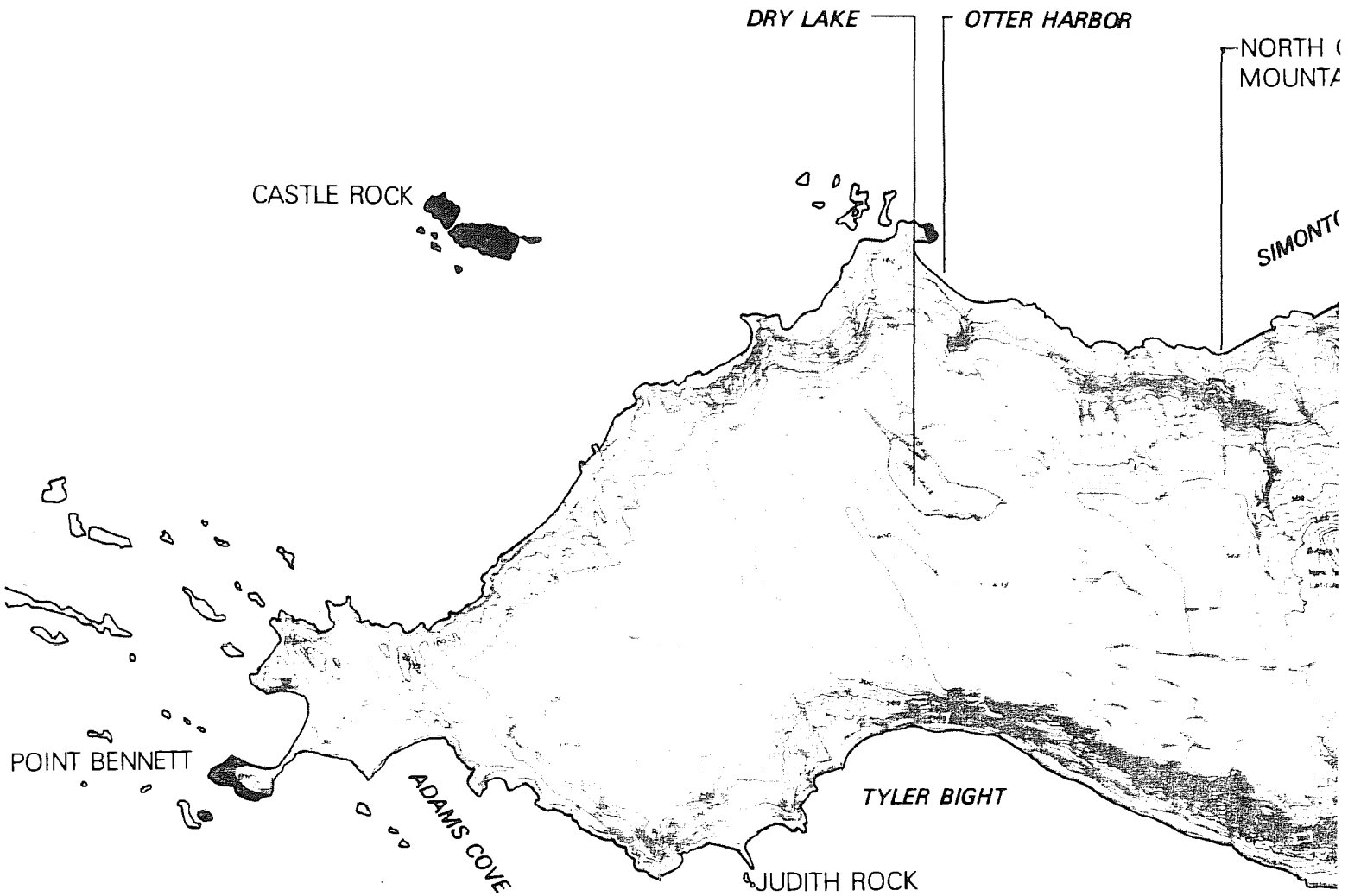
DSC	AUG 80

BREEDING AREAS OF MARINE BIRDS

ANACAPA ISLAND

CHANNEL ISLANDS NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

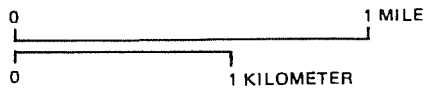

DRY LAKE
OTTER HARBOR
NORTH
MOUNTA
SIMONT
CASTLE ROCK
POINT BENNETT
ADAMS COVE
TYLER BIGHT
JUDITH ROCK
GREEN MOUNTAI
SOUTH GREEN MOUNTAIN CAI

BREEDING AREAS OF MARINE BIRDS

SAN MIGUEL ISLAND

CHANNEL ISLANDS NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE



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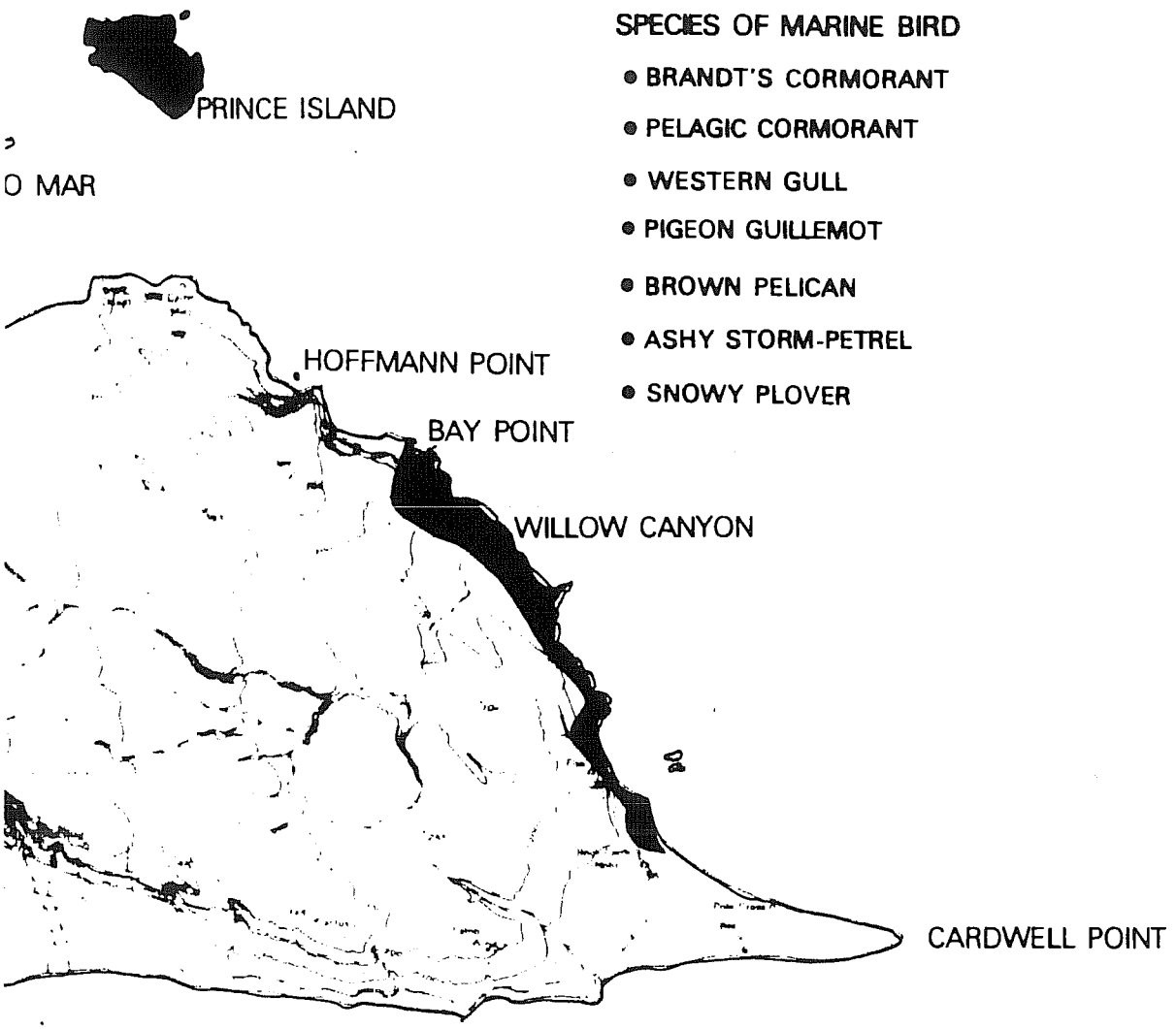
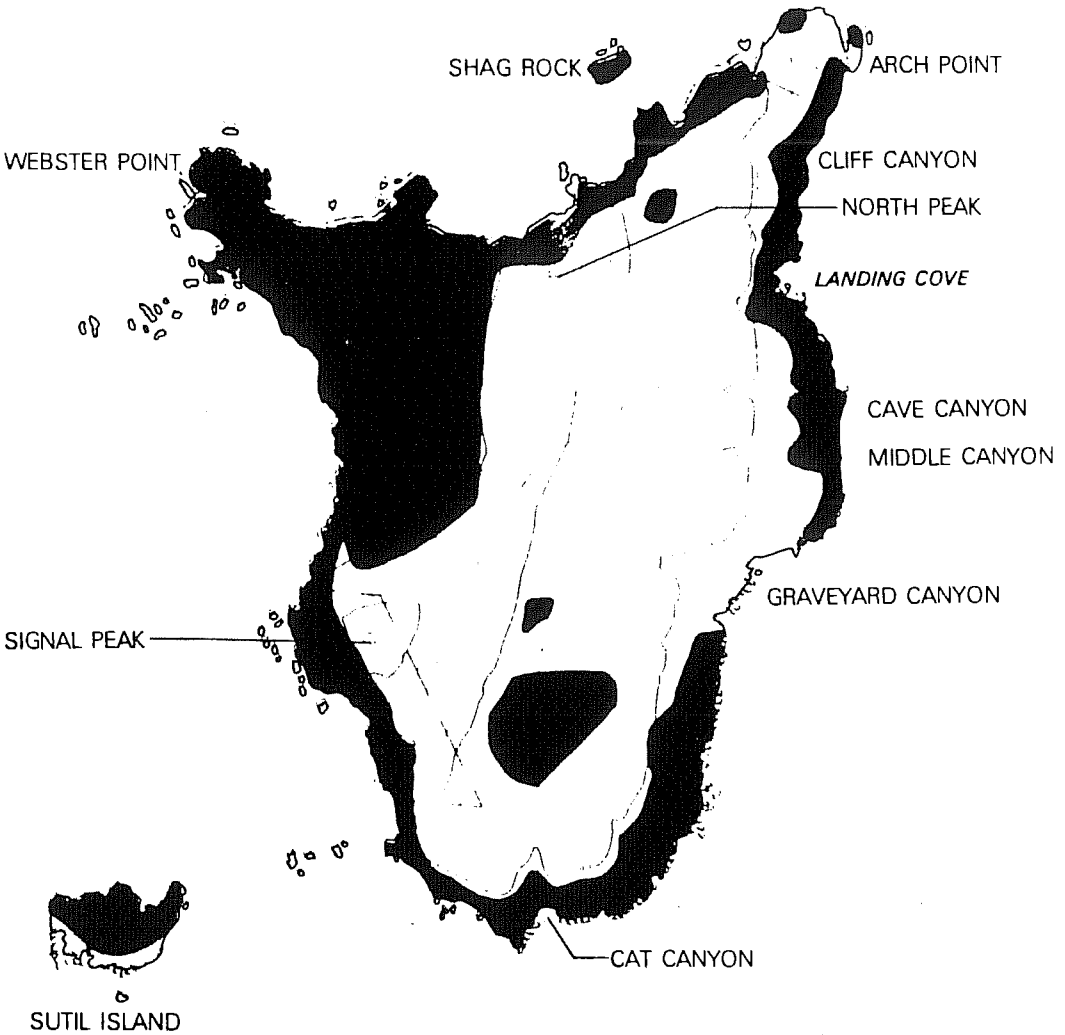
SPECIES OF MARINE BIRD

- BRANDT'S CORMORANT
- PELAGIC CORMORANT
- WESTERN GULL
- PIGEON GUILLEMOT
- BROWN PELICAN
- ASHY STORM-PETREL
- SNOWY PLOVER





SPECIES OF MARINE BIRD

- BRANDT'S CORMORANT
- DOUBLE-CRESTED CORMORANT
- PELAGIC CORMORANT
- WESTERN GULL
- PIGEON GUILLEMOT
- XANTUS' MURRELET
- BROWN PELICAN
- ASHY STORM-PETREL

NORTH

0 ½ MILE

0 ½ KILOMETER

159 | 20016A
DSC | AUG 80

BREEDING AREAS OF MARINE BIRDS

SANTA BARBARA ISLAND

CHANNEL ISLANDS NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

Populations of breeding seabirds in the southern California area have changed considerably during historical times. Elimination of breeding populations of two species, the common murre and the tufted puffin, may have been the result of natural population fluctuations, human disturbance, and/or changes in food availability. Populations of Xantus' murrelets and Cassin's auklets have experienced fluctuations influenced by the introduction and eventual removal of terrestrial predators and the extirpation of breeding peregrine falcons from the islands. Major declines in abundance of California brown pelicans, double-crested cormorants, and Brandt's cormorants have been related to sensitivity to direct human disturbance and pollutant-related reproductive failures.

In 1969 the presence of DDT metabolites was shown to be the cause of thin eggshells that resulted in reproductive failure of pelicans and cormorants nesting in the Channel Islands. Recent studies have shown that the initial "DDT improvement" seen in 1972 has leveled off without any significant change or gradual improvement since that time. It appears that the eggshell problem (for pelicans) remains chronic off southern California. Recent studies have also identified elevated levels of polychlorinated biphenyls (PCBs) in seabirds. Similar levels have been shown to result in birth defects and aborted young in marine and terrestrial vertebrates.

It is apparent that the greatest factor that has affected (and generally depressed) seabird populations on the Channel Islands is the presence of modern man. Surrounded by rich, productive waters, the Channel Islands currently serve as a sanctuary from intensive human disturbance. However, populations of seabirds are currently and will increasingly become critically sensitive to the activities and management practices of man in the foreseeable future.

Until recently, research and resource management activity specifically concerning the seabird populations of the Channel Islands has generally been negligible. Notable exceptions are the extensive research dealing with the endangered brown pelican and some limited work on western gulls. In anticipation of oil lease sale 48, the Bureau of Land Management funded baseline studies from 1975 to 1978 to gather information regarding distribution, occurrence, critical seasons, and resource needs. However, much of this information is of a preliminary nature. BLM funding has now been curtailed, yet continued intensive work is needed both to maintain an ongoing knowledge of seabird populations and to offer better resource recommendations in areas of joint administration. It is apparent that much information needed for management is unavailable and may be long in becoming available. The California Department of Fish and Game has responsibility for the welfare of seabirds within its jurisdiction; the Fish and Wildlife Service is responsible outside of state jurisdiction.

Distribution and Seasonality

Seabird use of the land of the Channel Islands can be divided into two components: nesting and roosting. Certain traditional areas on the islands are used by the birds for these activities, but there is some annual variation in the exact areas used. Roosting occurs throughout the year by both breeding and nonbreeding birds. Breeding activities occur seasonally (generally March to August), often in areas traditionally used as roosting sites. Some species (Xantus' murrelet, the storm-petrels, Cassin's auklet) come ashore only to breed, remaining at sea the remainder of the year.

Mechanisms governing site selections and timing of island use are basically understood, but there are still many unknowns. Generally, most seabirds nest in densely crowded colonies on small isolated islands. Factors contributing to the selection of traditionally utilized roosting and breeding areas include absence of terrestrial predators, freedom from human disturbance, exposure to cooling northwest winds, presence of suitable nesting substrate (e.g., hard ground and steep cliffs--cormorants; soft ground or small burrows--auklets and murrelets), and availability of preferred prey species.

The Channel Islands serve as a meeting place for species at the edges of their geographic breeding ranges. Species having a more northerly distribution generally occur on the western islands, while more southern species occur on the islands of the eastern end of the northern chain and the southern island group. These relationships are similar to those found in other species of both plants and animals and are due to the complex nature of the oceanographic factors present in this transition zone area.

Species Accounts

Storm-Petrels. Storm-petrels are small birds of the open ocean. Foods include larval and small fishes, shrimp, and other planktonic animals. Details of their biology are not as well known as those of other groups of seabirds, partly because they restrict their island visits to nighttime.

> Leach's Storm-Petrel (Oceanodroma leucorhoa)--This species is the most widespread storm-petrel in the northern hemisphere. In the eastern Pacific it breeds from Alaska south to Islas San Benitos, Baja California, Mexico. Breeding in the Channel Islands area has been noted since 1968. Birds are now believed to breed in small numbers on Santa Barbara Island and on Prince Island, adjacent to San Miguel Island. Nesting occurs in tiny rock holes and crevices in the sides of precipitous cliff faces. Food habits of Leach's storm-petrels breeding around the Channel Islands are virtually unknown.

Ashy Storm-Petrel (Oceanodroma homochroa)--This small petrel breeds from the Farallon Islands, off San Francisco, south to the Los Coronado Islands, Mexico. The largest known population is on the Farallon Islands, but smaller colonies exist on San Miguel, Santa Cruz, and Santa Barbara islands and their immediate offshore rocks and islets. Throughout the breeding season, birds seem to occur principally in waters within the "vicinity" of home islands. Because ashy storm-petrels are difficult to distinguish from other petrels, their at-sea distribution and seasonality is not well known; however, they are believed to be present in nearby offshore waters from at least May to January, and perhaps all year. This species may formerly have been more common and widespread on the islands. Burrows and ledges in large sea caves are used as nesting sites. While food resources are poorly known, they are believed to include small planktonic organisms which the parents regurgitate to feed their young as a "fish soup".

Black Storm-Petrel (Oceanodroma melania)--This storm-petrel historically bred on Los Coronados Islands and other offshore islands of Baja California and Mexico. In 1976 breeding birds were discovered on Sutil Island just off Santa Barbara Island. Thus Santa Barbara Island is at the northern limit of the black storm-petrel breeding range; this is probably the only breeding site for this species in the United States. Black storm-petrels lay a single egg in naturally occuring crannies and recesses, but seem to prefer burrows excavated by Cassin's auklets or other storm-petrels. Nesting occurs most commonly during June for colonies farther south. This petrel shows a preference for warmer coastal waters and tends to remain closer to shore than Leach's storm-petrels. Black storm-petrels are commonly seen in southern California from April to October, migrating south to the equator in winter. Foods include larval fish, squid, and garbage.

California Brown Pelicans (Pelecanus occidentalis californicus). The California brown pelican has historically bred from near Point Lobos, Monterey County, south to the Tres Marias Islands off Baja California. Now the only consistently used nesting site in the western United States occurs on West Anacapa Island. Breeding activities on Anacapa Island shifted from East Island to West Island in the 1920s, probably in response to human disturbances related to the installation of the U.S. Coast Guard lighthouse.

A major population decline occurred between 1968 and 1973, and this species was designated as endangered by the U.S. Fish and Wildlife Service in 1971. This population decline has been related to thinning of eggshells caused by high levels of DDT; these levels

initially lowered slightly in 1972 and continue to fluctuate. Eggshells have thickened as a result; however, the problem appears to be chronic. Since this species is at the edge of its range, it is particularly sensitive to environmental fluctuations and human disturbance. Colonies on San Miguel and Santa Cruz (Scorpion Rock) islands have been abandoned, and numbers on Anacapa Island have fluctuated widely. In January 1980 a small breeding population of pelicans recolonized Santa Barbara Island (Seagars, personal observation). Successful nesting on this island had last been noted in 1967; however, as this document went to press, it was too early to predict the long-term or short-term breeding success of this colony.

Recovery of the population has also been hindered by oscillations in food availability. In Mexico, several breeding sites have been abandoned due to tourism. As a result, the overall population and reproductive success continues to fluctuate widely.

Although information on food habits is limited, pelicans are inshore feeders that principally utilize northern anchovy but also feed on saury, mackerel, and blacksmith.

Cormorants. Three species of cormorants nest and roost in dense colonies on the Channel Islands. Their food habits are similar, although much variation in composition of food species occurs from island to island. Food consists of common varieties of midwater fish species that inhabit kelp beds.

All cormorants are known to be extremely sensitive to human disturbance. A single appropriately timed disturbance can result in a total reproductive failure when a colony is flushed by an intensive event. When incubating cormorants are flushed from their nests, eggs are often crushed beneath their feet, kicked off the steep cliffs, or eaten by western gulls. Disturbance to nesting cormorants is not likely to originate from land; however, significant disturbance can and does originate from boating activities, aircraft, and sonic booms. Potential for significant disturbance to cormorants nesting on the northern Channel Islands exists from the proposed U.S. Air Force space shuttle program. Current studies are underway to determine the behavioral response of cormorants to impulse noise.

Previously breeding in greater numbers, cormorants nesting on the Channel Islands experienced a population decline in the last century. However, reproductive success has increased since the decline of the high DDT levels of the late 1960s. "It appears now that the double-crested cormorant is capable of reproducing at a rate necessary to achieve growth for the colonies on the Channel Islands if the human disturbance problem can be eliminated." (Kelly, personal communication.)

Double-crested Cormorant (Phalacrocorax auritus)--This is the largest cormorant found on the west coast of the United States and the only one that nests at inland sites. This is the cormorant species most likely to be encountered in estuaries and quiet bays on the California coast. Breeding colonies are reported from southwestern Alaska to Baja California. Once a very common breeder in the Channel Islands, breeding numbers have decreased since the turn of the century, until at present only a remnant population persists. Reasons for the decline are not clear and probably involve a combination of several elements. Human disturbance has probably been a major factor; other factors may include decline of the Pacific sardine and reproductive failures related to DDT-induced eggshell thinning. Recent trends showing increased reproductive success may be related to lowering of DDT levels in the marine environment. Nesting occurs on steep vegetated slopes or cliffs on the north sides of the breeding islands. The timing of reproductive events may be highly variable from year to year due to environmental conditions, colony location, and/or disturbance.

Brandt's Cormorant (Phalacrocorax penicillatus)--By far the most abundant cormorants nesting in the Southern California Bight, Brandt's cormorants nest in the same areas as double-crested cormorants but usually lower on the cliff faces. The nests are composed of seaweed. Brandt's cormorants breed along the eastern Pacific coast from British Columbia to Baja California and in the Gulf of California. Nesting invariably occurs on the north sides of the larger Channel Islands and other locations with exposure to the prevailing northwest winds. The breeding season usually precedes that of the double-crested cormorants by about two weeks.

Foraging Brandt's cormorants are commonly found in large flocks in or near kelp beds in the vicinity of their breeding colonies. They almost never feed more than a few miles from land.

Pelagic Cormorant (Phalacrocorax pelagious)--This smallest of the cormorants that occurs in the North Pacific is also the least numerous of the three species of cormorants that breed on the Channel Islands. Not occurring in colonies as dense or large as other cormorants, pelagic cormorants nest on precipitous, exposed cliff faces abutting the open ocean. Nests constructed of guano-cemented seaweed are built in small crevices or on ledges. Breeding season and food habits are similar to that previously discussed for other cormorants.

Black Oystercatchers (Haematopus bachmani). These shorebirds occur along the coast from the western Aleutian Islands to central

Baja California. The southernmost breeding populations occur on the Channel Islands. Recent estimates indicate that probably over one-fourth of California's black oystercatchers breed on the Channel Islands.

Nesting occurs on rocky headlands in the high intertidal nearshore area and on offshore islets of the Channel Islands. Eggs are deposited in natural depressions in rock that are lined with gravel and seashell fragments.

Preliminary studies indicate that their diet consists almost entirely of mussels, but some limpets and chitons are also taken.

Snowy Plovers (Charadius alexandrinus). This shorebird breeds the length of California on sandy ocean beaches and also around inland lakes. Like the least tern (Sterna albifrons), loss of open beach nesting habitat due to increased human activity has resulted in significant reduction in the populations breeding along the California coast. Isolated beaches of San Miguel and San Nicolas islands provide the only significant coastal breeding areas of snowy plovers remaining in the state. A shell-lined scrape in the sand serves as a nest. Foods include small marine invertebrates and insects occuring along the shoreline.

Western Gulls (Larus occidentalis). This "sea gull" is the most widespread breeding marine bird in the Channel Islands. The present breeding range extends from Washington to Baja California. While this species probably formerly bred on the mainland coast of California, nesting is now restricted to offshore islands, associated islets, rocks, and sea stacks. There appears to have been little change (other than short-term fluctuations) in the numbers and locations of breeding western gulls since the turn of the century.

Western gull colonies are usually found on the exposed north and northwest sides of the islands and are almost always associated with vegetation. Vegetation is important in nest building and for protection of young from both the elements and predators (often neighboring gulls).

Factors that affect breeding success include food availability, weather, disturbance, and predation. Egg mortality increases with the amount of time adults spend off the nest. This factor is most critical on hot days shortly before eggs are due to hatch (mid-May). Disturbance resulting in nest desertion can lead to increased mortality due to both thermal exposure and predation by neighboring gulls.

Western gulls forage opportunistically on a variety of fish close to their colonies. Preliminary studies have indicated that reduced availability of preferred food items (especially anchovy and saury)

results in reduced reproductive success. Major components of the diet of western gulls vary on different islands: Squid has been of particular importance at Prince Island, and anchovies and sauries are most important at Santa Barbara Island.

Alcids. The northern counterpart of the penguin family, the alcids include auklets, murres, puffins, guillemots, and murrelets. These short-winged, pelagic birds are expert swimmers and divers. Generally coming ashore only to breed, they nest in crowded colonies on sea cliffs or in rock slides and in burrows.

Pigeon Guillemot (Cepphus colomba)--These birds breed throughout the Bering Sea region, across the Aleutian chain, and as far south in southern California as Santa Barbara Island. Completely absent during the winter, they are commonly seen near the breeding islands or island passages from February through August.

Pigeon guillemots breed in small groups within caverns or damp northern exposed sea cliffs. One or two eggs are laid on a collection of small rock chips or pebbles. Numbers and distribution in the Southern California Bight seem to have changed very little in this century. During the breeding season, pigeon guillemots forage in nearshore waters adjacent to their colonies. Recent studies only rarely noted foraging birds more than 1 nautical mile offshore; food taken was nearly always fish.

Xantus' Murrelet (Endomychura hypoleuca)--The narrow breeding range of Xantus' murrelets is restricted to the islands between central Baja California and Point Conception; the northernmost colony currently occurs at San Miguel Island. Murrelets come ashore to breed (February - June) but are essentially absent the remainder of the year. It is believed that murrelets move north to feed offshore during the nonbreeding season.

Xantus' murrelets nest primarily in natural crevices around the periphery of islands. Nests are most concentrated in canyons that contain rocky substrate and Eriophyllum bushes. Nests may also occur under buildings and other man-made artifacts that offer sufficient cover.

The present breeding distribution of Xantus' murrelets in the Channel Islands is similar to that recorded early this century. Only on Anacapa and Santa Barbara islands has their status shown any significant change. Murrelets on Anacapa Island have declined considerably, probably coincident with the introduction of the black rat. The population on Santa Barbara Island, numbering a few thousand birds, is probably

the largest known breeding population of this species in the world. The dramatic increase of murrelet numbers on Santa Barbara seems to be related to the disappearance of two predators, the feral house cat and the peregrine falcon.

Food items of murrelets include larval fishes (especially northern anchovy) found within the immediate vicinity of the islands. Preliminary studies have shown that murrelets respond to fluctuations in prey species availability by nest abandonment and other behavioral modifications.

Cassin's Auklet (Ptychoramphus aleuticus)--Cassin's auklets are the most abundant of the marine birds found breeding on the Channel Islands, where they reside year round. Some 23,000 auklets nest in this area; however, the largest colony of auklets (105,000 - 120,000) in California is located on Southeast Farallon Island. Cassin's auklets range from the Aleutian Islands of Alaska to Isla San Roque off Baja California. They usually nest in dense colonies on offshore islands with loose topsoil suitable for burrowing. Burrows may honeycomb an area so thoroughly that the soil structure may become undermined, highly unstable, and sensitive to collapse.

Breeding activities may begin as early as January, when birds arrive at night to excavate or renovate their burrows. Chicks hatch and fledge sometime between late April and late August.

Fluctuations in Cassin's auklets' abundance may be related to changes in water currents resulting in differential food availability and to the presence of introduced terrestrial predators. The elimination of these animals and the reduction of native birds of prey may have allowed the population of Cassin's auklets to increase. They are expected to recolonize Santa Barbara Island.

Larval fish and euphausiids constitute the majority of preferred food items of Cassin's auklets. Foraging generally occurs away from the islands in areas of upwelling and may involve flocks of up to 150 birds.

Habitat

San Miguel Island. San Miguel and, more importantly, its two small offshore islets (Prince Island and Castle Rock) support the largest and most diverse seabird colonies of the Channel Islands. More than 60 percent of the marine birds currently nesting in the area and 8 of the 13 breeding species (Leach's and ashy storm-petrel; Brandt's, double-crested, and pelagic cormorant; pigeon guillemot; Cassin's auklet; and snowy plover) have their

most important colonies on this island. Additionally, breeding populations of the western gull, black oystercatcher, Xantus' murrelet, and roosting brown pelican occur regularly on this island.

The absence of terrestrial predators and a minimum of human disturbance on Prince Island and Castle Rock enable large numbers of seabirds to successfully breed.

The steep cliffs, soft dirt (for burrowing), and vegetated areas of these islets all combine to provide a wide variety of preferred nesting habitats. Protected sea caves and isolated vegetated areas provide nesting habitat for guillemots and murrelets on the island proper. Isolated broad sandy beaches provide snowy plover nesting areas that are free from human disturbance. However, the presence of island foxes (Urocyon littoralis) probably limits extensive seabird nesting on the island proper. Rich foraging areas are close to the island: infrequently harvested kelp beds are thick around Castle Rock and to the south of the island, and significant areas of upwelling are located to the north.

Santa Barbara Island. Santa Barbara with its offshore islets (Sutil Islet and Shag Rock) is the second most important seabird nesting island of the Channel Islands. Nesting here is probably the world's largest population of Xantus' murrelets; the only United States population of black storm-petrels; a large colony of western gulls; populations of ashy and Leach's storm-petrels; pelagic, double-crested, and Brandt's cormorants; Cassin's auklets; and black oystercatchers. California brown pelicans roost here; a breeding colony appears to have been reestablished recently.

Both the island and its surrounding islets are free from significant terresterial predators. An endemic mouse is present on the main island and is responsible for some murrelet and auklet egg mortality. The last feral house cat was removed in 1978. Providing a varied habitat, Santa Barbara Island is ringed by precipitous sea cliffs and has two low peaks with well-vegetated rolling plateaus. Numerous sea caves and crannies are present.

Santa Barbara Island is surrounded by dense, extensive kelp beds that support a wide variety of marine life important as food items for seabirds. Rich offshore feeding areas are found nearby to the northwest and west of the island.

Anacapa Island. Anacapa has the fewest nesting species of marine birds of the three islands; however, it is the only place in the western United States where the California brown pelican breeds regularly. Middle Island supports the largest western gull colony in the Channel Islands. Also breeding on this island are populations of Xantus' murrelet; pigeon guillemot; Brandt's, double-crested, and pelagic cormorant; and possibly Leach's storm-petrel.

West Anacapa has steep, heavily vegetated slopes. It has been designated as a research natural area and is therefore closed to public visitation to protect nesting habitat of the brown pelican. A state ecological reserve boating closure zone has been established on the north side of West Island to further prevent disturbance to breeding and feeding pelicans.

All three islands (East, Middle, and West) are characterized by precipitous sea cliffs pocketed by numerous sea caves and burrows that provide habitat for seabirds. The tops of these islets are heavily vegetated, providing nesting habitat for western gulls. The presence of introduced black rats may have resulted in substantial mortality to nesting seabirds and may be the reason for such limited use of the island by burrow nesters such as Xantus' murrelets, Cassin's auklets, and species of storm-petrels.

Kelp beds surround the island; however, the heavy use of these areas by commercial and sport fishermen and private boaters has resulted in significant disturbance to breeding and feeding activities of the seabirds present there.

OBJECTIVES

Encourage state and federal agencies to manage the marine and associated resources around the Channel Islands to ensure adequate marine bird food reserves and to guard against increased levels of pollutants entering the marine environment.

Allow species diversity and abundance of breeding marine bird populations to return to the levels that may have occurred prior to the activities of European man and that were based upon habitat and food availability.

Allow natural processes and population fluctuations to occur with as little human intervention as possible.

Increase public understanding and appreciation of marine birds through education and observation without disturbance.

Discourage or prohibit any activities or programs that result in disturbance to marine birds and do not contribute to management of the species, especially to breeding colonies.

Develop a conscious, vigilant concern and awareness for actions potentially detrimental to the welfare of marine birds.

Ensure the implementation of a regular, systematically coordinated resource monitoring/research program to provide basic information for the management of marine birds.

GUIDELINES FOR MANAGEMENT

Because human disturbance within or in close proximity to marine bird colonies can and often does result in reduction or elimination of nesting success, appropriate guidelines need to be followed.

Expand interpretive programs to increase public understanding and enjoyment of marine bird populations.

Require all research activities to conform to park policies and to minimize disturbance to marine birds.

Continue to designate as sensitive areas all beaches and offshore rocks identified as traditional seabird roosting and/or breeding areas. (See preceding maps.)

Public visitation into these areas is prohibited in order to prevent disturbance. (Only management-approved research programs will be permitted within these areas on a limited basis.) The design of present and any future trail systems will include site-specific examination to ensure that disturbance to critical seabird and shorebird nesting areas will be minimized or eliminated. Working with appropriate agencies, close approach to roosting and/or nesting colonies will be discouraged. This distance of observation should be great enough to ensure that birds do not abandon a roost or colony site; specific distances will depend on species present, boat size and type (approach from sea), time of year, and individual colony characteristics. Exact distance determinations will result from proposed study and monitoring of trial regulations. Seasonal closure of some trails may be required to offer maximum protection to nesting areas.

Continue restricting visitor use of trails and campground areas and continue prohibiting cliff climbing.

On Santa Barbara Island, Cassin's auklets are reoccupying former habitat used for nesting. Off-trail use would compact the soil and prevent burrowing activities associated with nest building. Cliff climbing is unsafe because of the unstable substrate; additionally, cormorants and Xantus' murrelets use these areas for nesting and roosting.

Continue to prohibit pets on the islands; visitors should restrain pets when a colony is approached from the sea.

Feral house cats have significantly altered populations of breeding seabirds on the Channel Islands, and dogs have a significant potential for disrupting nesting seabirds.

Use park rangers to protect roosting and/or nesting marine birds through interpretive programs and law enforcement.

Rangers will assist the state in these activities within the 1-nautical-mile boundary of the ecological reserves surrounding the islands; they will also carry out responsibilities pertaining to sections of the Endangered Species Act and other statutes.

Continue efforts to develop cooperative management agreements with other governmental agencies to provide increased seabird protection in areas immediately adjacent to NPS jurisdiction.

For example, as a means of reducing disturbance to nesting California brown pelicans, a seasonal boating closure zone has been identified as part of California's Anacapa Island Ecological Reserve. This closure is designed to keep boats out of waters shallower than 20 fathoms on the north side of West Island from Frenchy's Cove to Rat Rock, the westernmost tip of the island. This closure is in effect from March 1 to May 31 and may be considered for extension should nesting activities be of lengthy duration. Establishment of additional closure zones in close proximity to highly sensitive cormorant nesting areas and other intensively used marine bird areas is proposed in "Actions."

Obtain more complete knowledge of the park marine birds. Include the following information:

awareness of their status and populations; knowledge of the health of those populations (e.g., chick production, incidence of mortality); understanding of marine bird resource needs and awareness of any changes of their availability (e.g., food resources, undisturbed breeding areas, pollutant levels); and awareness of the impacts of park activities on marine birds (e.g., developments, level of visitation, boat and air traffic).

Encourage cooperative agreements toward jointly funded management research in areas adjacent to park islands managed by the state.

Since breeding marine birds are dependent upon nearshore and offshore areas for feeding activities, management of these areas is of concern to the National Park Service. Research activities investigating the food habits and resources of marine birds and their interrelationships with the surrounding ecosystem are of special interest.

ACTIONS

Immediate Actions

- Design island air corridors to avoid sensitive marine bird areas.

  (See "Pinniped" section.)

- Develop a staff response to action plans of other agencies for cleanup of oil spills near the islands.

  Plans will specify an action plan to protect and rehabilitate seabirds should oil approach or impact the islands. (See "Pinniped" section.)

- Initiate removal/control program for introduced black rats on Anacapa and San Miguel islands.

  Introduced black rats on Anacapa Island have been documented to prey on eggs, chicks, and even adult brown pelicans and western gulls. It is believed that the activities of rats have contributed to or directly caused the reduction/elimination of breeding populations of Xantus' murrelets and storm-petrels on Anacapa Island. Black rats have also been documented on San Miguel Island and may be causing reduced reproductive success of cormorants nesting there. (For more details of this program refer to "Black Rats" section.)

- Designate Sutil Islet, Shag Rock, Castle Rock, and Prince Island as research natural areas off limits to public visitation.

  Enforce additional restrictions on legitimate research. These offshore areas are significant year-round seabird roosting and nesting areas. Prince Island is the most significant seabird island on the western coast of the United States, south of the Farallon Islands. It is riddled with nesting burrows of Cassin's auklets, and any attempt to walk on the island will cause destruction of nesting habitat. For these reasons, even management-related research and monitoring should be severely restricted. Monitoring should be conducted from boats. Shore trips will be allowed only at very infrequent intervals.

- Designate the following areas as sensitive, subject to the following restrictions on use:

  Anacapa Island--Middle Island - closed to visitors in nesting season, April 15 - August 1; largest western gull colony in the Channel Islands

San Miguel Island--Otter Harbor - closed; prominent brown pelican and cormorant roosting area

Point Bennett - closed; cormorant breeding/roosting area

Harris Point, sea caves - closed April - August; nesting pigeon guillimots

Simonton Cove beach - discourage unaccompanied beachcombing, especially from mid-April to late July when snowy plovers nest and raise their young. These birds frequent the shoreline and higher sand dune/driftwood strewn interface of the island and are easily disturbed

Santa Barbara Island--study feasibility of prohibiting visitor use where trails approach California brown pelican nesting and roosting areas

- Ensure U.S. Air Force monitoring of space shuttle impacts to the California brown pelican on all park islands to comply with the Endangered Species Act.

  Some of the space shuttle launches will generate a sonic boom over Anacapa Island, where most of the breeding and nesting of the California brown pelican takes place. While there is a low probability that pelicans will be repetitively exposed to booms during the breeding period, the effects of booms on eggs, embryos, chicks, and roosting mature birds should be monitored so that any negative impacts to this endangered species can be avoided or mitigated during subsequent launchings.

Research Actions

- Develop a plan and initiate monitoring of the status of seabird populations.

  This information is essential for evaluating changes in populations and understanding the causes of these changes. The primary goal is to provide the understanding needed to resolve ongoing problems (particularly human caused) related to fisheries management, direct disturbance (visitor and staff), oil development (present and proposed), and the space shuttle program. This survey would encompass one or more of the following alternatives.

- Conduct a small-scale program to record numbers of seabirds in large colonies at a single carefully selected point in the breeding season.

This method provides a minimal data base where none may exist; however, it has the potential to produce falsely based conclusions in the event of alteration of postcensus reproductive effort.

- Conduct an annual or semiannual monitoring program throughout the breeding season to provide information on hatching success and to document a seasonally complete reproductive effort.

  Because of the increased costs and logistic problems of short-term visits, an onsite approach may not only be easier than periodic visits but may also generate a more complete data base.

- Encourage and assist in a brown pelican monitoring program.

  Continue to monitor brown pelican population trends and any future impact from increased oil and gas development activities. Cooperative efforts of personnel from the California Department of Fish and Game, the United States Fish and Wildlife Service, and various universities have provided needed information. If monitoring programs by other groups are discontinued, initiate a program to provide the needed information.

- Study the levels of disturbance (human and natural) to seabirds.

  Populations of cormorants and pelicans may be capable of reproducing at rates necessary to achieve growth, provided that pollution and human disturbance are significantly reduced. However, some areas will be disturbed out of necessity if visitation is to continue.

  Studies of disturbance to breeding seabird colonies will be conducted during the months of heaviest visitation (May - September). The following will be addressed: frequency of disturbance, distance of disturbance from colony, time of day and season, intensity of sound disturbance, impact of disturbance to colony (percent mortality, and numbers affected). A comparison of midweeks, weekends, and holidays should further quantify degrees and periodicity of disturbance.

  Conclusions derived from these observations will aid in formulating management decisions regarding the impact of current visitation levels, in developing site specific allowable distances between visitors and seabirds, and in offering recommendations regarding establishment of closure zones within park boundaries and state ecological reserves. Conclusions and recommendations should, therefore, be applicable to other islands within park jurisdiction.

- Encourage and, if necessary, support pollutant monitoring research.

  Encourage continued monitoring of levels of DDT metabolites and polychlorinated biphenyls (PCBs) in the marine environment as they relate to seabird nesting success.

- Ensure other research and encourage cooperative study of the impact of kelp cutting on seabird foraging at Santa Barbara Island.

  Preliminary studies have documented that species of cormorants, western gulls, and brown pelicans spend a significant amount of time foraging in or near kelp beds. It has been hypothesized that removal of kelp from foraging areas may have a severe detrimental impact to populations of kelp-bed-feeding seabirds breeding on the Channel Islands.

  This study should include detailed documentation of seasonal seabird use of both kelp and nonkelp areas around the islands; comparison of the utilization of recently harvested and nonharvested areas; time for regrowth of kelp (how does this vary seasonally?); and recommendations for continuation, seasonal use, or total cessation of kelp harvest with respect to seabirds. Opportunistic underwater observations would be a minor component of this study in order to assess which portion of the kelp canopy is used by which seabird species and to document prey taken.

- Encourage a study of the food habits and the foraging areas used outside park boundaries by seabirds nesting on the islands.

  The recent BLM studies of seabirds have identified some areas surrounding park waters that are utilized extensively for feeding by island nesters (especially western gull, Cassin's auklets, Xantus' murrelets, and ashy and black storm-petrels). Some limited ocean transects will provide supplementary data. These transects would involve cruising the waters from 1 to 10 miles offshore Anacapa, Santa Barbara, and San Miguel islands. Observations of feeding seabirds should be correlated with surface and midwater trawls. Sampling should occur throughout the year, with emphasis directed to seabird breeding seasons (March - August).

- Encourage and cooperate in a study of use of nearshore waters by migratory species of seabirds.

  A significant portion of the seabirds that utilize the surrounding waters are migratory species. During specific times of the year these birds dominate the species composition of the Southern California Bight. "The passages and waters surrounding the northern Channel Islands are particularly

important. . . ." (Briggs et al., 1979). During these peaks in abundance, more than 2 million sooty shearwaters alone may be present in this area on a given day. The tremendous impact to local fish populations by the foraging activities of these migrants is obvious but almost totally unstudied. While most foraging activities of these migratory seabirds occur outside 1 nautical mile from the islands, feeding concentrations occur within the nearshore area with sufficent regularity to warrant management concern for their welfare as related to oil and gas exploration and use of fish resources within and around park waters.

Long-term study to identify preferred foods, further energy requirements, availability of forage, and fishery impacts with regard to migrant species utilizing nearshore island waters should be jointly initiated. This study should correlate oceanographic data with resource needs and availability in the nearshore island and total Southern California Bight area.

- Encourage and cooperate in studies of reproductive behavior of western gulls on Santa Barbara Island (ongoing University of California, Irvine, study).

- Encourage intensified studies of the biology of the snowy plover on San Miguel Island.

- Initiate studies of the biology of black oystercatchers on the Channel Islands.

- Continue to encourage and assist in sonic boom studies of disturbance to seabirds (other than brown pelicans) on San Miguel Island (ongoing USAF, Hubbs-Sea World Research Institute studies).

IMPACTS

The use of designated air corridors will reduce the frequency and intensity of disturbance to breeding/roosting colonies of marine birds. An increase in reproductive success may result.

Reducing and/or controlling the black rat populations may result in increased nesting success of marine birds (see section on "Black Rats").

Designating Sutil Islet, Shag Rock, Castle Rock, and Prince Island as research natural areas will ensure a minimal level of disturbance to sensitive habitats. Prohibition of visitation to certain areas will diminish the visitor experience, but this loss could be mitigated through the use of intensive interpretive programs designed to increase appreciation of the needs of seabirds.

Development of a seabird monitoring program at the initiation of any study could result in minimal disturbance to the colonies being studied. Proper technique should avoid or mitigate this impact. The information obtained will ensure effective management for an enhanced marine bird resource.

SUBTIDAL AND INTERTIDAL MARINE RESOURCES

DESCRIPTION

Tidal and offshore areas of the Channel Islands contain most of the remaining relatively pristine marine assemblages in the southern California region. The coastline of the islands is composed of rocky shorelines and precipitous headlands that define isolated stretches of broad sandy beaches. In comparison to the mainland coast, largely disturbed by man's influence and intensive development, island coastal communities are virtually untouched. However, these nearshore and intertidal habitats have been and will continue to be increasingly exposed to the impact of an exceptionally large recreation oriented public (Littler, 1978) as well as the pressures of intensive commerical operations.

Management is the responsibility of the state of California, but the Park Service will cooperate in both management and research activities because of its involvement with these resources: park boundaries extend 1 nautical mile seaward, and many island based resources are dependent upon the surrounding marine ecosystems. Additionally, visitor use of park islands impacts these resources.

As is true for many other resources, marine resources of the islands are vastly influenced by the transitional nature of the Southern California Bight. Presence of both northern and southern flora and fauna contributes to an exceptional diversity. Point Conception, 23 miles to the north of San Miguel, is considered a dividing line between northern and southern marine assemblages. San Miguel and San Nicolas islands are surrounded by the cool water of the California Current, which supports more northern species, while San Clemente, Santa Catalina, and Santa Barbara have predominantly southern species influenced by the warmer water of the California Countercurrent. Anacapa, Santa Cruz, and Santa Rosa islands have mixtures of both northern and southern forms. In general, communities on the northern sides of these islands are more profoundly influenced by the cooler California Current, while those on the southerly sides are influenced by warmer waters and are more similar to southern forms. Therefore, most of the marine communities that can be found along the entire

California coast are found around the islands in a relatively close relationship.

Rich, undisturbed tide pools abound on the islands, and their species diversity and abundance are unparalleled on the eastern Pacific coast. Especially significant are stocks of intertidal black abalone, the only such remaining populations of the southern California area. These intertidal areas serve as significant breeding and nursery grounds for a myriad of invertebrates and fish, are a major recreational attraction, and represent a scientific resource that only recently has begun to be studied.

The offshore islands are surrounded by kelp beds of varying size and extent. Kelp and other marine algae provide subtidal habitat for fish and invertebrates, allowing them to feed, reproduce, and hide from predators. These plants and animals form the basis of a complex ecosystem that eventually supports more visible life forms such as seabirds, seals, sea lions, and formerly, sea otters. Of the three islands, Santa Barbara is surrounded by especially dense and extensive kelp beds.

Habitat

Anacapa Island. Surrounded by precipitious cliffs, the 11-mile shoreline is narrow and generally inaccessible from land. The notable exception is Frenchy's Cove. The south side of this area is a broad tide pool and boulder beach that extends from Frenchy's Cove west to Cat Rock (about three-quarter mile). Tour boats bring visitors to the area on a regular basis and, as a result, the area has undergone extensive alteration from visitor related activities (Littler, 1978). The intertidal zone is characterized in a few limited areas by black sand beaches.

The island is surrounded by a broad shallow apron of rocky bottom reefs at water depths suitable for the establishment of thick kelp beds. The more extensive beds occur over the broader and more protected reefs of the southern side of the island (Hadder and Mel, 1978).

Due to the proximity of this island to the mainland, its accessibility, and high levels of human visitation, utilization of marine resources is high. Both sport and commercial fishing are intense. Lobster, abalone, rock scallop, rockfish, halibut, kelp bass, sheephead, and other species of gamefish are taken by sport divers and fishermen. Commercial activities include harvest of sea urchin, abalone, lobster, crab, sea bass, anchovy, mackerel, and other finfish. Kelp harvesting does not currently occur at Anacapa Island.

San Miguel Island. The 24-mile intertidal zone of this island is highly variable. Rocky headlands define extensive lengths of broad sandy beaches. Rocky intertidal zones generally consist of jagged, fissured benches and ridges. The northern shore is exposed to heavy surf, the persistently strong northwest winds, and the cool waters of the California Current; these conditions profoundly influence the character of this zone. Small amounts of fresh oil and tarry lumps are found on the island--a natural oil and gas seep is located approximately 5 km north of the western end of the island. Because visitation is extremely low, composition of the intertidal zone is essentially pristine (Littler and O'Brian, 1978).

Shorelines with no northwest exposure support moderate to dense kelp beds, particularly on the southwest coast. The beds on the northwest coast are sparser and show a great degree of seasonal variability (Hedder and Mel, 1978). Formerly thick kelp beds in Cuyler Harbor have been reduced by siltation of the harbor bottom--the result of erosion accelerated by overgrazing. Recent observations indicate this trend may be reversing as deposited sand is carried away by ocean currents (Johnson, 1979).

Only limited private and commercial sport fishing and diving occur around this island due to its isolation and inclement weather. Sport fisheries concentrate on abalone, rock scallop, rockfish, kelp bass, and sheephead. Commercial fisheries for abalone, lobster, and sea urchin occur around the island, primarily on the south shore near the Point Bennett area. The level of effort is low, again a function of distance and weather. Kelp is harvested from this island only on an infrequent basis.

Santa Barbara Island. The intertidal zone on the east coast consists typically of a narrow steeply sloping band along the shore, backed by a steep cliff (Seapy and Littler, 1978). The area immediately south of the landing cove receives some minor human visitation. The intertidal zone within the landing cove is heavily impacted from human activity associated with boat landing and "tide-pooling." North, west, and south sides of the island are generally composed of isolated, exposed boulder beaches backed by very precipitous cliffs. Small sandy beaches are present in Elephant Seal Cove and south of Webster Point. With the exception of the intertidal area within and immediately south of Landing Cove, all areas are closed to visitation due to the presence of three species of pinnipeds. There is a total of 5 miles of shoreline.

Santa Barbara Island is surrounded by extensive kelp beds. Major beds occur over rocky reefs located to the northwest, northeast, and southeast of the island and between the island and Sutil Islet. Sandy bottom areas are present west and east of the island; considerable siltation of the east portion is the result of water runoff from the island's eastern canyons. While sport fishery

impact is not as great as at Anacapa, extensive commercial use does occur. Principal resources involved are sea urchin, abalone, lobster, mackerel, anchovy, rock cod, shark, and sea bass. Kelp harvesting was reinitiated in June 1978.

Special Management Consideration and Zones

The state of California has designated the waters of Anacapa, Santa Barbara, and San Miguel islands from the mean high tide line to 1 nautical mile seaward as ecological reserves. Within these reserves special regulations and usage zones pertaining to protection and perpetuation of marine resources have been established. Limitations on commercial and sport take of resources within specific areas have been established.

The reader is referred to appendix C for the details of these regulations. It should be noted that these regulations are subject to change. The latest California Fish and Game code should be consulted.

OBJECTIVES

Cooperate, encourage, and assist the state in development of management philosophies that emphasize the nonconsumptive use of marine resources within the state ecological reserves that surround the islands.

Assist the state of California in management of the nearshore and intertidal zones, to ensure perpetuation of marine resources.

Encourage and assist in cooperative research efforts designed to provide management information.

Assist the state with enforcement of special regulations pertaining to the ecological reserves and other appropriate state laws.

Provide for educational, interpretive, and recreational use of intertidal and nearshore areas, recognizing the need for establishment of procedures designed to mitigate human impact.

Cooperate with and assist appropriate state and federal agencies in implementation of existing action plans for containment and clean-up of oil spills to protect the marine resources surrounding the islands.

ACTIONS

Cooperate with the state to encourage implementation of the following research projects.

- Initiate further studies designed to monitor impact to intertidal areas that are continuously subject to visitor use.

  Preliminary studies at Frenchy's Cove, Anacapa Island (Littler, 1978), indicate human disturbance has occurred; however, seasonal fluctuations and other factors need to be assessed in order to more fully document the degree of impact. Further investigations of previously established study sites should be supplemented with additional sampling areas. New transect lines should be placed in areas subject to human use and areas free from human use. Alternatives for mitigation of human-caused impact should be developed, tested, and implemented.

- Initiate intensive intertidal resource sampling studies for all three islands.

  In the course of recently completed BLM investigations, highly localized permanent study sites were established on all of the Channel Islands. It is recommended that these sites be monitored on an infrequent basis to document either man caused or natural change and that a number of other permanent sites be established to further document the resources present. These studies will provide a broader base on which to monitor impacts from visitation, collection, and oil pollution.

- Initiate intensive, long-term studies that will address both intertidal, nearshore, and pelagic species important to both commercial and sport fisheries. (The state of California has designed and funded studies of a preliminary nature; additional long-term, in-depth research is needed.)

  Species requiring special emphasis include: lobster, abalone, sea urchin, rock scallop, and finfish--especially northern anchovy, mackerel, saury, rockfish, calico bass, and sheephead. Baseline densities of these resources will be identified at a significant number of repeatable sampling stations around the islands. The catch per unit effort and level of effort for both sport and commercial fisheries will be defined. When these parameters are integrated with spawning, recruitment, and mortality rates, estimates of optimum sustainable yield will be calculated. These estimates will assist in effective management for sustained use without causing detrimental impact to other island resources.

The "open" and "closed" fishery zones of the state ecological reserves provide opportunity to use a sampling design similar to that employed by Davis (1977) in a study of a recreational harvest of spiny lobster. The questions being asked are not easily answered and are broad in scope; therefore, a long-term commitment of both personnel and funding will be required to provide data valuable for successful management purposes. Once preliminary management strategies have been determined, continued monitoring will be required to evaluate, revise, and implement the agreed-upon decisions.

- Perform additional studies recommended for cooperative marine research sections of this document that discuss pinnipeds, sea otters, and marine birds.

IMPACTS

Study of the intertidal zone will result in some short-term, localized trampling of marine algae and invertebrates. The data gathered will, however, provide suggestions for reducing long-term human impact to the areas studied. Study of fisheries resources should have little if any environmental impact, depending on techniques utilized. Should study areas be temporarily designated as "closed to fishing," a restricted abundance of fishery species to sport fishermen and income to commercial fishermen would result; however, when these areas were reopened, all parties would temporarily benefit from the increased availability of preferred items. In the long run, all fishermen and the public would benefit from improved management techniques resulting from these studies.

GEOLOGY AND SOILS

DESCRIPTION

The information in this section was summarized from a report by the Santa Barbara Museum of Natural Hisory (1979).

Geologically, Santa Barbara and Anacapa islands are similar. Both are comprised almost entirely of volcanic rocks, mainly basalts, into which marine terraces and benches have been cut by rising and falling seas. Soils are thin, clayey, and of low permeability. Anacapa and Santa Barbara islands have no aquifers and no freshwater sources, with the exception of small seeps.

In contrast, San Miguel Island has few volcanic rocks and is comprised primarily of tilted sedimentary rocks. San Miguel Island also has marine benches cut into the bedrock but differs from Anacapa and Santa Barbara islands by having a blanket of recently deposited sand dunes that cover most of the western two-thirds of the island. These dunes trap water and result in a number of freshwater springs. Soils on San Miguel Island are very deep, permeable, and have unusual features.

A combination of domestic animal overgrazing, cultivation for farming, and fire has resulted in significant levels of soil erosion on all of the islands within historic times, but erosion has been especially serious on San Miguel. Gullying is severe in some areas, and erosion continues to be an ongoing problem even though some stabilization by plants and recovery of past erosion areas have taken place.

Anacapa Island is recovering from recent human activity, and erosion as a result of man is now minimal on Middle and West Anacapa. Sea cliff erosion resulting from wave action is significant on Anacapa and is especially accelerated on the southeastern end of West Anacapa. The sheerness of the surrounding cliffs constitutes a potential visitor hazard, particularly on East Anacapa Island.

During historical times, San Miguel Island has been overgrazed by domestic animals, primarily sheep, and cultiviated until bare wind-stripped ground replaced grassy and shrubby vegetation. Drought and overstocking of sheep in 1863 and subsequent years combined to initiate an erosion episode that eventually left two-thirds of San Miguel a barren waste of drifting sand and blowing soil. As a result, a large number of changes have taken place in the topography, appearance, and shoreline characteristics of the island. Topsoils have been largely stripped, the periphery of the island is gullied, and large unstabilized sand dunes occur. In 1950 most of the sheep were removed. Since then, erosion has been markedly reduced and plants are reestablishing themselves on the island.

Present erosional problem zones on Santa Barbara Island include the areas that are immediately east of the toe of Signal Peak, along the trail that runs from the campground to the ridge saddle between Signal and North peaks, and immediately west of the toe of the ridge between Signal and North peaks. Instability of the near-vertical sea cliffs on the east and north side of Santa Barbara Island often results in rock failures because marine erosion is active in this area. This is a potential visitor hazard.

OBJECTIVES

Reduce human caused erosion on all of the islands to a minimal level and aid in the recovery of soils and vegetation.

GUIDELINES FOR MANAGEMENT

Control man-made erosion.

Continue to take corrective action when erosion problems arise in picnic areas, campgrounds, and along trails. Corrective actions could include emplacing railroad ties to divert or slow runoff, abandoning paths and reducing use in camping areas periodically to allow recovery, and continuing to prohibit all off-trail use. Take drainage patterns into account in any modifications in trails and any trail maintenance to control erosion so that natural drainage is not obstructed.

Advise visitors of safety hazards.

Continue to advise visitors of instability of vertical sea cliffs on Santa Barbara and Anacapa islands.

ACTIONS

- Monitor headward gully erosion and wind erosion.

Monitor headward gully erosion rates through annual measurements. In 1978 rebar was placed 50 feet upslope from several gully nickpoints to serve as a baseline for future measurements of erosion rates on all three islands. Changes in erosion patterns and rates can be monitored in the future by measuring the distances between rebar and new gully nickpoints, and the rate of headwall erosion can be calculated. Rebar was placed at 8 points on Santa Barbara Island, 10 points on Anacapa Island, and 22 points on San Miguel Island.

Monitor wind erosion by making comparisons between present and future aerial photography. A periodic assessment of changes brought about by wind erosion--changes in shoreline configuration, location of dunes, and recovery of dunes by vegetation--can be made from the photographs.

IMPACTS

Man caused erosion will decrease and the islands will continue to recover from past management practices. Monitoring studies will have no impact.

Placement of railroad ties could divert runoff and increase sedimentation to areas adjacent to trails. Trailside plants and animal habitat may be altered in a minor way by increased flow.

PALEONTOLOGY

DESCRIPTION

The primary paleontological resources on the Channel Islands are plant and animal remains--some of which are associated with archeological sites--and caliche fossil forests, or rhizoconcretions.

The remains of plants and animals associated with archeological sites offer insights into human use and adaptation to the environment of the Channel Islands. These remains also offer the opportunity to study animal speciation and evolution, development of plant and animal communities, and their adaptations to varying climatic conditions.

The most notable animal remains are those of the pygmy mammoth. The largest concentration of pygmy mammoth remains, a dwarf form of the mainland mammoth, is found on San Miguel Island. Pygmy mammoth remains, as well as remains of Monterey pine, cypress, and currant, are preserved in island deposits. Archeological material has also been found at and near the spring, but no definite correlation between early man and the mammoth has been established.

Three major fossil caliche forests are found on San Miguel. These fossils are the caliche-encrusted casts of vegetation buried by sand dunes more than 14,000 years ago. Caliche is fragile and subject to damage because it can be easily collected and broken.

OBJECTIVES

Preserve, in place, paleontological material.

Allow excavation to obtain new scientific information only under carefully designed, comprehensive programs.

GUIDELINES FOR MANAGEMENT

Protect fossil forests from visitor trampling and collection by allowing public access only with ranger escort.

Record, number, and map the location of mammoth bones in order to correlate this information with archeological reports and investigations.

Preserve paleontological material in place except where destructive and unpreventable erosion is resulting in the loss of these resources; in such cases, salvage may be necessary.

Permits for scientific excavation and collection will be issued only when the immediate need for new information exceeds the potential future value of such sites, which would result from more advanced scientific methods available at that time. All sites will be excavated by interdisciplinary teams so that maximum information can be obtained for the disturbance created.

ACTIONS

- Monitor caliche forest.

  Map and photograph the area covered by fossil caliche forests and plot the major rhizoconcretions and coverage by iceplant. This plotting should be accomplished prior to the first space shuttle launching proposed for 1981. Annually monitor the attrition of the forest. Compare the mapped data immediately before and after space shuttle launchings to determine what effects may be caused by sonic booms and overpressures from launching and reentry of the aircraft. Any adverse effects on the caliche forest will be brought to the attention of the U.S. Air Force so that this valuable resource will be adequately protected during future space programs.

IMPACTS

Monitoring of the caliche forest will allow long-term preservation by quantifying losses of caliche and the reasons for losses so that managment actions can be taken.

WATER

DESCRIPTION

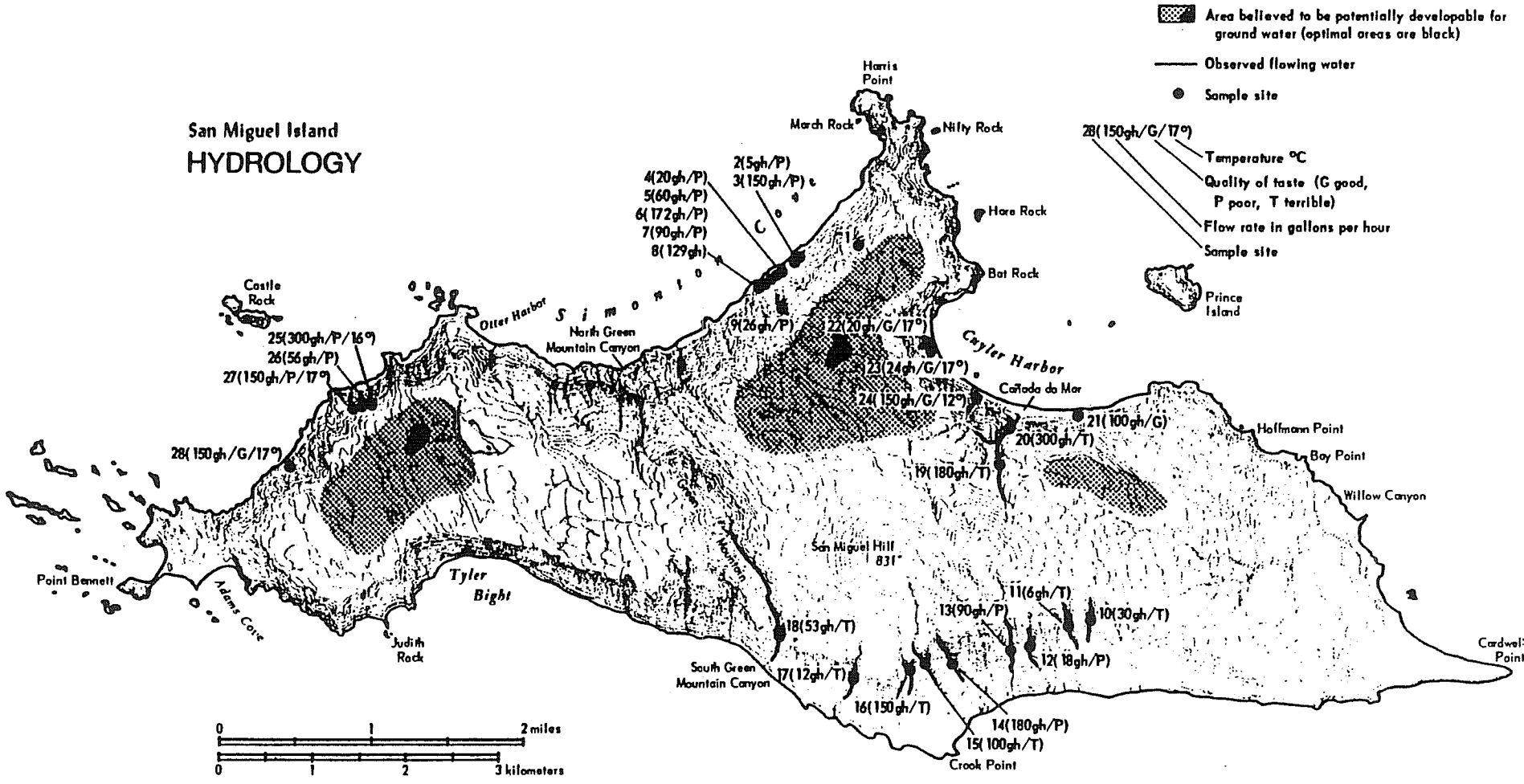
Information on fresh water in this section was summarized from a report by the Santa Barbara Museum of Natural History (1979).

Fresh surface water is not available on either Anacapa or Santa Barbara islands except for a few small seeps. The surfaces of these two islands are small and relatively impermeable, so that no aquifers exist. Water runs off into the ocean during and immediately after storms.

Unlike Anacapa and Santa Barbara islands, San Miguel is covered by a porous sand blanket and has a relatively large recharge area; therefore a groundwater aquifer is present. Many small seeps as well as springs are present on the island. The flow rate and water quality of the springs have been measured during a single season and are recorded on the following San Miguel Hydrology map.

The best fresh water (best tasting and chemically purest) known on San Miguel Island is at Bath Beach (#28), followed by three springs in the Cuyler Harbor area (#22, #21, and #24). Although springwater quality data is limited at present (water from only one sampling period has been analyzed), preliminary testing indicates that the water quality of the springs listed above appears safe when compared with the federal maximum contaminant levels for noncommunity water systems. The water quality of springs on San Miguel Island does fall short, however, of Environmental Protection Agency and state of California suggested standards for secondary maximum contaminant levels. Salts and total suspended solids are high in these island waters.

The quality of ocean waters in the immediate area of the islands is high. Most of the marine water pollution within the Southern California Bight area stems from municipal wastewater discharges. The distance of the islands from the mainland, the large diluting volume of the ocean, and the shelves and basins near the mainland where many pollutants settle ensure high water quality at present. As activity increases from offshore oil and gas development, the potential for discharge into water surrounding the islands is increasing. Oil leaks, accidental spills, discharge of formation water, drill mud, sediment, debris, and sludge will all increase in the area and will decrease water quality as oil development progresses. These water pollutants could not only reduce the health of marine life, but could also decrease the recreational potential of the surrounding ocean waters and the scenic quality of island shorelines.


San Miguel Island
HYDROLOGY
Area believed to be potentially developable for ground water (optimal areas are black)
Observed flowing water
Sample site
28(150gh/G/17°)
Temperature °C
Quality of taste (G good, P poor, T terrible)
Flow rate in gallons per hour
Sample site
Harris Point
March Rock
Nifty Rock
Hare Rock
Bat Rock
Prince Island
2(5gh/P)
3(150gh/P)
4(20gh/P)
5(60gh/P)
6(172gh/P)
7(90gh/P)
8(129gh)
9(26gh/P)
22(20gh/G/17°)
23(24gh/G/17°)
24(150gh/G/12°)
Cuyler Harbor
Cañada do Mar
21(100gh/G)
20(300gh/T)
19(180gh/T)
Hoffmann Point
Bay Point
Willow Canyon
Castle Rock
Otter Harbor
North Green Mountain Canyon
25(300gh/P/16°)
26(56gh/P)
27(150gh/P/17°)
28(150gh/G/17°)
Point Bennett
Adams Cove
Judith Rock
Tyler Bight
San Miguel Hill 831'
South Green Mountain Canyon
18(53gh/T)
17(12gh/T)
16(150gh/T)
11(6gh/T)
13(90gh/P)
10(30gh/T)
12(18gh/P)
14(180gh/P)
15(100gh/T)
Crook Point
Cardwell Point
0 1 2 miles
0 1 2 3 kilometers

Water Uses

Present uses of park waters can be divided into uses of terrestrial fresh water from runoff and springs on San Miguel, and uses of marine water surrounding the islands. Fresh water flows maintain riparian vegetation in canyons, provide habitat for birds, and provide fresh drinking water for foxes, rats, mice, birds, and occasionally the island ranger. There is the potential for use of springs or for development of a well on San Miguel for domestic water supply, but such development has not yet been attempted, and it is probable that the springs would not be acceptable as a public water supply even if the water were treated.

Ocean waters within park boundaries are currently used for recreational boating, diving, fishing, and other sports; as habitat for a large variety of marine organisms that range from diatoms and plankton to whales; by commercial divers and fishermen as a source of their livelihood; and as a source of seafood and such products as kelp.

Water Management Problems

There are several existing and potential water management problems on the three islands. The potential exists for sewage and other effluent pollution of cliffs and the surrounding ocean on both Santa Barbara and Anacapa because of poor permeability of the clayey soils. Soils on both islands cannot accept effluent. At present, graywater disposal on Santa Barbara and sewage disposal from flush toilets on Anacapa present potential problems of an unknown extent. Recent installation of an evapo-transpiration treatment system on Anacapa and self-contained systems on Santa Barbara should partially resolve these problems.

On San Miguel, the water in Canada do Mar is being polluted by coliform bacteria from an outhouse located upstream. This problem can be corrected by moving the facility or installing a self-contained system.

Development of a local domestic water supply that is safe and convenient for visitor/staff use may be necessary on San Miguel in the future. The distance of San Miguel from the mainland and the need for water for resident rangers, researchers, and visitors in emergencies requires that water be supplied to the island by aircraft. This supply method is expensive and unreliable.

Potential contamination of ocean waters is much more difficult to anticipate and control. Natural oil seepages release from 40 to 670 barrels of oil a day into the Santa Barbara Channel. These seepages are considered part of the natural environment, but other

discharges are man caused. Although some pollution accompanies the use of marine engines needed to transport visitors, staff, equipment, and supplies to the islands, this contamination is insignificant. Dumping of human wastes by recreational and commercial boats is a likely, but minor, source of pollution. Future discharges, both intentional and accidental, in conjunction with oil and gas developments pose a potentially serious threat to marine water quality and marine organisms.

OBJECTIVES

Eliminate all sources of park originated water pollution from the islands and cooperate with and review proposals for neighboring development, to keep discharges at a minimum.

Maintain groundwater reserves on San Miguel Island at a level that will allow natural flow to maintain terrestrial habitat and prohibit intrusion of salt water.

Maintain natural drainage patterns on Anacapa and Santa Barbara islands.

GUIDELINES FOR MANAGEMENT

Minimize the liquid component of sewage and waste effluent on East Anacapa and Santa Barbara islands.

Practice water conservation through the use of low-volume flush toilets on East Anacapa Island in staff housing and eventually by the conversion of toilets on East Anacapa to self-contained systems such as chemical, vault, or composting. A detailed study of sewage disposal options for each island will precede adoption of a new system.

- Eliminate pollution.

Move the outhouse above the San Miguel Island ranger station in Canada do Mar to a location where leaching will not affect surface water flow, or convert to a self-contained system.

ACTIONS

- Monitor springwater quality on San Miguel Island.

Continue to seasonally (three to four times annually) monitor springwater quality and flow rates of springs that have shown promise as potable sources by having acceptable water quality

and flow rates. Signs will be posted warning visitors of the unreliability of water quality and the high salt content of the water.

- Develop a staff response for cleanup in the case of oil spills near the islands.

  The quality of ocean water surrounding the islands would deteriorate significantly in the event of an oil spill. The National Park Service will cooperate with other agencies to implement oil spill contingency plans.

- Study alternative sewage disposal methods.

  Conduct a study of alternatives for disposal of sewage and wastewater that is site-specific for each of the three islands. Both traditional and alternative methods should be evaluated, based upon anticipated visitor use capacities. Solutions to the problem of excess effluent disposal (graywater, not sewage) will be investigated.

- Develop a water supply on San Miguel when there is a proven need.

IMPACTS

Correction of problems resulting in sewage leaching will increase the water quality of surface terrestrial and ocean waters. Any future use of groundwater reserves from wells on San Miguel Island will have an insignificant effect on reserves because of the low consumption anticipated, probably less than 10 gallons per day for staff, researcher, and visitor use.

AIR QUALITY

DESCRIPTION

The air quality of the islands is currently excellent. While no monitoring information is available to substantiate this statement, the remoteness from pollution sources and the prevailing onshore winds for most of the year keep man caused air pollutants low. However, visibility and clarity are often naturally reduced by fog and haze. There are few emissions sources on or near the islands with the exception of passing tankers and recreational and commercial boats. Future offshore oil and gas development will ultimately contribute to air pollution, but current development is at

a low level, with exploratory activity from a few platforms. Occasional Santa Ana offshore winds probably have the greatest influence on air quality. These winds can temporarily degrade the air quality of the islands, particularly in October and November as they bring pollutants from the urbanized Los Angeles basin and coastal California.

Air quality related values are very important attributes of the islands. On those days when fog lifts to allow viewing, the scenic resources and the vistas of rocky coastlines, other islands, and the mainland are outstanding--especially from East Anacapa, which affords spectacular views of Middle Anacapa, West Anacapa, and Santa Cruz islands, as well as of the mainland. Although large numbers of rare, threatened, endangered, and endemic species and abundant cultural resources are found on the islands, little or nothing is known of their susceptibility to air pollutants.

Under the Clean Air Act, as amended in 1977, the entire country was classified, based upon the amount of allowable air quality deterioration that can take place in each area. At that time Channel Islands National Monument was designated as Class II but has recently been recommended for upgrading to Class I status. The proposed upgrading has not yet been acted upon by Congress or the state of California. Under Class I status no deterioration of air quality is allowable because air quality related values are deemed important to the area. Maximum allowable increment increases of two pollutants, particulate matter and sulfur dioxide, have been established for Class I and Class II areas (see appendix D). Allowable increments of ozone, which is closely related to hydrocarbons, are being defined so that these pollutants can also be monitored.

If Channel Islands National Park is reclassified as a Class I air quality area, it will have another goal as specified by the act in that no impairment of the visibility from air pollution will be allowed. If it can be demonstrated, with the concurrence of the state, that emissions from other facilities will have an adverse impact on air quality related values in Class I areas, whether or not emissions exceed allowable increases, a construction permit for the new facility cannot be issued.

At present the largest threat to air quality related values on the Channel Islands is from imminent offshore oil and gas development. As a result of Outer Continental Shelf Lease Sale 35, there were 56 leases granted; numerous exploratory wells and 38 platforms are expected to be developed. As a result of lease sale 48, more exploratory wells will be drilled, and an estimated 31 platforms will be constructed. In addition, support facilities and oil transport will be required that will increase pollution emissions. An air quality analysis was conducted to determine emissions of particulates

and sulfur dioxide from both drilling platforms and tanker loading areas that could be associated with lease sale 48 (BLM, 1979). The analysis assumed that platforms and tanker loading areas were located in a manner to cause maximum onshore concentrations of pollutants. During Santa Ana winds, which can be present for more than 24 consecutive hours, it is likely that the allowable Class I increments could be exceeded, depending upon location of emission sources. The placement of emission sources, yet to be determined, is of critical importance in determining what effect oil and gas development will have on air quality of the islands. The Bureau of Land Management analysis concludes that development for lease sale 48 will not result in visual impacts in the proposed Class I area of the former monument.

Control of emissions from stationary sources and ships in the area of the park is the responsibility of Santa Barbara County and Ventura County air pollution control districts and the South Coast Air Quality Management District. A monitoring station has been installed on East Anacapa Island but was not operational at the time this plan was prepared.

OBJECTIVES

Exercise NPS responsibility to maintain the high air quality of the park and protect air quality related values, especially if the park is upgraded to a Class I area.

Determine existing airborne pollution levels, what visual and biological resource values could be affected by future pollution sources, and what levels of air pollution degradation would adversely affect them.

ACTIONS

- Monitor outer continental shelf (OCS) oil and gas development.

  Keep informed of new developments, review permits, evaluate potential impacts, and notify agencies responsible for permits of potential threats to park air quality in order to keep degradation from oil and gas development to a minimum. The location of platforms and tanker loading areas will greatly affect the amount of air deterioration that may take place as a result of oil and gas developments. A system is being devised by the National Park Service that will allow evaluation of air quality effects in response to projects, such as oil and gas development, that could threaten park areas. Monitoring projects that could affect the park will be the responsiblity of the Air Quality Program Division in Washington, D.C., with technical assistance from the NPS Denver Service Center.

- Monitor air quality.

  Obtain baseline data on ambient air quality levels to provide comparative measurements of later increased pollution levels. The Ventura County Air Pollution Control District is initiating a project to monitor air pollution that will result from outer continental shelf oil and gas activity. They have installed and will operate an offshore air monitoring facility on Anacapa that will make direct ambient measurements on meteorological conditions and concentrations of pollutants. The monitoring system will be computer controlled and automatic and occupies an existing structure. Meteorological information to be gathered includes atmospheric stability, wind speed, wind direction, temperature, humidity, and solar radiation. Air pollutants that will be continuously measured will include sulfur dioxide, ozone, nitrogen oxides, nonmethane hydrocarbons, methane, sulfates, and total suspended particulates.

  This monitoring station will provide ambient air quality data only for Anacapa when, in fact, similar information is needed for all of the islands, but the information obtained will greatly aid the National Park Service in commenting on and reviewing future development in the area and in establishing the sensitivity of the islands to changes in air quality. The Park Service will aid Ventura County in any way possible in accomplishing this project.

IMPACTS

If monitoring programs are initiated and if the Park Service is able to influence the placement of oil and gas development structures, air quality degradation will be minimized over the long term. No disturbance to resources is expected as a result of monitoring activities.

WEATHER REPORTING FACILITIES

DESCRIPTION

Weather stations recording observations with varying degrees of frequency are present on most of the Channel Islands. However, there is no single agency coordinating the recording of this information and therefore there is no standardization of events reported or the frequency of recording. Present facilities for recording weather data include the following.

Anacapa Island

Ranger Station, East Island--

Agency: NPS reporting to U.S. Weather Service, Marine Weather, Los Angeles.
Facilities: Manual weather station--rain gauge, anemometer, maximum and minimum recording thermometer; data sent by radio and mail.
Data: Wind speed and direction, visibility, sky conditions, sea state, temperature, precipitation.
Frequency: Twice daily.
Location of Data: U.S. Weather Service, Los Angeles, Channel Islands National Park. Data not summarized.

U.S. Coast Guard Lighthouse, East Island--(In service by summer 1980.)

Agency: Ventura County, Environmental Resource Agency (ERA) Air Pollution Control District.
Facilities: Automatic, radiotelemetric, computer stored and analyzed.
Data: Wind speed and direction, temperature, humidity, solar radiation, and "criteria" air pollutants.
Frequency: Continuous.
Location of data: Ventura County, ERA; monthly summaries requested to be provided to Channel Islands National Park headquarters.

San Miguel Island

San Miguel Peak--

Agency: U.S. Navy, Pacific Missile Test Center, Climatology, Point Mugu.
Facilities: Atomic powered, automatic, radio transmitted weather station.
Data: Wind direction and speed, humidity, air temperature, (occasionally) rainfall.
Frequency: Hourly.
Location of Data: U.S. Navy, Point Mugu. Data on computer tapes, not summarized

Point Bennett Research Station--

Agency: National Marine Fisheries Service, Division of Marine Mammals, Seattle.
Facilities: Individual weather instruments.
Data: Wind speed and direction, air temperature, humidity, solar radiation.
Frequency: Continuous from May to October when staffed.
Location of Data: On file (not summarized) National Marine Fisheries, Marine Mammal Division, Seattle.

Santa Barbara Island

Arch Point--(In service 1977 to 1979 only.)
Agency: California Department of Transportation, Environmental Planning Branch, Los Angeles.
Facilities: Automatic, battery powered station data recorded on tape.
Data: Wind speed and direction, air temperature.
Frequency: Hourly.
Location of Data: CAL-TRANS, Los Angeles; Channel Islands National Park headquarters. Data not summarized.

OBJECTIVES

Keep records of weather conditions for park areas within NPS jurisdiction in order to provide for the welfare of the public.

ACTIONS

- Contact agencies involved with weather data collection to integrate the efforts of each into a coordinated, organized, and standardized process. All available historic data will be compiled and summarized. An official U.S. Weather Bureau station will be placed on each island to record the following: barometric pressure, wind speed and direction, air temperature, humidity, rainfall, solar radiation, sea state, cloud conditions (cover), "criteria" air pollutants, and sea surface temperature. Determine and implement a standard for frequency and techniques of recording.

- Summarize and store collected data in a central location for access by appropriate agencies and the public.

IMPACTS

No further impacts to natural, historic, or cultural resources are anticipated, since existing sites, equipment housings, and facilities will be used. More accurate data will enable managers to better evaluate past and predict future environmental conditions. Accurate data will enable weather observers to better monitor conditions, resulting in increased safety of mariners traveling in the vicinity of the islands. This data will also allow for evaluation of any changes resulting from OCS oil and gas development activities as well as any changes resulting from mainland-based operations.

CULTURAL RESOURCES

DESCRIPTION

Along with their rich variety of natural resources, the three islands possess cultural resources and features that are highly important sources of information in understanding man's relationship to them. Each island contains archeological and historic sites with evidence of intensive human use and/or occupation reaching at least 10,000 years into the past. The islands are listed on the National Register of Historic Places as archeological districts that have yielded or may yield information not only important to their prehistory and history but to related scientific disciplines as well.

Two properties possessing architectural as well as historical integrity are located on two of the islands. The East Anacapa lighthouse has been determined eligible for inclusion on the National Register, and the nearby complex of buildings associated with it is in the process of nomination as a historic district. Channel Islands cultural resources also include places that may or may not possess tangible remains but that are significant to the living descendants of the early Native American inhabitants in the Santa Barbara Channel region. Descriptive material regarding historical and archeological resources is found in several studies that were prepared for the National Park Service by Glassow (1977), Greenwood (1978), Rozaire (1978), and Weinman (1978).

A brief ethnohistorical overview of the Chumash has also been completed by Van Horn (1979) in order to establish a framework for consultation with various Chumash-affiliated Native Americans. Information regarding man's historic manipulation of the natural and marine resources of the Channel Islands is discussed in the preceding sections of this document as well as in the aforementioned studies.

OBJECTIVES

General

Provide through adequate research and programming for the preservation, protection, interpretation, use, study, and management of all cultural resources meeting National Register criteria and for less significant sites in line with National Park Service "Cultural Resources Management Guidelines." Comply fully with requirements for cultural resources preservation. These requirements include, but are not limited to, the following:

The Antiquities Act of 1906 (P.L. 59-209)

The National Historic Preservation Act of 1966 ((PL 89-665), as amended, P.L. 94-422

The Archeological and Historic Preservation Act of 1974 (P.L. 93-291)

American Indian Religious Freedom Act (P.L. 95-341)

Presidential Executive Order 11593, "Protection and Enhancement of the Cultural Environment"

"Protection of Historic and Cultural Properties," Advisory Council on Historic Preservation regulations (36 CFR Pt. 800)

"Policy Guidelines for Native American Cultural Resources Management," NPS Special Directive 78-1

Staff Directive 78-2, "Collections and National Register Nominations"

Special Directive 78-10, "Testing of Materials for Preservation of Cultural Resources, Sites, Structures and Objects"

Archeological Resources Protection Act of 1979 (P.L. 96-95)

NPS-28, "Cultural Resources Management Guidelines" (draft)

Specific

Specific objectives for cultural resources management at Channel Islands National Park are as follows.

Monitor and eliminate to the greatest degree possible human impacts upon cultural resources

Preserve, maintain, use, and interpret historic buildings and structures

Preserve, protect, study, and interpret historic and prehistoric archeological resources

Actively seek consultation with local Native American groups having historical and cultural ties to the islands on matters of mutual concern for resource preservation

Increase public awareness of early Native American use of the islands through sensitive and accurate interpretation

Promote among visitors and park staff a concern for and awareness of the fragile and nonrenewable nature of cultural resources

Encourage a multidisciplinary approach in research projects that will maximize information bases with a minimum of cultural resource commitment

Preserve all data (literature and objects) relevant to cultural resources in a manner that meets professional standards

GUIDELINES FOR MANAGEMENT

The following specific statements will assist managers in meeting preservation compliance mandates while implementing management actions.

Historic Structures

Accomplish preservation or maintenance of existing historic resources by repair of original deteriorated fabric or by replacement using materials as like the original as possible.

Accomplish maintenance, preservation, or restoration work according to guidelines prescribed in historic structure reports and maintenance guides to be prepared for National Register sites.

Allow interior remodeling of historic structures to accommodate management facilities and visitor services according to preservation guidelines.

Make efforts to preserve original interior design details.

Do not attempt reconstruction or replication of historic structures, as this contravenes NPS policy.

Visitor understanding will be provided through other interpretive techniques.

Evaluate additional buildings that are added to the parks' List of Classified Structures against National Register of Historic Places criteria and nominate any that qualify.

Archeology

Base preservation and protection of archeological sites on historic preservation law, NPS policies and standards, recommendations of

Native American groups, and recommendations of professional archeologists.

Determine appropriate preservation techniques for archeological sites that contain human remains in consultation with Native American representatives, the park superintendent, and the NPS Western Region professional staff. Decide final actions on a case by case basis, depending upon above consultation, location and condition of remains, and degree of environmental or physical hazards involved in data gathering.

Obtain archeological clearance from the Western Archeological Center, NPS, prior to undertaking any ground-disturbing activity or natural resource management action that could affect cultural resources. Halt all work if archeological resources are discovered during management or construction activities until a professional determination of site extent and significance can be made and appropriate action taken.

Require full compliance with existing management policies for archeological excavation, salvage, and curation of materials when loss of a cultural resource will result from management actions whose necessity has been determined to be of overriding importance.

Brief all park employees and research personnel engaged in work on the islands regarding compliance procedures for cultural resource protection in their areas.

ACTIONS

Historic Structures

- Anacapa Island--Prepare a historic structures maintenance guide for buildings in the East Anacapa Historical District that will include an ongoing cyclic maintenance program.

  As part of the maintenance program, replace the asbestos shingle siding on the ranger residence with stucco, the original exterior material.

- San Miguel Island--The Lester Ranch complex and the Nidever Adobe have experienced substantial loss of fabric and are therefore considered ruins. Appropriate actions for their preservation are discussed in the next section.

- Santa Barbara Island--No historic structures have been identified.

Archeology

- Anacapa Island--Conduct surveys to locate potential cultural resources on West Anacapa, East Fish Camp, and other locations around the periphery of Middle Anacapa and to determine their significance. Conduct additional surveys to determine if other historical archeological sites are present.

- Monitor impacts to the archeological site on the East Anacapa loop trail.

  Mitigate potential damage by devising methods that could include covering the trail through the site, or periodic survey and salvage of surficial remains. (Relocation of the trail was considered, but adjacent undisturbed natural and cultural resources would be severely impacted.)

- Conduct limited testing and data recovery of sites that are being destroyed on Middle and West Anacapa.

  Site priority is identified in Greenwood (1978).

- San Miguel Island--Formulate and implement alternative methods of preserving human remains currently subject to severe erosion.

  The approach will include ongoing consultation with a committee of local Native Americans and possible use of interim nonmechanical stabilization of remains (such as covering with biodegradable netting) until final actions are determined.

- Formulate research designs that incorporate a multidisciplinary approach for recovery and analysis of bones and artifacts, other than human burials, that are subject to loss through cliffing, sloughing, and gullying.

  Priority areas are identified in Greenwood (1978).

- Conduct archeological survey of areas not examined by Greenwood (1978).

  This survey examined only 28 percent of the previously recorded sites and identified several that are being lost, some containing human remains. A survey of the remainder of the island will identify other sites that may require management action. This survey will be consistent with Greenwood in mapping, recording, and site identification.

- Relocate government sign intruding on sites at Cuyler Harbor.

- Record, number, and map locations of mammoth bones and areas of oxidized soil to correlate with the recording systems used in Greenwood (1978) and Rozaire (1978).

- Undertake limited testing to determine extent and kinds of material present at the Nidever Adobe site.

  Follow with either salvage archeology, including recording by measured drawings and photographic survey, or partial excavation and minimal stabilization (capping adobe walls, etc.) if warranted.

- Adapt techniques used in Nidever Adobe research to further investigate and evaluate the Lester Ranch complex and other historical sites.

- Reduce present and future deterioration of the Herbert Lester grave by berming or filling to inhibit gullying and of the Cabrillo Monument by repairing with mortar.

- Santa Barbara Island--Formulate a research design to allow minimal data recovery and analysis of sites affected by advanced and continuing erosion and public accessibility.

  All work will be done by a professional archeologist. Emphasis will be placed on using an interdisciplinary team.

- Undertake study to determine the feasibility of rerouting the existing trail at Webster Point and vicinity away from archeological sites.

  Additional study is needed before action can be taken because of sensitive plant and animal resources in the area.

- Monitor public access to archeological sites on or in proximity to the existing trail system to determine extent, if any, of site deterioration.

- Conduct additional surveys to determine location and extent of any historical site remains.

Native Americans

- Encourage the use of known Chumash place names for the Channel Islands along with the European names.

Informational literature such as park brochures may be used to illustrate the dual names.

- Continue ongoing consultation and coordination with Chumash descendants to address matters of mutual concern on the Channel Islands, particularly San Miguel Island.

- Encourage Chumash descendants of the Santa Barbara Channel region to participate in the preparation of programs, exhibits, replica artifacts, or literature that will assist the park staff in accurately interpreting the cultural history of early Native American inhabitants of the islands.

Miscellaneous Actions

- Collections--Prepare scope of collections statement with the assistance of the regional curator and regional staff in the areas of natural and cultural resources. It will define the collection needs and limits and recommend appropriate actions.

- Library--Develop a professional library that has adequate space for books, archival material, photographs, and card catalogs; adequate professional staffing; security, control, and protection for collections; and thorough cataloging of collections.

IMPACTS

Actions for cultural resources emphasize preservation in situ and accumulation of more information.

Impacts associated with preservation/maintenance work on East Anacapa will be temporary in duration but will result in closing the facility to the public during the work. Visual elements out of keeping with the structure such as scaffolding and occasional loss of original fabric (to aid in determining accurate replacement material) may result. However the long-range effect will be to preserve the buildings and the historic scene.

Use of historic structures as interpretive facilities, as is proposed for the Anacapa lighthouse, can lead to excessive wear and tear on the structure. Determining and enforcing the carrying capacity of the structure will somewhat mitigate this effect.

A decision not to move the nature trail away from the archeological site on East Anacapa was based on the lack of apparent significant damage being done to the site as the result of present trail use, the number of mitigating measures that could be implemented to

SUMMARY OF ACTIONS AND IMPACTS

protect the site, and the damage to adjacent cultural and natural resources that would occur as the result of trail relocation.

Erosion is resulting in the natural loss of archeological material. Although data recovery through recording (measurement, drawings, photography) and limited retrieval of diagnostic material will result in preservation of resource information, the actual resource itself will be lost through natural deterioration. Opportunity for future evaluation or the implementation of more sophisticated field techniques will not exist once archeological resources are exposed and eroded away or retrieved. Conservation archeology will be practiced to the maximum degree possible.

A list of the actions proposed in this plan is found in appendix E. The actions are divided into those that will require extra funding to implement and those identified as administrative actions, which can be implemented on a field level. In the case of natural resources, those requiring funding are further broken down into primarily research projects (likely to be funded by natural science funds) and primarily management projects (identified as resource management actions).

Impacts of the various actions proposed within a section are discussed at the end of that section. Because of a further need to summarize the effects of the plan on specific resources, the impacts in this section are discussed according to the type of resource potentially affected.

In addition, many impacts, such as those concerning researchers and other field workers, are common to several of the actions. While manipulative research is generally prohibited and manipulative management is kept to a necessary minimum, the need for the proposed projects is documented throughout the plan, and actions resulting in impacts (for instance, small excavations or test plots; installation of equipment; or collecting) may be both valid and necessary. Off-trail travel must often be engaged in when sampling or when observations are made in remote sites. Such foot traffic could result in trampled vegetation (which in turn might delay vegetational recovery), disturbed archeological sites, and erosion. Resources other than the one under consideration may be unknowingly disturbed by those lacking knowledge and sensitivity of resources outside their field. Unauthorized collecting of resources during fieldwork may occasionally occur, since most researchers are not supervised. To mitigate these potential impacts, all field researchers and crew members will be made aware of the sensitivity of the wide variety of resources that should not be disturbed, as well as the general areas of archeological sensitivity. When the need is indicated, multidisciplinary research teams will be required.

Researchers staying on the islands in most instances are required to be in the campground, as are other overnight visitors. Since the campgrounds are small and have a capacity limit, the presence of researchers or crews might result in fewer spaces for general campers on a given day. On the other hand, this could result in informal information exchange between researchers and visitors.

Discussions of impacts to specific resource types follows.

VEGETATION

In general, the plan will encourage conditions allowing more natural habitat on and around the islands. Through time, the actions should result in more island area covered with a mosaic of an increased number of native plants. Nevertheless, as has been stated, most actions involving projects on the islands will result in local and minor damage, primarily through trampling of both exotic and native plant species. Extra damage could occur when such work is undertaken on the sides of canyons and slopes, such as much of the work with snails, or when the project requires considerable physical activity, as in the case of pelican banding. Care will be taken to make researchers and crews aware of the canyons and cliffsides and to ensure that no activity is undertaken in the vicinity of special plant species or particularly fragile and valuable vegetational communities.

Actions called for in the "Vegetation" section should result in greater knowledge and more quantifiable information regarding the decline or spread of both exotic and native plants, particularly special status species, and the dynamics of the various vegetational communities. Studies of potential exotic plant eradication could include the clearing of test plots or the possible use of such agents as herbicides, which would result in local destruction of both exotic and native species. Although not likely, such studies might lead to the ability to eradicate large areas of exotic plants, or at least to locally lessen their influence, concurrent with revegetation of those areas by natives. Direct eradication of exotics of limited range will disturb other plants but will prohibit those exotic species from further extension of their range.

Actions called for in the wildlife sections will in many cases cause local and minor disturbance to vegetation, particularly those projects involving snail species, the island night lizard, rabbit and rat eradication, and some seabird monitoring. The number of projects allowed within or through sensitive vegetational communities will be small and their impacts will be monitored; additionally, projects deemed necessary but identified as destructive to sensitive communities, or those that could potentially initiate erosion, will be scheduled for periods when their impacts will be least. Information gathered from some projects, such as those involving the island night lizard and special status snail species, should serve to emphasize the need for encouragement of native plant communities. Work on scale insects could result in an action program of direct benefit to the Anacapa Island prickly pear cactus populations. The eventual eradication or at least control of rabbits on Santa Barbara Island will remove an important predator of both exotic and native plants, which could allow some native species, particularly, greater opportunities to recover. Closure of areas during nesting or

breeding seasons will enable vegetation near the trail to grow, uninhibited by foot traffic. Relocation of trails for whatever reasons will destroy vegetation along the new trail site, with the probability of colonization of weedy species, usually nonnative, on the old trail location.

Monitoring of erosion will enable decisions to be made about the need for stabilization of slopes before sloughing of vegetated slopes occurs. Monitoring of air quality and OCS activities makes it more likely that clean air will continue around the islands, resulting in the likelihood of healthier plants.

Actions called for in the "Cultural Resources" section should have no impact on vegetation except for the direct, but local and minor, effects of trampling and destruction of plants during excavation or salvage.

WILDLIFE

The cumulative effect of the plan on wildlife should be the elimination or control of influential exotic animal species, as well as enhancement of the island ecosystems for native species through greater knowledge of requirements and through habitat manipulation and protection. Negative impacts common to most of the field projects include the destruction of certain invertebrates and small vertebrates through such activities as trampling and stone turning, and the local--but not necessarily minor--disturbance to individuals or groups of animals through close approach, loud noise, and so forth. Disturbances for archeological excavations, test plots for exotic plant eradication, or actual removal of some exotic species such as trees--all will remove some habitat on a minor basis.

Impacts of actions recommended in the "Vegetation" section include the potential loss of habitat through exotic plant removal; in the case of low-growing vegetation, this would be replaced by other low vegetation, but the removal of trees would effectively eliminate this particular ecological niche. While control of plants through chemical means could adversely affect animals, the encouragement of native plants should result in increased populations of most native animals, a more normal population of some others (such as the Santa Barbara Island deer mouse), and nesting opportunities for a greater variety of birds.

Impacts of actions recommended in the wildlife sections include the potential attempts to eradicate such nonnative species as the ant and rabbit on Santa Barbara Island, the black rat and scale insect

on Anacapa Island, and the black rat on San Miguel Island, thereby removing or reducing these naturalized species from the island scene. The net effects should be more natural processes on the islands and the lessening, if not removal, of the pressure these species exerted on native forms. Because the techniques proposed for eradication of rabbits and rats have the potential of being primarily and secondarily harmful to certain native species, determination of such impacts will be preliminary to use of such techniques; this will ensure that unacceptable risks will not occur and that special status species will not be affected. Reduction of rats on Anacapa Island should allow deer mice to regain their numbers. Studies of interaction between humans and populations of marine birds/mammals will provide management with greater information with which to make decisions on such administrative actions as area closures. Protection of habitat through such actions as prohibition of rock turning or area closures should be of direct aid to populations of individual species.

Monitoring of both OCS activity and marine resources will help management formulate its responses to other agencies responsible for such activity; this in turn could help protect intertidal and subtidal habitats as well as individual marine wildlife from effects of poorly conceived development plans.

PHYSICAL RESOURCES

Overall, the plan dictates monitoring various physical phenomena to make possible a better understanding of the processes involved and the fluctuations to be expected, and to be able to direct the quality of the air and water surrounding the islands toward a continued high degree of purity.

Other actions indicated by the plan should have little impact on the islands' physical resources, except that the addition of researchers or work crews to the present level of use could result in more campfires, greater use of outhouses, and on San Miguel Island, trampling of areas around springs and streams for a local and minimal impact to air and water quality. The administrative action to move the location of the outhouse at the San Miguel Island ranger station will aid in upgrading that particular stream course. Instructions to researchers and others will further limit the impacts of living activities on the islands. Test plot clearing or digging of archeological sites could result in greater runoff from rains and the potential for erosion to begin. These actions will be mitigated by careful selection of such sites and constant monitoring of likely erosion. The monitoring of OCS activities reduces the future likelihood of decreased air and ocean water quality, and the

monitoring of the caliche forest in connection with the space shuttle program could allow a factual assessment of actual and potential damage.

ENDANGERED SPECIES

Legal obligations under the Endangered Species Act of 1973, as well as moral obligations, dictate that certain species of biota will receive particular attention when impacts of this plan are considered. Appendix B identifies the animals and plants that are already listed as threatened or endangered, proposed for listing as threatened or endangered, or candidates for listing as threatened or endangered.

Under the act, all federal agencies must examine all proposed actions to determine that they will not impact any species (or its habitat) protected by the act. If the agency determination is that impacts could occur, formal consultation with the U.S. Fish and Wildlife Service is requested. If Fish and Wildlife agrees that impacts are likely, the process results in a "biological opinion" from them to the initial agency. Fish and Wildlife also requests that informal consultation take place regarding species proposed for listing. As well, NPS policy dictates that species officially being examined for protection under the act be afforded the same consideration as if they were already listed. Hence, the discussion that follows addresses all of the species listed in appendix B.

These species are listed as threatened or endangered:

Dudleya traskiae--Baseline information gathered for the plan gives a good indication of this plant's status and its particular distribution on Santa Barbara Island. Such knowledge enables the National Park Service to ensure that only those researchers or resource managers who can recognize the plant will go into those areas, and then only on a necessity basis. Continued monitoring of this species will update the information needed for species management and habitat protection. Eradication of the rabbit would eliminate this plant's only serious predator.

Xantusiana (Klauberina) riversiana--Very little information is known of the island night lizard's status or distribution on Santa Barbara Island. Conceivably, any actions proposed there could affect this species. Actions concerning rabbit eradication, vegetative habitat manipulation, trail relocation, and so forth cannot be properly undertaken without more

information concerning this species. Conversely, the proposed regulation prohibiting rock turning on the island could be advantageous to lizards as well as to certain snail species. A high priority in this plan is to obtain enough information to be able to manage this species on Santa Barbara Island.

Pelecanus occidentalis--Actions calling for continued monitoring of this species, monitoring of seabirds in general for effects of sonic booms, and surveys of nearshore fish stock should all help manage this species. Except that research or resource management personnel could cause minor and local disturbances to individual groups of pelicans, no adverse effects of the plan are likely.

Haliaeetus leucocephalus and Falco peregrinus--These species that once nested on the Channel Islands are no longer resident. Therefore, no actions proposed should negatively impact these species, except that transient birds could pick up and eat rats or rabbits poisoned (if that method is selected) by respective eradication programs, to unknown effect. This potential will be addressed in studies before such poisonings are initiated; further, if it is found necessary, the poisoning attempts will be timed for seasons that would minimize the probability of transience by these birds of prey.

Enhydra lutris--This species once was common around the Channel Islands according to archeological evidence and historic reports. None of the actions proposed should negatively influence these species. Projects related to the gathering of information on intertidal and subtidal invertebrates should increase knowledge that may be necessary for management should the sea otter recolonize the islands.

These species are proposed for listing as threatened or endangered:

Dichondra occidentalis and Lavatera assurgentiflora--The former is found occasionally at widely scattered areas on San Miguel Island; the latter is found in varied but usually rare abundance on both San Miguel and Anacapa islands. Certain status information has been gathered by the Santa Barbara Museum of Natural History (1979), and tentative locations for these species have been identified. All personnel who are performing projects in these areas will be made familiar with these plants. Projects that generate more information regarding special status species, as well as those concerning eradication of exotic plants, should be generally helpful to these species. The specific actions concerned with monitoring the mallow population at Point Bennett on San Miguel will enable steps to be taken, if necessary, to protect this population from trampling by pinnipeds.

Coelus globosus--The beetles are known to occur on San Miguel Island and are thought to occur on Anacapa; further specific knowledge is lacking. Potentially, any actions that occur on beaches or dunes on these islands could affect the status of these beetles. Actions designed to monitor potential OCS oil drilling activities could indirectly benefit this species, as could oil spill contingency plans. The proposed research concerning this species should allow plans to be made concerning its management.

Binneya notabilis, Micrarionta facta, and Micrarionta tryoni--Ranges for these Santa Barbara Island snails are more restricted than in former times. Updated basic information on their status is found in baseline information gathered by the Santa Barbara Museum of Natural History (1979). Projects for further monitoring of these snails will aid in their management. Currently, few other projects will be allowed within these snails' habitats. The proposed exotic plant and rabbit eradication projects could result in more native vegetation, which should allow the snails more preferred habitat in which to enlarge their ranges.

These species are candidates for listing as threatened or endangered:

Eriogonum giganteum var. compactum, Erysimum insulare, Eschscholzia ramosa, Orobanche parishii subsp. brachyloba, Phacelia divericata var. insularis, and Quercus tomentella--Initial surveys by the Santa Barbara Museum of Natural History (1979) indicate that these plants (one species found within the former monument only on Anacapa, two only on San Miguel, two only on Santa Barbara, and one found on both Anacapa and San Miguel) vary in abundance from occasional to rare, and have ranges varying from widely scattered to few in concentrated areas. As with all the plants, further survey work is necessary. Detailed information on all special status species will be supplied to all researchers and others who must venture through areas or into habitats identified as likely for these species. Actions designed to eradicate Santa Barbara Island rabbits and to control exotic plants on all the islands will be generally helpful to these species.

Arctocephalus towsendi--Thought to have once used the Channel Islands in much larger numbers, Guadalupe fur seals now utilize San Miguel only sparingly, in the company of northern fur seals and California sea lions around the Point Bennett area. All these species are protected from harassment by the Marine Mammal Protection Act and, since boat access and land access are prohibited (by the California Department

of Fish and Game and the National Park Service) at Point Bennett, the species is currently well protected. In addition, National Marine Fisheries Service personnel present at Point Bennett throughout much of the year are in a position to monitor its small numbers daily. All actions designed to obtain more information on pinnipeds and their requirements or to give greater assurance that their habitat remains protected should enhance the status of this species.

CULTURAL RESOURCES

Overall, the plan dictates thorough surveys of all sites of cultural importance and the formulation of plans to preserve and stabilize these resources or to effect recovery and salvage of data from sites not able to be stabilized. Particular responsibility is felt toward human remains, and help and advice are actively sought from local Native American groups.

The actions proposed in other sections of the plan are not likely to impact cultural resources except for inadvertent foot traffic over sites. All researchers and crews will be directed to avoid areas of cultural resources. If it is necessary to perform a project around such sites, an NPS cultural resources specialist will be called upon to direct access to the area, the degree of work allowed, and ensure compliance with legal requirements and NPS policies.

CONSULTATION AND COORDINATION

Management efforts in the park will be coordinated with other agencies, some of which have jurisdiction over certain park resources. Currently, management of the three islands involves cooperation with the California Coastal Commission, California Department of Fish and Game, California State Water Resources Control Board, Bureau of Land Management, U.S. Coast Guard, Fish and Wildlife Service, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, and particularly the U.S. Navy. In some cases, such cooperation is solely in the realm of information exchange or review of other agency documents. In others, the cooperation assumes greater proportions. All of these agencies were asked to review this plan, and their comments were carefully considered. The primary agencies and their current roles with respect to park resource management are listed below.

BIOSPHERE RESERVE PROGRAM

Anacapa and Santa Barbara islands, as the original Channel Islands National Monument, are one of more than 25 areas within the United States designated an "international biosphere reserve" and are therefore an integral part of the United Nations Man and the Biosphere Program (MAB). This program was established to promote intergovernmental cooperation in research and resource management projects throughout the world and to allow the greater possibility that information be shared, irrespective of political boundaries. Biosphere reserves were identified as examples of various ecotypes around the world in which the primary objectives are the conservation of genetic diversity and the preservation of an area in which to carry on baseline environmental research and monitoring. Information gained through studies and monitoring proposed in this plan have international applicability as part of this biosphere program.

The Channel Islands, often compared to the Galapagos Islands because of the high degree of endemism and location at the meeting of two major ocean currents, offer an exceptional laboratory for studies under the MAB program. Of particular interest is the natural evolutionary changes as opposed to man induced changes. Efforts to restore and maintain prehistoric natural conditions may prove at odds with normal evolutionary changes.

The MAB program places an emphasis on long-term monitoring and evaluation; funding is not limited to a single agency. Many of the monitoring projects proposed in this plan emphasize interagency cooperation and lend themselves to funding through the MAB program.

San Miguel Island meets all qualifications for UNESCO designation as an international biosphere reserve. Further study is required to determine if Santa Rosa and Santa Cruz islands would qualify.

BUREAU OF LAND MANAGEMENT

This agency is responsible for management of those resources of the territorial waters of the United States that are not managed by the various states; the BLM is lead agency in development of potential natural gas and petroleum lease sales. As part of lease sale 48, which encompasses the Channel Islands region, the BLM compiled baseline biological and cultural information for the entire Southern California Bight. In this effort the park staff often cooperated with various BLM contract researchers in obtaining information from the islands. In addition, the National Park Service was of direct help in gathering and assessing archeological information. The park staff has reviewed the various public documents relative to lease sale 48 and will continue to review documents related to subsequent lease sales in an attempt to ensure protection of park resources.

CALIFORNIA COASTAL COMMISSION

This state agency was established by the California Coastal Act of 1976 to promulgate and ensure compliance with regulations designed to protect the California Pacific coastal strip from detrimental or unrestricted development. The CCC, along with the National Oceanic and Atmospheric Administration, also investigates alternatives of establishing marine sanctuaries within state waters. A currently proposed marine sanctuary encompasses the water area for 6 miles around all of the northern Channel Islands as well as Santa Barbara Island. Since some of this water area is included within the park, future consultation with the CCC is a certainty.

CALIFORNIA DEPARTMENT OF FISH AND GAME

Coordination with this department takes several directions. Since 1978 monument law enforcement rangers have been deputized as state game wardens for the purpose of enforcing game regulations within the ecological reserves surrounding each island. This department is also consulted with respect to their jurisdiction of the marine resources surrounding the islands and of resident terrestrial wildlife species. In addition, the Department of Fish and Game may assume management responsibility for marine mammals from the National Marine Fisheries Service, and concurrent management of the pinnipeds on the islands may take place with the state. The legislation establishing the new Channel Islands National Park stipulates that the National Park Service undertake an inventory of the marine resource and offer advice to the Department of Fish and Game concerning management of this resource. The same bill extends the park's administrative boundary out 1 nautical mile around each of the park islands, which will facilitate cooperation

not only in law enforcement but also in research. Finally, consultation takes place between the park and the department regarding wildlife management and, in particular, the state's endangered species program; several island species of animals and plants are currently either protected under the state's endangered species act or are being considered for such protection.

CALIFORNIA OFFICE OF HISTORIC PRESERVATION

This office reviews all plans and proposals for development that might affect cultural resources. Additionally, a liaison for the California Native American Heritage Commission is part of the office staff and reviews the plan for consultation and coordination with concerned Native Americans. The state historic preservation officer comments on plans as part of required compliance with the National Historic Preservation Act of 1966. To facilitate such review, the Park Service apprises the historic preservation officer of pertinent NPS-sponsored cultural studies and surveys.

CALIFORNIA STATE LANDS COMMISSION

Specific to this plan, the state lands commission has the statutory responsibility to administer and manage the use of the state's tidelands and submerged lands around Santa Barbara, San Miguel, and Anacapa islands; that is, lands between the mean high tide line and seaward 3 miles. Such lands within 1 nautical mile of the islands have been leased to the Department of Fish and Game for ecological reserves. However, the state lands commission has retained authority over these areas for oil, gas, geothermal, and other mineral exploration and development under certain conditions, as explained in Oil and Gas Sanctuary under the "Other Agency Activities" section.

The California Lands Commission also has permit authority over dredging, disposal of dredging spoils, mining, and salvage operations on this land.

CALIFORNIA WATER RESOURCES CONTROL BOARD

This agency has designated the waters offshore of the Channel Islands to a distance of 1 mile or a depth of 300 feet as areas of special biological significance. Within such areas the unique resources are recognized, and certain regulations such as those regarding wastewater discharges are in effect to prevent degradation of the unique environment. The National Park Service has cooperated in the past and will continue to cooperate with efforts of personnel at the various regional water quality control boards to monitor the quality of the waters around park islands.

U.S. FISH AND WILDLIFE SERVICE

This agency will be involved in consultations with the National Park Service concerning the Endangered Species Act of 1973 (as amended). According to this law, all federal agencies must ensure that their actions do not jeopardize certain species of plants or animals that have been recognized as endangered or threatened. If there is the chance that a federal action may affect one of these species, consultation with the U.S. Fish and Wildlife Service must occur. NPS guidelines indicate that even if a species is a candidate for inclusion under this act, informal consultation will take place. Since several species have been considered, proposed, or already included under the Endangered Species Act, particularly on Santa Barbara Island, both the resource management plan and the broader General Management Plan require consultation with Fish and Wildlife. In addition, Fish and Wildlife conducts research, especially related to endangered species. The U.S. Fish and Wildlife Service also enforces the Migratory Bird Treaty Act of 1918, which provides not only for the protection of birds normally thought of as migratory, such as waterfowl, but also most other species of birds. For this reason most research, including banding, having to do with any birds within the park must also be covered by federal permits from Fish and Wildlife. Finally, the U.S. Fish and Wildlife Service is one of several agencies that is consulted by the Bureau of Land Management in its decision to lease tracts around the islands.

NATIONAL MARINE FISHERIES SERVICE

This is a branch of the National Oceanic and Atmospheric Administration charged with enforcement of such pertinent laws as the Fur Seal Treaty Act of 1911 and the Marine Mammal Protection Act of 1972, both of which give "lead agency" status to this agency for management of all seals, sea lions, sea otters, dolphins, porpoises, and whales. On the islands, therefore, these animals are mutually managed by both the National Marine Fisheries Service and the National Park Service. Under a memorandum of agreement, currently in draft form, between the two services, management by the National Marine Fisheries Service must comply with park laws; therefore, potential practices such as capture of pinnipeds on the three islands for commercial use is prohibited. In addition, the park and National Marine Fisheries Service may at some future date cooperate in research of marine mammals.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

This agency is charged with the establishment of national marine sanctuaries within United States waters. A currently proposed

marine sanctuary encompasses the water area for 6 miles around all of the northern Channel Islands and Santa Barbara Island. The park has recognized the need for a more regional approach to protection of the entire Channel Islands area and has indicated its support of the concept of a marine sanctuary. The establishment of a Channel Islands National Park (with a 1-nautical-mile jurisdictional boundary into the ocean from all the northern islands and Santa Barbara Island) will require a greater amount of coordination between the National Park Service and National Oceanic and Atmospheric Administration if the sanctuary is approved. (See appendix F for map.) As of this writing, approval by the president of the United States and concurrence of the governor of the state of California are still required.

UNITED STATES AIR FORCE

While this agency has no direct management responsibility for the islands, military operations occur in the air space over the islands. Consultation with the U.S. Air Force will continue, particularly as the space shuttle program moves into active phases. Close cooperation will be required to monitor and, if required, mitigate the impacts of the space shuttle program on island resources.

UNITED STATES COAST GUARD

This agency owns several portions of the three islands currently or potentially usable for emplacement of aids to navigation. These portions are managed by the National Park Service as part of the park. Under the expanded park legislation, these lands could be transferred to the Department of the Interior with provision for the continuation of existing and/or new essential navigational aids. The two agencies also cooperate in search and rescue missions, particularly in the waters within the park boundary.

UNITED STATES NAVY

This agency owns San Miguel Island and associated Prince Island but, through a 1976 amendment of a 1963 memorandum of agreement, the National Park Service jointly manages the island. This agency also operates an extensive installation on Santa Cruz Island, recently added to the park. Within the constraints of their mission, the U.S. Navy often is able to assist in the transportation of supplies, personnel, and equipment to the islands and provide other services that contribute to the management of the park. Although day to day management and protection of the islands rests with the National Park Service, military activities continue to take precedence over other uses. Close cooperation with the U.S. Navy with regard to San Miguel continues to be essential. Under the

park legislation, these lands could be transferred to the Department of the Interior with provision for the continuation of essential national security missions. It is understood that the memorandum of agreement between the two departments will remain in effect except as it may be modified by subsequent agreement.

APPENDIXES

APPENDIX A

FORMS AND CORRESPONDENCE SENT TO POTENTIAL RESEARCHERS

United States Department of the Interior
NATIONAL PARK SERVICE
CHANNEL ISLANDS NATIONAL MONUMENT
1699 ANCHORS WAY DRIVE
VENTURA, CALIFORNIA 93003

IN REPLY REFER TO:

Thank you for your interest in collecting and/or engaging in research within Channel Islands National Monument. The monument is a unit of the National Park System and was established to preserve outstanding cultural, natural, and paleontological resources, while at the same time allowing public enjoyment of these same features. We realize the value of research, and recognize it as a legitimate use of the monument. At the same time, because of our mandate for resource protection, only certain non-manipulative research projects have sufficient justification to be allowed on these three smallest of the Channel Islands; ill-conceived projects, or even too many legitimate ones, could seriously impact their fragile and sensitive resources.

In general, research is allowed if: 1) It is necessary for management or; 2) it is virtually non-impacting and requires no collecting. If it does require collecting, or if it may result in even minor disturbance to the resource on the islands' ecosystems, it may still be allowed if: 1) it can be accomplished only within the monument and; 2) if potential for jeopardizing the status of any impacted resources, or harming the ecosystem as a whole, is negligible.

If you feel that your project meets these criteria, please provide the information requested below. As well, if there is a necessity to collect, please fill out and return at the same time the enclosed application for a collecting permit (WRO Form 107).

Most applications will be processed within one month of receipt. However, to avoid last minute anxieties, we strongly urge you to apply as early as possible before you hope to start field work. You may provide the information required by sending copies of research grant proposals, graduate study proposals, or similar documents. Information which we need which is not included in your proposals may be furnished as an addendum or a cover letter. Please provide complete information the first time--otherwise, further delays will

result. In order to assess all proposals objectively and fairly we need all the following information:

1. Name of principal investigator
2. Institution or organization, department, address and telephone number
3. Principal investigator's rank or discipline
4. Title of proposed research
5. Abstract of proposed research
6. Detailed description of the proposed research including:

    A. What is to be accomplished
    B. When the research is anticipated to begin
    C. Duration of the research
    D. Research design and methodology
    E. Type and amount of specimens to be collected, if any
    F. The value of the research to the investigator's discipline and to Channel Islands National Monument
    G. Why it is necessary to conduct the research/collect the specimens in Channel Islands National Monument rather than in some area outside the monument.
    H. Pertinent published and unpublished references
    I. Names, affiliations, and qualifications of other personnel involved, including field assistants
    J. Source and amount of funding
    K. Timetable of work
    L. Miscellaneous logistical considerations: type of transportation to be used, number of trips, number of persons on each trip, whether camping is anticipated, etc.

All proposals will be evaluated objectively, irrespective of the investigators lack of funding or small curriculum vitae at the present time. In these cases, however, we may request an interview in order to better evaluate your experience and interest.

If you receive certification of your project, you must agree to furnish annual progress reports, a final report, and copies of theses, dissertations, publications, and reports to other agencies resulting from research in the monument. If a project is cancelled, postponed, or terminated, please inform us so that the file on your project can be closed.

Since the potential for adverse impacts on monument resources is great with much research, special conditions appropriate to your work might be included as part of your certification and your collecting permit. Noncompliance with these conditions could result in your project being terminated.

You must have all appropriate Federal and State of California permits before certification can be issued. If your natural science project

Form WRO-107
(March 1973)

United States Department of the Interior
National Park Service, Western Region

APPLICATION FOR PERMISSION TO COLLECT
SPECIMENS OF PLANTS, ROCKS, MINERALS, AND ANIMALS

Name of Area	Date
Name of Applicant	Home Address
Representing (Name of Institution)	Period of Collecting From To
Specimens to be Collected (Type & Quantity)	
Other Applicable Collection Permits: Federal: Agency: No: Expir. Date:	State: Agency: No: Expir. Date:
Reason for Collecting within this Area	
Place where Specimens are to be Deposited	

I, the applicant, having read the conditions on the reverse of the permit relating to collections within areas administered by the Western Region of the National Park Service, agree that, if the permit is granted, I will comply with all the conditions stated therein.

Signed _____

TO BE FILLED IN BY ISSUING OFFICE ONLY - DO NOT WRITE BELOW THIS LINE

Approved for Collecting following Specimens (Type & Quantity)

Locality of Collecting Limited to:	Permit Expiration Date
Special Conditions or Restrictions:	Copies of this permit sent to appropriate State and other Federal agencies, if applicable? Yes _____ No _____

Recommended by (Signature and Title)	Approved by (Signature of Supt.)	Date Approved

---

United States Department of the Interior
National Park Service, Western Region

COLLECTING PERMIT

In Accordance with the Conditions and Restrictions Appearing on the Back, Permission is Granted:

Name of Collector	To Collect within (Area)	Date Issued

To Collect the following Specimens (Type & Quantity)

Locality of Collecting Limited to:	Permit Expiration Date
Special Conditions or Restrictions:	

Approved (Signature)

Superintendent,

The collecting of rare or endangered natural objects, if permitted at all, will be allowed only when approval has been obtained from the Regional Director of the Western Region, National Park Service, San Francisco, California.

THIS PERMIT MUST BE CARRIED AT ALL TIMES WHILE COLLECTING. SEE REVERSE FOR CONDITIONS AND RESTRICTIONS.

Form 10-226
(April 1966)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

INVESTIGATOR'S ANNUAL REPORT

(Natural Sciences Research)

This form is to be completed by the researcher and returned to the Superintendent of the Park by JANUARY 1. See reverse for additional instructions.

TO SUPERINTENDENT	PARK	REGION

1. Project Title

2. Name(s) of Researcher(s) and Institution(s)

3. Source(s) and Amount(s) of Funds Other Than NPS, if Any

4. Starting Date of Project	5. Percent Completion of Project to Date:	6. Est. Additional Time Required for Completion Beyond January 1st:
	_____	_____ Years _____ Months

7. Summary: (a) of progress; (b) of significant findings, if any, to date; (e) recommendations regarding future course, i.e., on basis of work so far, shou d it proceed as planned, be reoriented, expanded, reduced, time schedule and support level adjusted, etc.;

(Use Additional Sheets if Necessary)

8. Signature of Investigator	Date

9. RSP Number

				N				

NS

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

RSP

NATURAL SCIENCES RESOURCE STUDIES PROBLEM

Original and one copy of the completed form should be submitted to the regional director for his review. The regional director retains one copy and forwards the original to the Office of Natural Sciences Studies in WASO. Refer to the "Natural Sciences Studies Handbook" for additional information.

PARK	REGION

1. Title of Problem *(Brief Name)*

2. Statement of Problem *(Use continuation sheet if needed for further explanation)*

CHECK ONE

3. ☐ Request for Service-supported studies or advice.

4. ☐ Reporting independent studies initiated, or to be initiated.

5. Submitted By *(Name)*	Title	Date
6. Superintendent's Review ☐ Approved ☐ Disapproved	Signature	Date
7. Regional Director's Review ☐ Approved ☐ Disapproved	Signature	Date

8. WASO Review By *(Name, Title, Date)*

a. ☐ Needs no additional study: problem can be solved by using existing knowledge and/or techniques.

b. ☐ Needs study to obtain solution.

c. Recommendations:

d. Methods of Funding

☐ Resource Studies ☐ Other M&P ☐ D&C/PCP#: ☐ Service Personnel ☐ Other

9. Est. Cost: $ _____ Per year for estimated _____ years. Total Estimate Cost: $ _____

10. Approved by Chief Scientist

_____ *(Signature)* _____ *(Date)*

11. RSP Number

				N				

Form 10-224 (1/69)

APPENDIX B

THREATENED AND ENDANGERED SPECIES OCCURRING WITHIN CHANNEL ISLANDS NATIONAL PARK (Exclusive of Santa Rosa and Santa Cruz islands)

The following species are listed as threatened or endangered species:

	Status
Dudleya traskiae (Santa Barbara Island live-for-ever)	E
Falco peregrinus anatum (American peregrine falcon)	E*
Haliaeetus leucocephalus (bald eagle)	E*
Pelecanus occidentalis (brown pelican)	E
Xantusia (Klauberina) riversiana (island night lizard)	T
Enhydra lutris (sea otter)	T*

*Extirpated on the three islands

The following species are proposed for listing as threatened or endangered species:

	Status
Binneya notabilis (slug snail)	E
Coelus globosus (globose dune beetle)	T
Dichondra occidentalis	E
Lavatera assurgentiflora (island mallow)	E
Micrarionta facta (Concentrated snail)	E
Micrarionta tryoni (Tryon's snail)	T

The following species are candidates for listing as threatened or endangered status:

	Status
Arctocephalus towsendi (Guadalupe fur seal)	E
Eriogonum giganteum var. compactum	E
Erysimum insulare (island wallflower)	T
Eschscholzia ramosa (island poppy)	E
Orobanche parishii subsp. brachyloba	T
Phacelia divaricata var. insularis	T
Quercus tomentella (island oak)	T

APPENDIX C

STATE ECOLOGICAL RESERVE REGULATIONS

WITH THE SECRETARY OF STATE
(Pursuant to Government Code Section 11380.1)

Copy below is hereby certified to be a true and correct copy of regulations adopted, or amended, or an order of repeal by:

FISH AND GAME COMMISSION
(Agency)

Date of adoption, amendment, or repeal:

December 8, 1978

By Leslie F. Edgerton
Leslie F. Edgerton
Executive Secretary
(Title)

DO NOT WRITE IN THIS SPACE

DO NOT WRITE IN THIS SPACE

AFTER PROCEEDINGS HAD IN ACCORDANCE WITH THE PROVISIONS OF THE ADMINISTRATIVE PROCEDURE ACT (Gov. Code, Title 2, Div. 3, Part 1, Chapter 4.5) AND PURSUANT TO THE AUTHORITY VESTED BY SECTIONS 1580-1584 OF THE FISH AND GAME CODE, AND TO IMPLEMENT, INTERPRET OR MAKE SPECIFIC SECTIONS 1580-1584 OF THE FISH AND GAME CODE, THE FISH AND GAME COMMISSION HEREBY AMENDS ITS REGULATIONS IN TITLE 14, CALIFORNIA ADMINISTRATIVE CODE, AS FOLLOWS:

(1) Subsection (b)(31) of Section 630 is amended to read:

(31) Anacapa Island Ecological Reserve, Ventura County.

(A) Except as specifically prohibited under this section, boating, sport and commercial fishing, spearfishing, swimming and diving with underwater breathing apparatus are permitted within the ecological reserve which extends one mile from the nearest point of land of east, middle and west island(s) commonly referred to as Anacapa Island.

(B) A natural area is hereby established from the mean high tide mark seaward to a water depth of 10 fathoms (60 feet) on the north side of East Anacapa Island between a line extending 345° magnetic off the westernmost point and a line extending 75° magnetic off the easternmost point. It is unlawful to take or possess any native plant, fish, wildlife, aquatic organism or disturb any natural geological feature within the described natural area.

(C) No invertebrates may be taken from within the following areas:

1. The mean high tide mark to a water depth of 20 feet on the south side of West Anacapa Island between a line extending 145° magnetic off the National Park Service Monument at the southernmost point, adjacent to and excluding Cat Rock, and a line extending 220° magnetic off the National Park Service Monument at the easternmost point near Frenchy's Cove.

2. The mean high tide mark to a water depth of 20 feet on the north side of Middle Anacapa Island between a line extending 345° magnetic off the National Park Service Monument at Bat Ray Point to a line extending 345° off the westernmost point of East Anacapa Island at the western boundary of the natural area off Anacapa Island.

(D) No net or trap may be used in waters less than 20 feet deep off the Anacapa Islands commonly referred to as Anacapa Island.

(E) A brown pelican fledging area is designated from the mean high tide mark seaward to a water depth of 20 fathoms (120 feet) on the north side of West Anacapa Island between a line extending 345° magnetic off the westernmost point and a line extending 345° off Portuguese Point, a distance of approximately 7,000 feet. No person, except as provided in subsection (a)(10), and employees of the National Park Service in the performance of their official duties shall enter this area during the period March 1 to May 31.

(F) No person shall fire or discharge any firearm or explosive devices, air or gas gun within the ecological reserve.

(G) Harvesting of kelp from within this reserve shall be prohibited except under a permit issued by the department.

(2) Subsection (b)(32) of Section 630 is amended to read:

(32) Santa Barbara Island Ecological Reserve, Santa Barbara County.

(A) Boating, sport and commercial fishing, spearfishing, swimming and diving with underwater breathing apparatus are permitted within the ecological reserve which extends one mile from the nearest point of the principal island of Santa Barbara.

(B) No invertebrates may be taken from the mean high tide mark seaward to a water depth of 20 feet on the eastern side of the island between a line extending 345° magnetic off the northernmost point of Arch Rock and a line extending 165° magnetic off the southernmost point.

(C) No net or trap may be used in waters less than 20 feet in depth off the eastern side of the island between a line extending 345° magnetic off the northernmost point of Arch Rock and a line extending 165° magnetic off the southernmost point of Santa Barbara Island.

(D) No person shall fire or discharge any firearm or explosive devices, air or gas gun within this reserve.

This order shall take effect on the thirtieth day after filing with the Secretary of State as provided in Section 11422 of the Government Code.

The Fish and Game Commission has determined that there are no new costs to local government, pursuant to Section 2231 of the Revenue and Taxation Code.

630. Ecological Reserves. The areas specified in this chapter have been declared by the Fish and Game Commission to be ecological reserves. A legal description of the boundaries of each ecological reserve is on file at the department's headquarters, 1416 Ninth Street, Sacramento. Ecological reserves are established to provide protection for rare or endangered wildlife, aquatic organism and specialized terrestrial or aquatic habitat types. Public entry and use of ecological reserves shall be compatible with the primary purposes of such reserves, and subject to the following applicable general rules and regulations, except as otherwise provided for the special area regulations:

(28) San Miguel Island Ecological Reserve, Santa Barbara County.

(A) Fishing is not permitted from shore or areas closed to boating. Recreational fishing is permitted from boats in other reserve waters. Commercial fishermen possessing abalone, lobster or sea urchin permits or using hook-and-line gear may fish in the reserve in areas open to boating. Commercial fishermen desiring to use other gear or seeking species not authorized by their permit must apply and obtain a permit in compliance with Section 630(a) (3) of this title.

(B) Swimming, skin and SCUBA diving are permitted in all areas where boating is authorized.

(C) Boating is permitted except between Judith Rock and Castle Rock where boats are prohibited closer than 300 yards from shore. Boats may be anchored overnight in the reserve only at Tyler Bight and Cuyler Harbor. Boats traveling within 300 yards of shoreline or anchorages shall operate with a minimum amount of noise and shall not exceed speeds of five miles per hour. Landing is allowed on San Miguel Island by permit only at the designated landing beach in Cuyler Harbor. No person, except as provided in subsection (a) (10) shall have access to all other offshore rocks and islands in the reserve.

(1) Notwithstanding the 300-yard boating closure between Judith Rock and Castle Rock, the following shall apply:

(A) Boats may approach no nearer than 100 yards from shore during the period(s) from March 15 through April 30, and October 1 through December 15; and

(B) Boats operated by commercial abalone diving permittees and commercial sea urchin boat operators who have been issued permits by the department to take sea urchins from the Point Bennett area of San Miguel Island may enter any waters of the 300-yard area between Judith Rock and Castle Rock for the purpose of fishing abalone and sea urchins during the period(s) March 15 through April 30, and October 1 through December 15.

(2) The department may rescind permission for boats to enter waters within 300 yards between Judith Rock and Castle Rock upon finding that impairment to the island marine mammal resource is imminent. Immediately following such closure, the department will request the commission to hear, at its regularly scheduled meeting, presentation of documentation supporting the need for such closure.

(31) Anacapa Island Ecological Reserve, Ventura County.

(A) Except as specifically prohibited under this section, boating, sport and commercial fishing, spearfishing, swimming and diving with underwater breathing apparatus are permitted within the ecological reserve which extends one mile from the nearest point of land of east, middle and west Island(s) commonly referred to as Anacapa Island.

(B) A natural area is hereby established from the mean high tide mark seaward to a water depth of 10 fathoms (60 feet) on the north side of East Anacapa Island between a line extending 345° magnetic off the westernmost point and a line extending 75° magnetic off the easternmost point. It is unlawful to take or possess any native plant, fish, wildlife, aquatic organism or disturb any natural geological feature within the described natural area.

(C) No invertebrates may be taken from within the following areas:

1. The mean high tide mark to a water depth of 20 feet on the south side of West Anacapa Island between a line extending 145° magnetic off the National Park Service Monument at the southernmost point, adjacent to and excluding Cat Rock, and a line extending 220° magnetic off the National Park Service Monument at the easternmost point near Frenchy's Cove.

2. The mean high tide mark to a water depth of 20 feet on the north side of Middle Anacapa Island between a line extending 345° magnetic off the National Park Service Monument at Bat Ray Point to a line extending 345° off the westernmost point of East Anacapa Island at the western boundary of the natural area off Anacapa Island.

(D) No net or trap may be used in waters less than 20 feet deep off the Anacapa Islands commonly referred to as Anacapa Island.

(E) A brown pelican fledging area is designated from the mean high tide mark seaward to a water depth of 20 fathoms (120 feet) on the north side of West Anacapa Island between a line extending 345° magnetic off Portuguese Rock to a line extending 345° off the western edge of Frenchy's Cove, a distance of approximately 4,000 feet. No person except as provided in subsection (a) (10), and employees of the National Park Service in the performance of their official duties shall enter this area during the period March 1 to July 31.

(F) No person shall fire or discharge any firearm or explosive devices, air or gas gun within the ecological reserve.

(G) Harvesting of kelp from within this reserve shall be prohibited except under a permit issued by the department.

(32) Santa Barbara Island Ecological Reserve, Santa Barbara County.

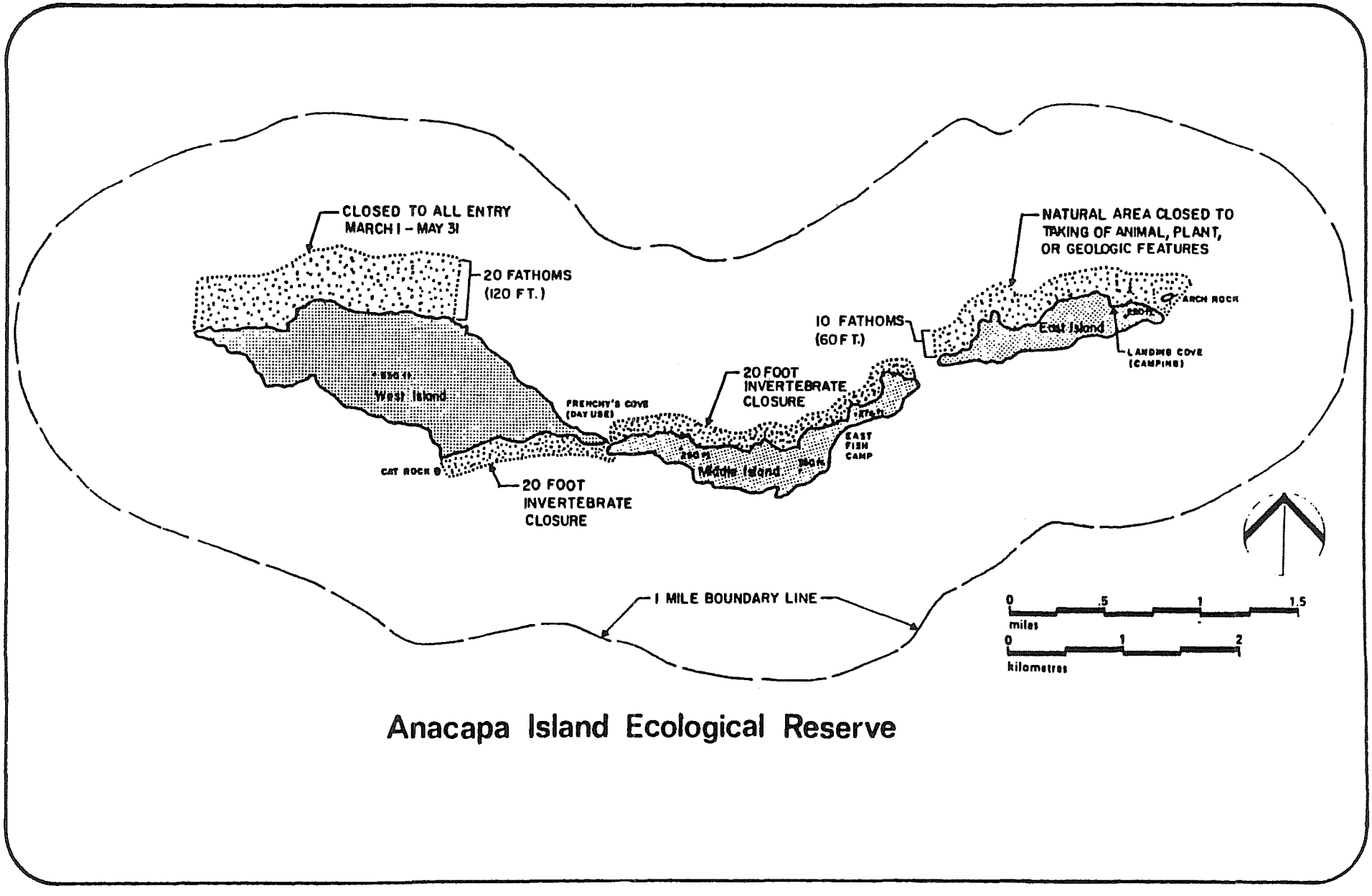
(A) Boating, sport and commercial fishing, spearfishing, swimming and diving with underwater breathing apparatus are permitted within the ecological reserve which extends one mile from the nearest point of the principal island of Santa Barbara.

(B) No invertebrates may be taken from the mean high tide mark seaward to a water depth of 20 feet on the eastern side of the island between a line extending 345° magnetic off the northernmost point of Arch Rock and a line extending 165° magnetic off the southernmost point.

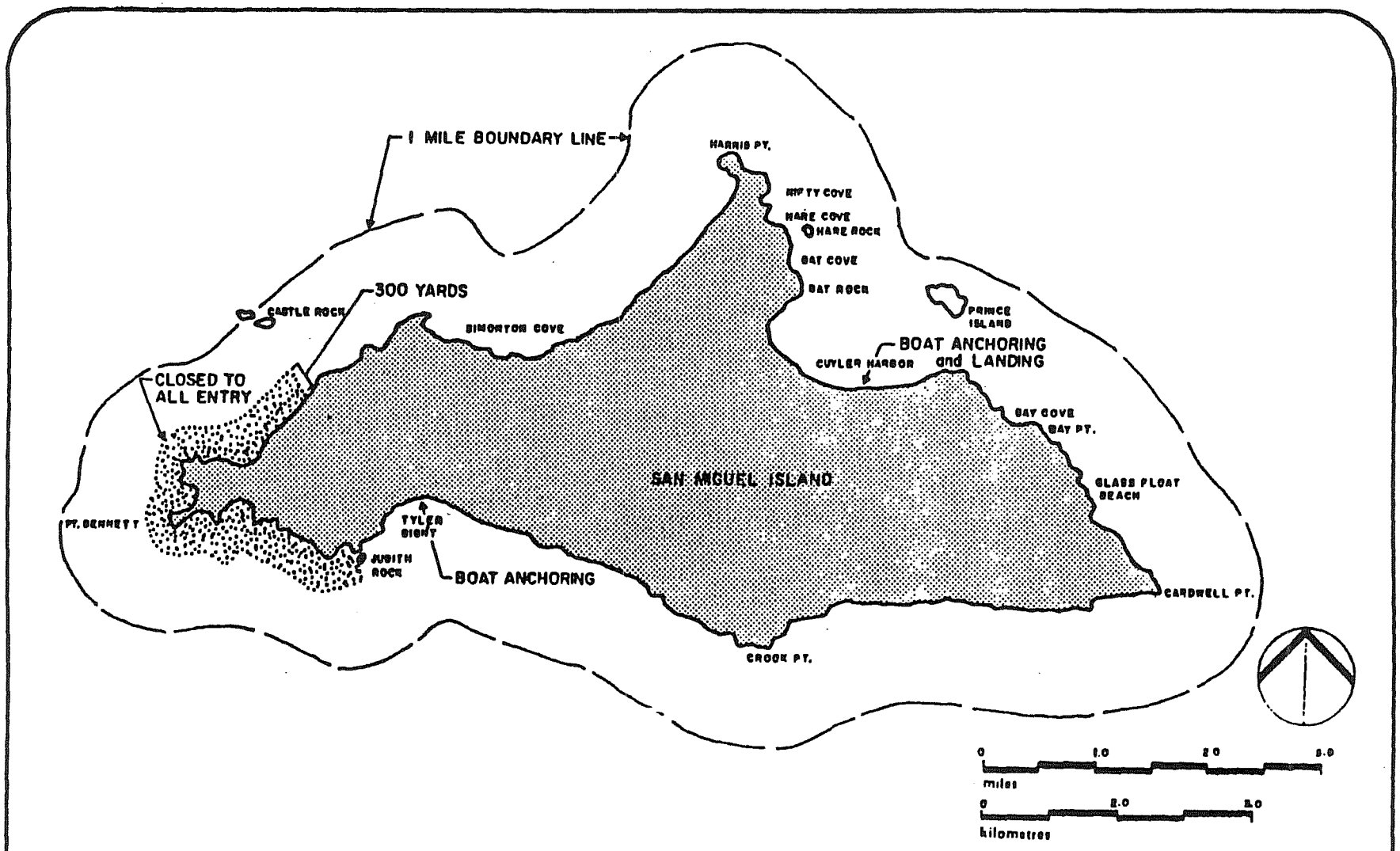
(C) No net or trap may be used in waters less than 20 feet in depth off the eastern side of the island between a line extending 345° magnetic off the northernmost point of Arch Rock and a line extending 165° magnetic off the southernmost point of Santa Barbara Island.

(D) No person shall fire or discharge any firearm or explosive devices, air or gas gun within this reserve.

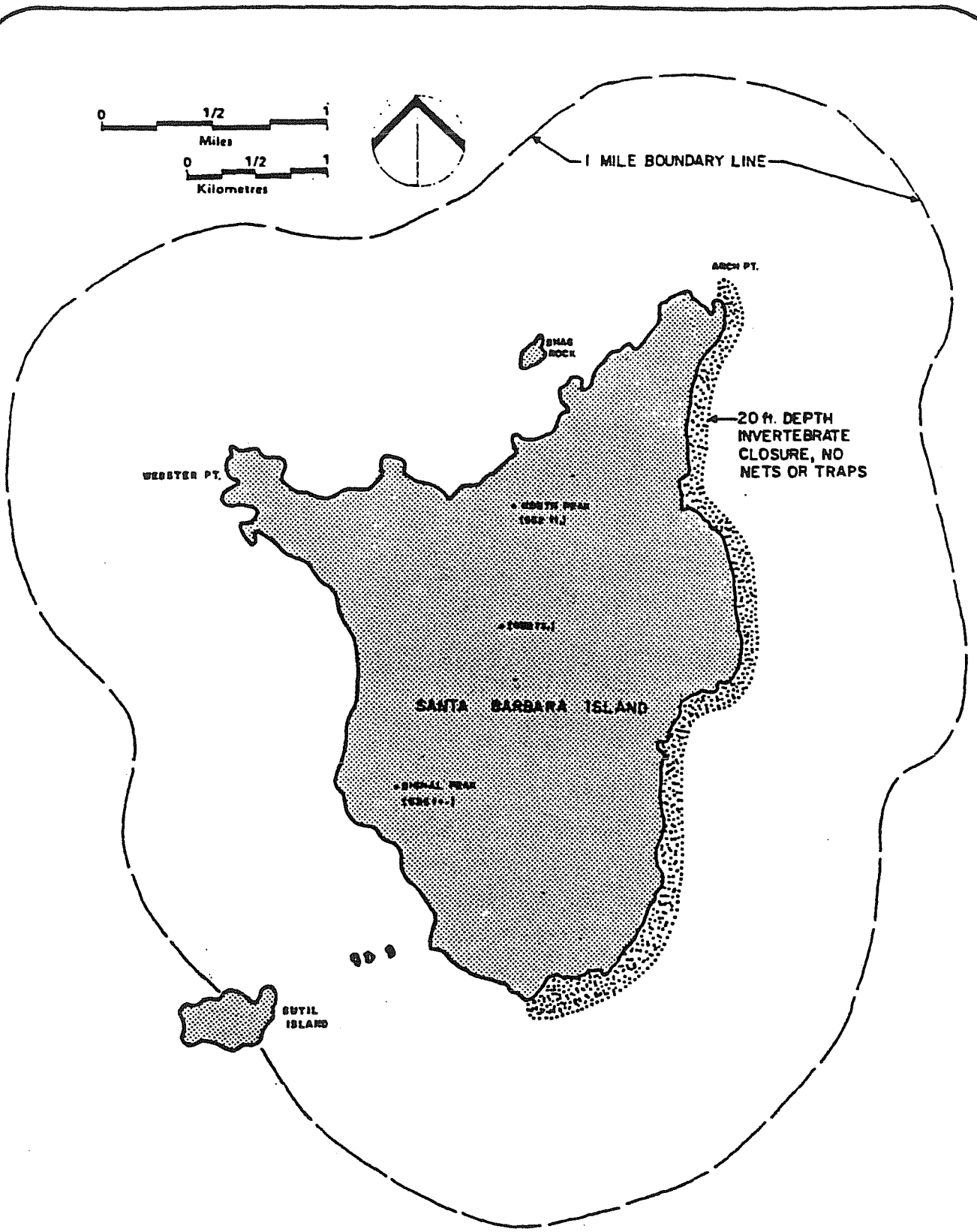
(E) Harvesting of kelp from kelp lease sites within the Santa Barbara Island Ecological Reserve shall be permitted.



Anacapa Island Ecological Reserve



San Miguel Island Ecological Reserve



Santa Barbara Island Ecological Reserve

APPENDIX D

AIR QUALITY STANDARDS

The Clean Air Act created three classifciations of varying degrees of restriction of allowable air quality deterioration. Under this classification, Channel Islands National Monument was designated Class II. The monument has been recommended for Class I status, as air quality related values are deemed important to the area. This recommendation would also apply to the expanded park. The maximum allowable increase of particulate matter and sulfur dioxide for Class I and Class II areas has been established as follows:

POLLUTANT	MAXIMUM ALLOWABLE INCREASE (micrograms per cubic meter)	
	Class I	Class II
Particulate matter		
Annual geometric mean	5	19
Twenty-four-hour maximum	10	37
Sulfur dioxide		
Annual arithmetic mean	2	20
Twenty-four-hour maximum	5	91
Three-hour maximum	25	512

APPENDIX E

SUMMARY LIST OF NATURAL AND CULTURAL RESOURCE PROJECTS

In the separate Management Program document, projects will be assigned numbers by priority and funding sources. The following list is not in order of priority.

Natural Science Projects

- Initiate exotic plant eradication study.
- Update, correct, and refine species lists and vegetation community maps.
- Monitor special status plant species.
- Monitor distribution and abundance of proposed special status snail species.
- Identify past distribution of special status snail species.
- Determine extent of competitive interaction between introduced ants and special status snails.
- Study food preference of carnivorous snails.
- Determine distribution and abundance of globose dune beetles.
- Assess damage by scale insects to prickly pear cactus on Anacapa Island.
- Determine distribution, abundance, and habitat requirements of island night lizards on Santa Barbara Island.
- Determine status of amphibians and reptiles on Anacapa and San Miguel islands.
- Study feasibility of bald eagle reintroduction on park islands.
- Determine status of European starlings on park islands.
- Monitor status of San Miguel island foxes.
- Determine status of the deer mouse on East Anacapa Island.
- Determine impacts of rat eradication/ control techniques on nontarget species found on Anacapa and San Miguel islands.

Design rat eradication/control program for San Miguel Island.

Determine impacts of rabbit eradication/control techniques on nontarget species found on Santa Barbara Island.

Continue study of basic biology of feral rabbits on Santa Barbara Island.

Determine species, abundance, seasonal status, distribution, and preferred habitat of bats on park islands.

Determine abundance, seasonal status, distribution, mortality, pup production, and behavioral observations of pinnipeds on park islands.

Study biology of harbor seals on park islands.

Study human activity/pinniped interaction.

Cooperate in studies to determine impacts to pinniped auditory systems resulting from high pressure sonic booms, monitor space shuttle sonic boom impacts on San Miguel Island pinnipeds, and survey San Miguel Island elephant seal population expansion.

Encourage behavioral studies of eared seals, food habit studies of local pinnipeds, studies of specific interaction and use of space, and monitoring of diseases.

Initiate baseline survey of nearshore marine resources of sea otter prey species.

Study human activity/seabird interaction.

Monitor level of pollutants in the populations of seabird species.

Study impacts of kelp cutting on seabird foraging around park islands.

Cooperate in studies of food habits and foraging areas of seabirds nesting on park islands, use of nearshore waters by migratory species, reproductive behavior of Santa Barbara Island western gulls,

biology of snowy plovers on San Miguel Island, biology of black oystercatchers on park islands, and sonic boom effects on various seabird species.

Cooperate in studies of visitor use impact to intertidal resources, intertidal resource sampling studies on park islands, and in long-term studies of commercial and sport fisheries around park islands.

Resource Management

Control or eradicate some exotic plant species.

Projects

Monitor plant transects on the islands.

Eradicate black rats on East Anacapa Island.

Initiate feral rabbits eradication program for Santa Barbara Island.

Monitor pinniped populations on park islands.

Monitor seabird populations on park islands during nesting season.

Monitor brown pelican status and nesting success on Anacapa Island.

Monitor gully and wind erosion on the three islands.

Monitor springwater quality on San Miguel Island.

Monitor caliche forests on San Miguel Island.

Administrative Actions

Suppress all fires on the three islands.

Prohibit rock turning on Santa Barbara Island.

Encourage a qualified group (such as the Audubon Society) to undertake an annual bird census on park islands.

Reduce man-made harborage for black rats on Anacapa and San Miguel islands.

Expand interpretive programs to increase reasonable public access to and enjoyment and understanding of pinniped and seabird populations.

Cooperate with other agencies to designate areas offshore of the

islands as boat closure zones because of pinniped or seabird populations.

Establish air corridors over park islands.

Establish a program for NPS participation in oil spill contingency plans.

Designate the Point Bennett area and Prince Island off San Miguel Island, and Shag Rock and Sutil Island off Santa Barbara Island, as research natural areas.

Relocate trail section, if feasible, on Santa Barbara Island.

Close various areas on the islands seasonally, as needed to protect seabird populations.

Relocate the outhouse near the ranger station on San Miguel Island or convert to self-contained system.

Monitor OCS oil and gas development around park islands.

Monitor air quality on the islands.

Establish consistent weather stations on park islands.

Cultural Resource Projects

Prepare historic structure maintenance guide for buildings in East Anacapa Historical District.

Conduct surveys to locate cultural resources, especially historical archeological sites, on park islands.

Monitor impacts of the East Anacapa Nature Trail on the archeological site.

Conduct limited testing and data recovery from Anacapa Island sites.

Formulate and implement alternative methods of preserving eroding human remains on San Miguel Island.

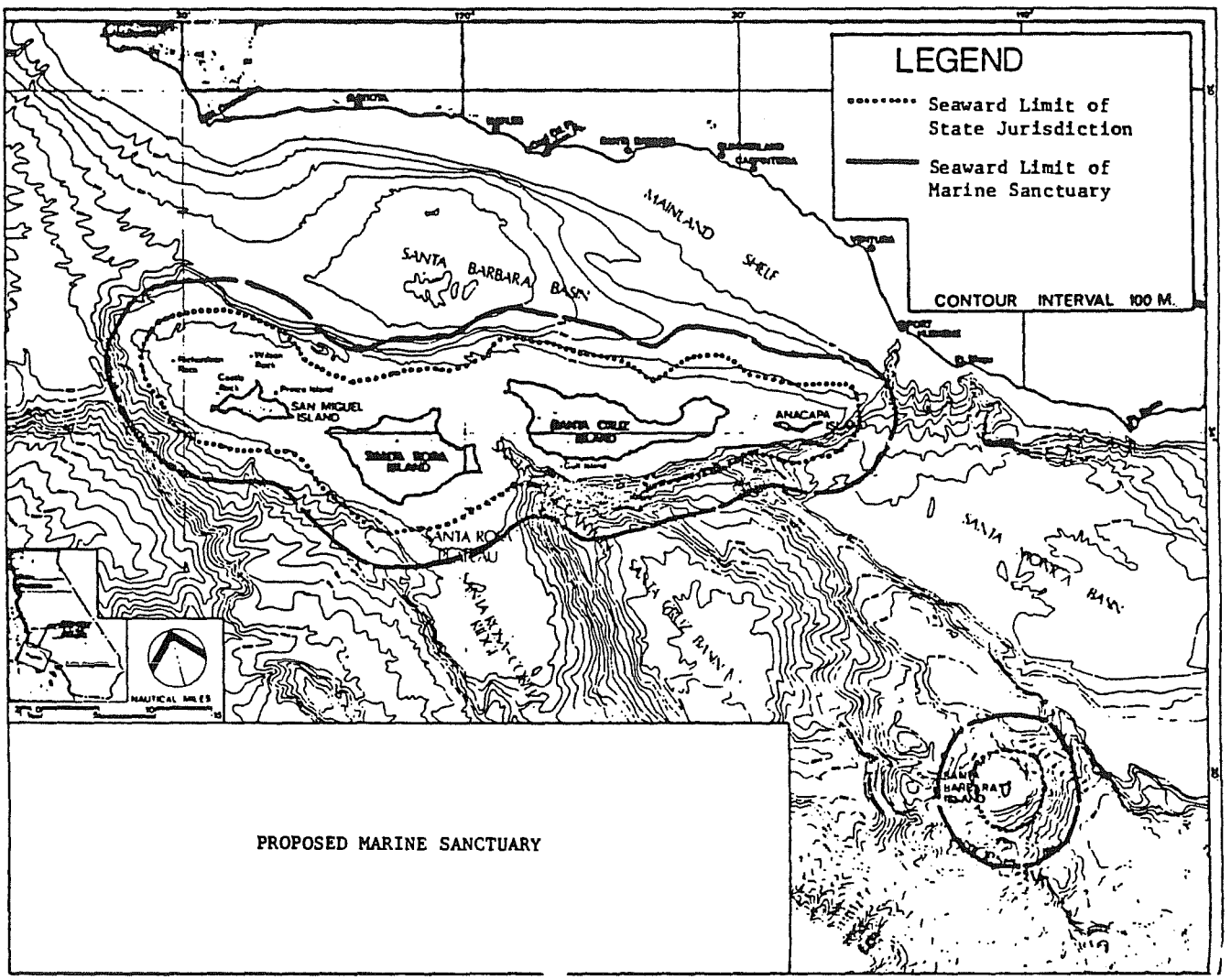
Formulate multidisciplinary designs for recovery and analysis of eroding bones and artifacts from San Miguel Island sites.

Conduct archeological survey of area on San Miguel not examined by Greenwood (1978).

- Record, number, and map locations of mammoth bones and areas of oxidized soil to correlate with recording systems of Greenwood (1978) and Rozaire (1976).
- Undertake limited testing of Nidever Adobe site leading to either salvage or partial excavation and stabilization if warranted.
- Further evaluate Lester Ranch complex.
- Stabilize and maintain Herbert Lester grave and Cabrillo Monument.
- Formulate research design to allow minimal data recovery and analysis of sites affected by erosion and accessibility.
- Study feasibility of rerouting trail in Webster Point area.
- Monitor public access to archeological and historic sites to determine site deterioration.
- Use Chumash place names for the Channel Islands in information literature.
- Encourage Chumash descendants to participate in preparation of programs, replicas, etc.

A P P E N D I X F

PROPOSED MARINE SANCTUARY MAP



A P P E N D I X G

COMPLIANCE CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE

LLOYD 500 BUILDING, SUITE 1692
500 N.E. MULTNOMAH STREET
PORTLAND, OREGON 97232

July 31, 1980

Memorandum

To: Regional Director, Western Region, National Park Service, Box 36063, San Francisco, California 94102

From: Acting Regional Director, Portland, Oregon (AFA-SE)

Subject: Formal Section 7 Consultation Request re: Draft Natural and Cultural Resource Management Plan (NCRMP) Environmental Assessment for Channel Islands with Project Statements (#1-1-80-F-44)

This memorandum responds to your request of March 11, 1980, for formal consultation pursuant to Section 7(a) of the Endangered Species Act, as amended, on the subject draft documents for the Channel Islands, dated February 1980. By letter dated June 27, 1980, an extension to the 90-day consultation period was mutually agreed to by our respective staffs.

Several Federally listed species occur on or in the vicinity of the Channel Islands, and will be considered in this consultation. These include: the island night lizard (Klauberina riversiana), the California brown pelican (Pelecanus occidentalis californicus), the bald eagle (Haliaeetus leucocephalus), the American peregrine falcon (Falco peregrinus anatum), the southern sea otter (Enhydra lutris nereis), and the Santa Barbara Island liveforever (Dudleya traskiae). Several candidate species will also be discussed.

Project Description

These draft documents provide a means for public involvement in future plans for the Channel Islands National Monument. They outline research and resource management plans with analyses of impacts to the Islands. The Project Statements summarize those projects discussed in the draft NCRMP which are of highest priority. Several priority items are proposed to protect or enhance endangered species. These will be discussed in our following comments. However, let us point out that the proposals to protect, enhance, or study listed species were of general description and do not allow detailed analysis by us at this time.

the Channel Islands. A population decline resulted from the commercial harvest by fur traders during the 1800's and this population was brought to near extinction by the turn of the century.

In 1938, the southern sea otter was identified off Point Sur, California, and that population was expanded to an estimated high of 1443 individuals (1979 census) with a range between Seal Beach (San Luis Obispo County) and Ano Nuevo Point (Santa Cruz County). A few wandering individuals have been sighted to the north and south of these range limits. Provided the population continues to increase, it is presumed that the population will extend its range to the Channel Islands and coastline south of Point Conception.

The southern sea otter is an opportunistic predator foraging in both rocky and soft sediment communities, seldom ranging beyond the 20-30 fathom depth. They feed on a variety of benthic invertebrates, including abalone (Haliotis sp.), sea urchins (Strongylocentrotus sp.), kelp crab (Pugettia sp.), and others.

Invertebrates

Three candidate invertebrate species - all land snails - occur on Santa Barbara Island. The concentrated snail (Micrarionta facta) is restricted solely to Santa Barbara Island. It is found in sheltered rock formations, usually below 250 feet elevation. M. facta was proposed for endangered status on January 12, 1977 (42 FR 2507) but was withdrawn pursuant to the 1978 amendments to the Endangered Species Act. We have very little other information on the ecological requirements for this species. Our recommendations (below) will center on the need for additional survey work and study related to this and other land snail species.

Tryon's snail (Micrarionta tryoni) is known only from Santa Barbara and San Nicolas Islands. Habitat destruction by feral animals (rabbits) and loss of the plant Coreopsis are believed to be limiting factors for this species. Projects designed to relieve these pressures will benefit this species. M. tryoni was proposed for threatened status on April 28, 1976, and withdrawn pursuant to the 1978 amendments to the Endangered Species Act.

The slug snail (Binneya notabilis) is restricted to an extremely specific range on Santa Barbara Island. It is found under soil and associated with thick, succulent roots. Unknowning destruction by hikers, accidental brush fires, and the uncontrolled spread of

exotic ice plant (mesembryanthemum (Carpobrotus) sp.) all constitute threats to the species that can be controlled by proper planning. B. notabilis was proposed for endangered status on April 28, 1976 (41 FR 17742), and subsequently withdrawn pursuant to the 1978 amendments to the Endangered Species Act.

Flora

Dudleya traskiae (Crassulaceae) or the Santa Barbara Island liveforever (SBIL) was determined to be an endangered species on April 26, 1978. "(F)ormer practices (such) as farming, grazing, and intentional burning" were cited as causes for the decline in the native insular vegetation and the SBIL (43 FR 17910-17916). However, it was primarily European rabbits (Oryctolagus) introduced in the 1940's that gnawed and grazed the SBIL to the ground that induced the belief that the SBIL was extinct (Philbrick, 1972 and Smithsonian, 1975). Subsequently small SBIL stands were located in 1975 in three canyons and a substantial colony of several hundred plants was discovered near Signal Peak (Moran, 1979). This "reappearance" of D. traskiae has been attributed in part to the reduction by the NPS of the rabbit population on Santa Barbara Island. However, it is plausible that the "steep, nearly vertical cliff(s)" of the Signal Peak colony may have made the SBIL inaccessible to rabbits and to humans in the past (Moran, 1979). Still much remains to be done regarding removal of the rabbits and recovery of the SBIL on Santa Barbara Island (43 FR 17915 and Moran, 1979). This effort has been started by the State of California Department of Fish and Game. They are taking the lead within an interagency working group in drafting a recovery plan for the taxon for the FWS.

Dudleya is a favorite among rock gardeners, and cactus and succulent growers for its beauty, unique succulent habit and appearance, and hardiness. This has generated moderate to intense collection pressures on Dudleya by many individuals including non-botanists and amateur growers.

Several Federal candidate plant species grow on the Channel Islands. Eriogonum giganteum ssp. compactum, Lavetera assurgentiflora, Mahonia (Berberis) pinnata ssp. insularis, and Orobanche parishii ssp. brachyloba are among those species found on the islands that are being considered to include in a "Notice of Review" to be published in the Federal Register later this year by this Service. These species suffer from much the same threats as the SBIL, but they also are threatened by exotic plant species described on page 61 of the Environmental Assessment. Little is known on the status of these species.

Discussion and Recommendations

Several project statements could have an effect on listed or candidate species. As detailed project plans are developed, NPS should determine whether or not a project could affect a listed species, and then request consultation on specific projects. Any project element that requires a Federal endangered species permit (i.e., island night lizard research) should be subject to formal consultation with this Regional Office prior to submittal of your permit application. What follows in this Section is a discussion of several specific proposals.

We strongly support the Santa Barbara Island European Rabbit Eradication and the Anacapa Island Black Rat Eradication research plans. Such programs are highly desirable in the protection of endemic species. However, non-target species (i.e., endangered and candidate species) could be impacted by the chosen elimination methods. To insure no negative impacts to listed species, we would like to review the final eradication plans within the context of formal consultation, prior to implementation.

The proposed study on the status of the island night lizard on Santa Barbara Island could have an effect on this threatened species. Specific plans on the methods proposed to accomplish this project should be evaluated for their possible effects. We would appreciate a copy of the proposed study. Again, formal consultation with our Service will be required in order to support your application for a Federal endangered species permit.

The sea otter historically was an endemic species on the islands. Natural expansion of their range may indeed lead to reoccupation of the Channel Islands. Further, in the draft Sea Otter Recovery Plan, the Channel Islands are proposed to be examined for a possible translocation site(s). In-depth studies of the nearshore community structure and composition of the islands will be necessary prior to any decision. Thus, we are in favor of the proposed "Subtidal Marine Resource Inventory: Invertebrates." We agree that similar studies will need to be conducted at all islands and a close review of the research presently being conducted on San Nicolas will prove to be of great help in completing our research proposal. We lood forward to reviewing your completed proposal.

We strongly endorse the Exotic Plant Eradication Feasibility project. The project statement points out that the ultimate goal of exotic plant removal may have some detrimental effects. We urge you to fund

This concludes formal consultation on the Draft NCRMP and Project Statements for the Channel Islands. If you have specific questions regarding this matter, please call our Sacramento Area Manager at FTS 468-4664.

Bill Meyer

William H. Meyer

Literature Cited

Britton, N.L. and J.N. Rose. 1903. New or noteworthy North American Crassulaceae. Bull. N.Y. Bot. Gard. 3:1-45.

Grinnell, J. and A.H. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna, No. 27. 608 pp.

Kiff, L.F. 1978. Historical changes in resident populations of California Islands raptors. Paper presented at the Symposium on California Islands. February 1978. Santa Barbara Museum of Natural History.

Moran, R.V. 1979. Dudleya traskiae (Rose) Moran. Santa Barbara Island Dudleya. CNPS Rare Plant Status Report 2 pp. (unpublished).

Philbrick, R.N. 1972. The plants of Santa Barbara Island, California. Madrono 21:329-393.

Smithsonian Institution. 1975. Report on endangered and threatened plant species of the United States. House Doc. No. 94-51. 200 pp.

BIBLIOGRAPHY

ANDERSON, DANIEL W., GRESS, F, MAIS, K.F., and KELLY, P.R.
1978 "Brown Pelicans as Anchovy Stock Indicators and Their Relationship to Commercial Fishing." CALCOFI conference.

CALIFORNIA DEPARTMENT OF FISH AND GAME
1978 "A Biological Assessment of the Island Night Lizard," by R.L. Wilson, Western Instrument Corporation, Oxnard, CA. Inland Fisheries Branch.

1977 "The Status of Brown Pelicans at Anacapa Island in 1975," by Daniel W. Anderson, R.M. Jurek, and J.O Keith. 63 (1):4-10.

1976 "A Proposal for Sea Otter Protection and Research and Request for the Return of Management to the State of California," vol. 1, draft. Operations Research Branch.

CALIFORNIA DEPARTMENT OF FISH AND GAME, RESOURCES AGENCY
1970 "Reproductive Status of the California Brown Pelican in 1970" (with notes on breeding biology and natural history), by Franklin Gress. Report 70-6. Wildlife Management Branch.

DAVIS, G.E.
1977 "Effects of Recreational Harvest on a Spiny Lobster, Panulirus argus, Population." Marine Science bull. 27(2):223-236.

HUMBOLDT STATE UNIVERSITY
1979 "The Reintroduction of the Bald Eagle to the California Channel Islands." Project proposal. Arcata, CA.

HUNT, G.L. and HUNT, M.W.
1974 "Trophic Levels and Turnover Rates: the Avifauna of Santa Barbara Island, California." Condor 76:363-369.

INTERDISCIPLINARY SYMPOSIUM OF THE CALIFORNIA CHANNEL ISLANDS
1978 "Historical Changes in Resident Populations of California Island Raptors," by L.F. Kiff. Santa Barbara.

JONES, H.L. and DIAMOND, J.M.
1976 "Short-time Base Studies of Turnover in Breeding Bird Populations of the California Channel Islands." Condor 78:526-549.

LE BOEUF, B.J. et al.
1979 "Marine Mammal and Seabird Survey of the Southern California Bight Area," vol. III - Principal Investigator's Reports. Draft. Santa Cruz: University of California. BLM contract 08550-CT5-28.

LITLER, M.M.
1978 "Assessments of Visitor Impact on Spatial Variations in the Distribution and Abundance of Rocky Intertidal Organisms on Anacapa Island, California." NPS contract CX-4000-8-0010.

NORTHWEST FISHERIES CENTER
1976 "Physiological Impacts of Oil on Pinnipeds," by G.L. Kooyman, R.L. Gentry, and W.B. McAlister. Processed report.

PHILBRICK, R.N.
1972 "The Plants of Santa Barbara Island, California." Madrono 21:320-393.

SANTA BARBARA BOTANIC GARDEN
1967 Proceedings of the Symposium on the Biology of the California Islands, R.N. Philbrick, ed. Santa Barbara.

SANTA BARBARA MUSEUM OF NATURAL HISTORY
In Press "The Distribution and Abundance of Seabirds Breeding in the California Channel Islands," by G.L. Hunt, Jr.; R.L. Pitman; and H.L. Jones. Proceedings of the 2nd Conference on the Biology of the Channel Islands.

SOUTHWEST FISHERIES CENTER
1979 An Annotated Catalog of Published and Unpublished Sources of Data on Populations, Life History, and Ecology of Coastal Marine Mammals of California, by S.W. Johnson. Administrative report LJ-79-1.

TODD, E.I. and KENYON, K.W.
1972 Selected Bibliography on the Sea Otter. Special scientific report--Wildlife 149. Washington, DC.

UNITED STATES DEPARTMENT OF COMMERCE, NATIONAL MARINE FISHERIES SERVICE

1977 A Summary of Knowledge of the Sea Otter, Ehnydra lutris, L., in California and an Appraisal of the Completeness of Biological Understanding of the Species, by C.D. Woodhouse, R.K. Cowen, and L.R. Wilcoxon. NTIS technical report PB-270-374. Marine Mammal Commission.

1975 "San Miguel Island Management Plan," by R.L. DeLong. Washington, DC. Marine Mammal Commission.

UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT

1979 Final Environmental Statement, OCS sale 48. Five vols.

1978 Summary of Marine Mammals and Seabird Surveys of the Southern California Bight Area, 1975-1978, vol. III, part I - Pinnipeds of the Southern California Bight, by M.L. Bonnell et al. Santa Cruz: University of California.

1978 A Kelp Survey of the Southern California Bight, by D.T. Hodder and M.R. Mel. Vol. III, report 2.6. Southern California Baseline Study. Washington, DC.

1978 Biological Features of Rocky Intertidal Communities near Cuyler Harbor, San Miguel Island, California, by M.M. Littler and P.Y. O'Brien. Vol. III, report 2.1. Spatial and Temporal Variations in the Distribution and Abundance of Rocky Intertidal and Tidepool Biotas in the Southern California Bight. Washington, DC.

1978 Biological Features of Rocky Intertidal Communities Near Cove Canyon, Santa Barbara Island, California, by R.R. Seapy and M.M. Littler. Vol. III, report 2.1. Spatial and Temporal Variations in the Distribution and Abundance of Rocky Intertidal and Tidepool Biotas in the Southern California Bight. Washington, DC.

UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

1977 Administration of the Marine Mammal Protection Act of 1972--June 22, 1977, to March 31, 1978. Washington, DC.

UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

1974 "The Status of the Song Sparrow and Bewick's Wren on San Clemente Island and Santa Barbara Island, California," by R.M. Stewart et al. Report to the Endangered Species Office by Point Reyes Bird Observatory, Bolinas, CA.

UNITED STATES DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE

1979 "The California Sea Lion Population on Santa Barbara Island; Results of the 1979 Breeding Season Studies and Recommendations for Management of the Sea Lion Population," by Caroline B. Heath.

1979 "Preliminary Observations of Selected Harbor Seal Hauling Areas on San Miguel Island," by T.D. Morrison. Draft.

1979 "Natural Resources Study of the Channel Islands National Monument, California." by Santa Barbara Museum of Natural History.

1979 "Ethnohistorical Overview of the Chumash Indians," by Larry Van Horn.

1979a "Baseline Resource Information for Planning and Management. Pinniped Resources of the Channel Islands," D.J. Seagars, ed. Draft.

1979b "Baseline Resource Information for Planning and Management. Breeding Marine Birds of the Channel Islands," D.J. Seagars, ed. Draft.

1979 "Avian Use of Kelp Beds at Santa Barbara Island, a Preliminary Report," by M. Barratt and G.L. Hunt, Jr., Irvine. University of California.

1978 Archeological Survey and Investigation, Channel Islands National Monument, California, by Roberta S. Greenwood.

1978 "Historic Resource Study, Channel Islands National Monument and San Miguel Island, California," by Lois Weiman. Chambers Consultants and Planners. Draft.

1978 A Report on the Archeological Investigations of Three California Islands: Santa Barbara, Anacapa, and San Miguel, by Charles E. Rosaire.

UNITED STATES DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE

1977 "Archeological Overview of the Northern Channel Islands, California," by M. Glassow.

1976 "Guidelines for Protection and Management of Colonially Nesting Seabirds," by R.A. Buckley and F.G. Buckley. Boston: North Atlantic Regional Office.

1970 "Seals and Sea Lions of San Miguel, Santa Rosa, Santa Cruz, Santa Barbara, and Anacapa Islands," by G.A. Bartholomew and D.K. Odell. M.S., University of California, Los Angeles.

UNIVERSITY OF CALIFORNIA

1979 Summary of Marine Mammal and Seabird Surveys of the Southern California Bight Area 1975-1978. Vol. III, part III, book II - Distribution, Status, Reproductive Ecology, and Foraging Habits of Breeding Seabirds. Draft. Irvine.

1975 "Studies of Avian Turnover, Dispersal, and Colonization of the California Channel Islands, by H.L. Jones. PhD dissertation. Los Angeles.

1978 Summary of Marine Mammal and Seabird Surveys of the Southern California Bight Area, 1975-1978, by K.T. Briggs et al. Vol. III, part III. Distribution, Numbers, and Seasonal Status of Seabirds of the Southern California Bight. Draft. Santa Cruz.

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As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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