

ENVIRONMENTAL ASSESSMENT ON THE
CONTROL OF EXOTIC EUROPEAN RABBITS
ON SANTA BARBARA ISLAND

CHANNEL ISLANDS NATIONAL PARK, CALIFORNIA

JULY 1981

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I. PURPOSE AND NEED FOR THE ACTION:

Santa Barbara Island is the smallest of the eight Channel Islands off the southern California coast. It is one of five islands which comprise Channel Islands National Park.

European rabbits (Oryctolagus cuniculus) were introduced on Santa Barbara Island in the early part of the Twentieth Century. Since then, estimates indicate the rabbit population has periodically fluctuated from about 50 to over 2,000. Foraging by the introduced rabbits has caused habitat modification. During dry years, rabbits severely impact such native succulents as the giant coreopsis and the Santa Barbara Island live-forever, not only because other food sources are limited but also because rabbits partially obtain their water requirements from these plants (National Park Service, 1980). Rabbit grazing was a contributing factor in the reduction of coreopsis distribution from formerly large stands covering most of the eastern half of the island to presently small stands in isolated locations. Rabbit foraging is also believed to be the primary reason for the reduction of the Santa Barbara Island live-forever (U.S. Fish and Wildlife Service, 1980). This plant was believed nearly extinct until a larger population was rediscovered in 1975.

The inhabitation of the island by the exotic rabbits is contrary to National Park Service (NPS) policy. The 1978 NPS Management Policies Handbook states:

"Manipulation of population numbers of exotic plant and animal species up to and including total eradication, will be undertaken whenever such species threaten protection or interpretation of resources being preserved in the park. Examples of threatening situations include: . . . threatening the perpetuation of natural features, native species (including especially those that are endangered, threatened, or otherwise unique), natural ecological communities, or natural ecological processes"

The approved Channel Islands National Park Resources Management Plan identifies elimination of the rabbits as a major objective. The general impacts of the rabbit control program were identified in the Environmental Assessment for the Natural and Cultural Resource Management Plan, February 1980. However, the Finding of No Significant Impact for this assessment stated that further environmental documentation would be prepared to analyze the various methods for rabbit control.

This assessment sets forth and analyzes several alternatives for control of the exotic rabbit. The document will be distributed to the public for review and following this review the NPS will select a plan of action.

II. DESCRIPTION OF THE ENVIRONMENT:

A. European Rabbit

The European rabbit was introduced on Santa Barbara Island in the early part of the 20th Century. The most recent introduction was in 1941. In 1953, after an absence of almost three years, NPS biologist Lowell Sumner, Jr., visited Santa Barbara Island, and found conditions drastically changed. Rabbits "ran about in great numbers." The coreopsis was being girdled and stands of the plant, as well as other native vegetation, were becoming less abundant as a direct result of rabbit grazing. Some of the introduced vegetation, such as the wild oats, had also been heavily impacted (Sumner, 1958).

Because of the dramatic change in the island's condition, the NPS and the U.S. Fish and Wildlife Service instituted a rabbit control program in 1954. This program included intensive shooting by personnel from both agencies, as well as poisoning with strychnine. The program lasted four years and though it was recommended to continue in 1959, it did not.

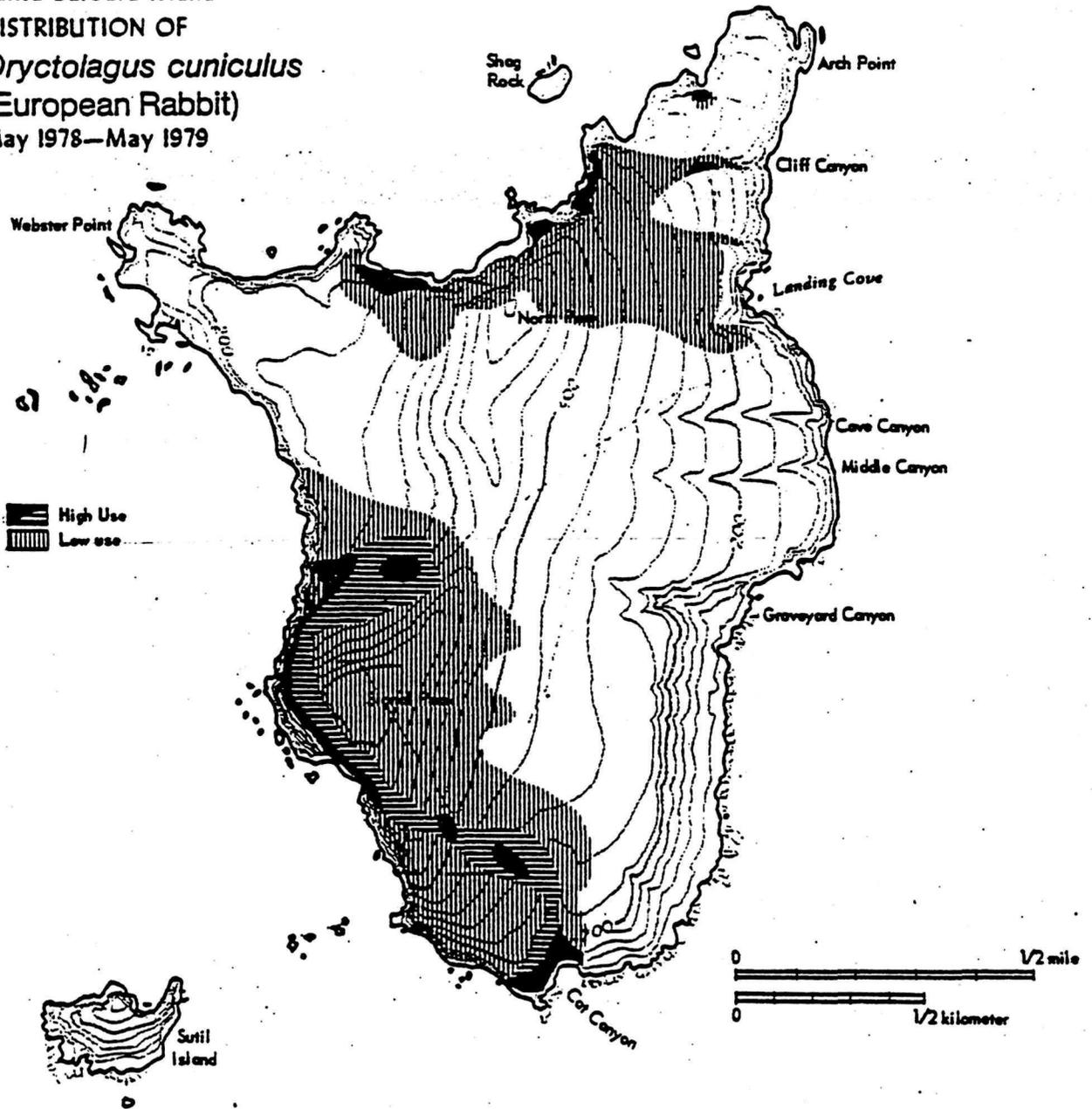
Several interesting characteristics of rabbit population dynamics in relation to control techniques surfaced during these control efforts. Most importantly, it was discovered that the rabbit population was able to substantially recover annually when control efforts were seasonal or periodic instead of continual. At the conclusion of the 1954 control program there were an estimated 200 rabbits left on the island. However, in the following year (1955), approximately 2,500 rabbits were taken during the control program. It was also learned that the rabbit population fluctuates in relationship to wet and dry cycles which affect the availability of vegetation. The several dry winters preceding 1957 which reduced vegetative growth seemed as much a factor in the low rabbit population levels as was the control program. By contrast, the wet winter of 1957-58 resulted in such luxuriant vegetation growth that the small number of rabbits was physically unable to move around as a result of the tall grasses. The rabbits were thus isolated in small areas. This program also demonstrated that poisons were about twice as effective as shooting for rabbit control.

Control efforts were resumed in the mid-1960 and have continued to the present day. Control methods included shooting and poisoning until 1972 when Executive Order 11643 restricting the use of pesticides on federal lands was signed. These efforts have been periodically successful, to the point that it was once believed that the rabbits had been eliminated. However, a lack of follow-up to the control program permitted the rabbit population to return to pre-control numbers (Woodhouse, 1979). For the past several years, control has been limited to shooting by NPS personnel as a portion of their routine work while stationed on the island.

The rabbit population has varied considerably in recent years. In the early 1970's, population estimates ranged from 185 to 475 animals (Woodhouse, 1979). During the last several years, numbers have been lower. In December 1980, intensive censusing efforts were conducted utilizing pellet counting techniques on trails and in test plots. Based on this survey, the NPS estimated the rabbit population to be approximately 100 animals.

The rabbits are concentrated in two major areas, one in the north and the other in the southwest portion of the island (see Rabbit Distribution Map).

Santa Barbara Island
DISTRIBUTION OF
Oryctolagus cuniculus
(European Rabbit)
May 1978—May 1979



From: 'Natural Resources Study of the Channel Islands National Monument, California', Dennis Power, Editor, Santa Barbara Museum of Natural History, 1979.

B. Soils and Topography:

Santa Barbara Island is approximately 638 acres in size and roughly triangular in shape. Topographically it consists of a small north-south oriented ridge connecting the island's two high points, North Peak and Signal Peak, with a gradual sloping terrace to the east, and a steeper slope to the west leading to a smaller marine terrace. The eastern terrace is intersected by several small gully-like canyons opening to the ocean. The island is almost entirely surrounded by cliffs, ranging from gentle slopes of approximately 150 feet to sheer cliffs of approximately 500 feet elevation.

Three soil types are found on Santa Barbara Island. Lithic xerothents are thin shallow soils found on the steep slopes on the periphery of the island. Typic chromoxerants are clayey soils which are found on the terraces. Vertic argixerolls are clayey, organic-rich soils found in the high central portion of the island. Evidence indicates that the entire island is capable of, and has experienced serious erosional problems (Johnson, 1979).

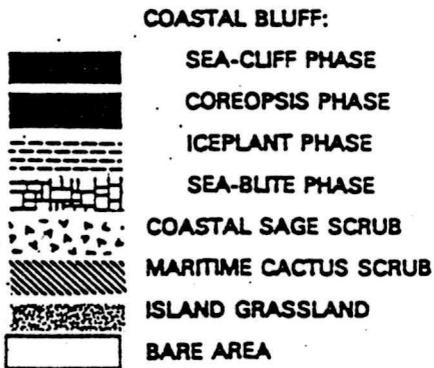
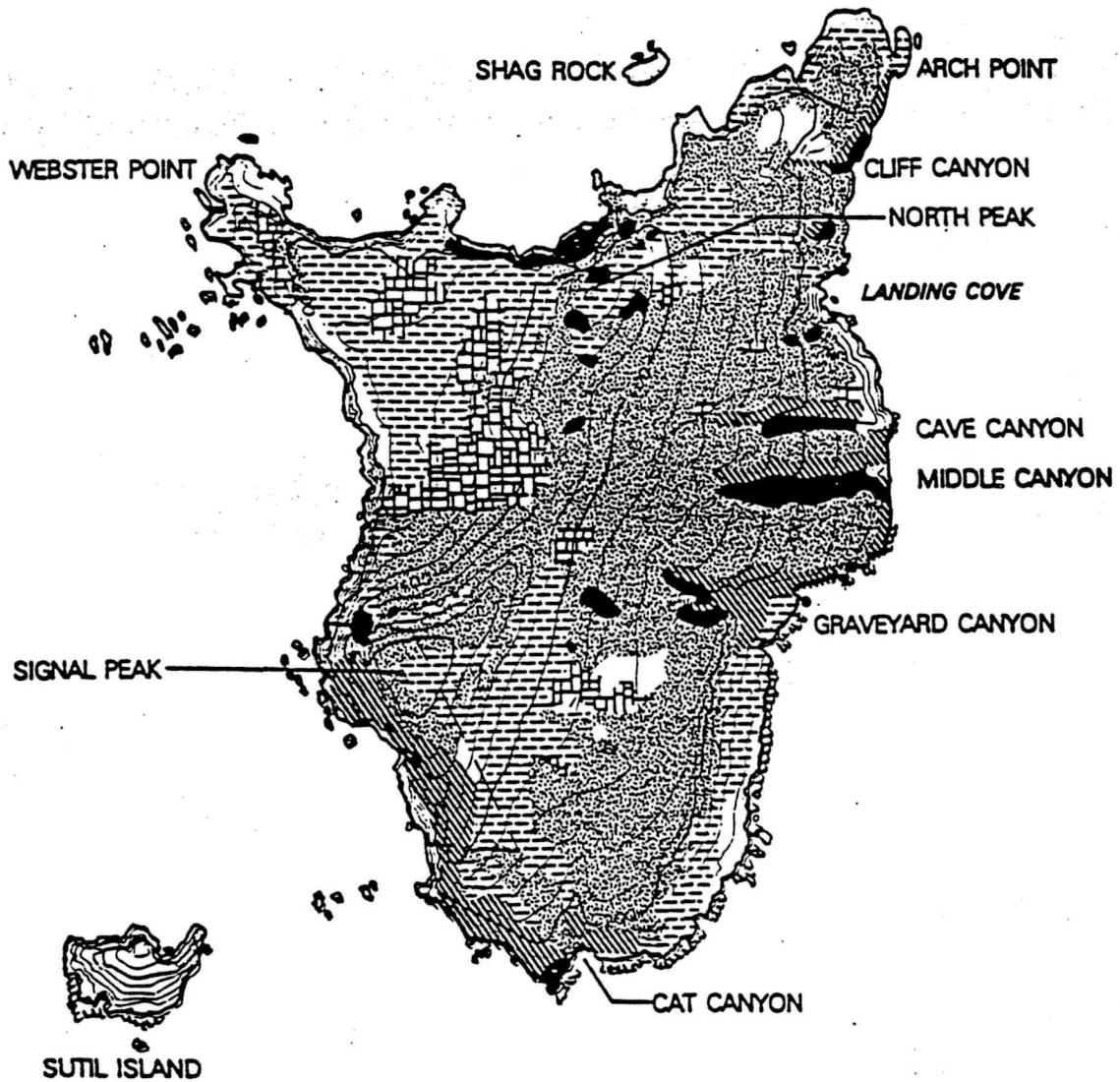
C. Vegetation:

In part because of its small size and lack of topographic variability, Santa Barbara Island has only three native vegetational communities. These communities are the Coastal Bluff community, the Coastal Sage Scrub community and the Maritime Cactus Scrub community (see Vegetation Map). Historically, all of these native communities were more extensive. The island was once dominated by giant coreopsis on its eastern half and on north-facing canyon slopes, native perennial grasslands on heavy deep soils, a variety of shrubs in hardpan areas and on bluffs, and maritime cactus on the driest sites (NPS, 1980). However, human activities including grazing of domestic animals, farming, military activities, and accidental and deliberate fires, have reduced the range of these native communities primarily to small stands in canyons and along cliff slopes. A fourth community, the non-native Island Grassland, now covers more of the island than any other community. Dominant species are the introduced crystalline ice plant (Mesembryanthemum crystallinum) and exotic grasses.

Components of the Coastal Bluff community include the giant coreopsis (Coreopsis gigantea), the Santa Barbara Island live-forever (Dudleya traskiai), and the Santa Barbara Island buckwheat (Eriogonum giganteum var. compactum) (Hochberg et al, 1979).

The Coastal Sage Scrub community is limited to steep slopes west of Signal Peak. It is in an area currently much used by rabbits. Its major plant representative is the island coastal sagebrush (Artemisia californica var. insularis) (Hochberg et al, 1979).

The Maritime Cactus Scrub community occurs primarily on the south-facing slopes of canyons and cliff slopes. Its major components include the coastal prickly pear cactus (Opuntia littoralis) and the coastal cholla cactus (O. prolifera) (Hochberg et al, in Power, 1979).



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VEGETATION
SANTA BARBARA ISLAND
CHANNEL ISLANDS NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR /
 NATIONAL PARK SERVICE

From: General Management Plan for Channel Islands National Park. NPS. 1980.

D. Wildlife:

There are few species of native terrestrial wildlife on Santa Barbara Island. Apart from birds, the only native terrestrial vertebrates are the deer mouse (Peromyscus maniculatus) and the island night lizard (Klauberina riversiana), a federally listed threatened species. Breeding land birds include the horned lark (Eremophila alpestris) and the western meadowlark (Sturnella neglecta). Several species of hawks and owls either nest on Santa Barbara Island or visit it regularly. The burrowing owl (Speotyto cunicularia) is known to nest in rabbit burrows on the island.

Several species of seabirds also nest on the island, mostly on the cliffs. Three species of pinnipeds inhabit the rocky shoreline.

E. Endangered and Threatened Species:

Five species known to have occurred or which are currently residents or occasional visitors to Santa Barbara Island have been federally listed (or are proposed for listing) pursuant to the 1973 Endangered Species Act, as amended.

Historically, the endangered bald eagle (Haliaeetus leucocephalus) nested on Santa Barbara Island. There have been no recent nestings on the island and no recorded observations in the last five years. However, the eagle was recently reintroduced on Santa Catalina Island about 20 miles away and it is conceivable they may forage periodically on Santa Barbara Island.

Ephemeral colonies of endangered brown pelicans (Pelecanus occidentalis) are known to have utilized Santa Barbara Island in the past. However, nesting has declined and only one nesting has been recorded in the last ten years. Although the island is not an important nesting area, it remains an important resting and feeding area. Groups of up to 200 birds are frequently sighted along the cliffs of the island.

The endangered American peregrine falcon (Falco peregrinus anatum) historically bred on the island. In recent years, there have been no nestings, but several sightings of falcons are made each year. Sightings of birds occur throughout the year, but are most frequent in the winter.

The distribution of the endangered Santa Barbara Island live-forever (Dudleya traskiae) is restricted to several canyons with a major colony at Signal Peak. The abundance of this plant has been significantly reduced by rabbit grazing and historical agricultural practices. Formerly thought nearly extinct, the survival of this species is possibly due to the inaccessibility of individuals near Signal Peak.

The island night lizard (Klauberina riversiana) is found exclusively on Santa Barbara Island. It is currently listed as a threatened species.

F. Water Resources:

Annual precipitation on Santa Barbara Island is approximately 12 inches, most of which falls as rain from late November to April. Island soils which shrink and crack when dry and expand when wet, absorb most rainfall without runoff, though there is some water flow in canyons following winter rains. No standing water or fresh water springs occur on Santa Barbara Island.

G. Cultural Resources:

Cultural resources include the remains of farming and military activity in the form of old equipment, concrete pads, and a quonset hut, which currently houses NPS personnel. There are 19 known archaeological sites on Santa Barbara Island (Greenwood, 1978), primarily trash middens of Gabrielino Indians who seasonally visited there. These sites are located primarily on the island's western terrace. The entire island is listed as an archaeological district on the National Register of Historic Places.

H. Visitor Use and Experience:

Visitation to Santa Barbara Island numbers nearly 6,000 persons annually, though more persons sail to and around it. Less than half of those visiting the island in private boats come ashore (Bellamy, personal conversation). The small campground is generally utilized by organized groups during spring and summer months. While campers usually stay several days, the average visitor's length of stay is only several hours. Trail guidebooks and a small museum are available to provide a greater understanding of the island. The past history of the island, its recent abuses, and resulting impacted natural communities are a dominant interpretive theme. Visitors are generally sensitive to the story and favorably impressed over the goal of NPS to return affected ecosystems to a more natural state.

III. ALTERNATIVES:

A. Alternative A - Status Quo or Existing Conditions

1. Description:

Under this option, no extra control efforts would be engaged in, beyond those which currently take place. Present control efforts are limited to shooting by the island ranger (and occasionally other NPS personnel) using either rifle or shotgun. The amount of time spent per day would vary from none to several hours, with less hunting activity during the months of high visitation. The hunting activities would take place over all portions of the island, depending upon where rabbits or rabbit sign has been noticed. Hunting would take place primarily during daylight hours.

2. Impacts:

Based on the past success under this alternative, it is very unlikely that rabbit elimination would result.

Impacts to the soil would be limited to minor disturbances of lithic xerothents on steep slopes in areas of frequent foot traffic.

Since rabbits would probably not be eliminated, impacts to vegetation from rabbit foraging would continue. Native vegetative communities could continue to be restricted to remnant status, depending on the size of the remaining rabbit population. The range of these native communities could be further reduced. Survival of the Santa Barbara Island life-forever and the giant coreopsis would continue to be jeopardized. Minor vegetation trampling during hunting activities would continue.

Wildlife dependent on native plant communities would be prevented from extending their range and could face further reduction if native plant communities continue to be impacted. Hunting activity would continue minor temporary disturbance of wildlife by close approach or noise of the gun.

Potential disturbance of the endangered brown pelican and peregrine falcon by close approach and gun noise would continue. However, due to the congregation of pelicans in non-hunting areas and the infrequency of falcon use, impacts would be very minor.

The potential for minor impact to archaeological sites due to trampling and subsequent erosion would continue.

Visitor use and experience will be impacted to varying degrees, including the possibility of the island being closed to visitation while hunting is ongoing and the potential for visitor discomfort at seeing NPS personnel with guns and/or dead rabbits.

B. Alternative B - Hunting with Guns

1. Description:

Under this alternative, a team of two full-time hunters would be utilized. A two-person team would be required in order to improve efficiency when rabbit numbers are low, permit use of both a shotgun and rifle while hunting to maximize shooting opportunities, and to permit control rapidly enough to offset the high reproductive rate of the rabbit.

Only fully qualified persons would be selected as hunters. Those persons selected for these positions would be trained in avoiding sensitive natural and cultural resources and proper hunting techniques.

2. Impacts:

Past experience indicates that relatively intensive sustained control efforts can result in population control. Since population numbers are currently low, this method may be successful in totally eliminating rabbits. However, if individual rabbits avoid hunters by relocating to inaccessible localities, this program may have to be continuous.

Impacts on soils would be similar to Alternative A. Although there would be two hunters, an information/education program would provide training to minimize trailing and erosional impacts.

Rabbit control would reduce impacts to vegetation as a result of their foraging activities. Native vegetation could expand into portions of the historical range. As under Alternative A, a limited amount of vegetational trampling would occur as a result of the hunting activity.

Wildlife dependent on the native plant communities would increase in abundance as native communities expand. Temporary disturbance of wildlife by hunters would continue, but would be minimized by the education program.

The potential for disturbance of the endangered brown pelican and peregrine falcon by close approach and gun noise would be mitigated by not hunting near pelican resting areas, or, if necessary not hunting during the pelican's nesting season during those years they nest on the island; as well, if roosting falcons are noted, those roosting areas will be avoided.

Impacts on the visitor experience would be minimized by an active interpretive program.

C. Alternative C - Snares/Traps

1. Description:

Under this alternative, a combination of various types of traps would be utilized in the rabbit control program. Traps to be utilized would include snares, Conibear traps, and live traps. Use of jaw traps has been rejected due to extensive public criticism of these traps as an inhumane method of trapping.

2. Impacts:

All these types of traps have been utilized in the past and met with varying levels of success. Neither snares nor Conibear traps have proved effective. This may be largely due to the vegetation and terrain of Santa Barbara Island which does not restrict the rabbits to specific routes of travel. In December 1980, studies were undertaken to determine the efficiency of snares and Conibear traps in capturing rabbits. Neither method proved efficient. In 667 snare nights, 3 rabbits were caught and in 450 trap nights, 5 rabbits were caught. Commercial live traps have been utilized for several years, yet no rabbits have been caught (Bellamy, personal communication). The lack of success is due largely to the abundant native deer mice which eat the bait and/or spring the trap. Utilizing all three methods, an estimated 140 trap nights would be required for each animal caught. Clearly trapping alone would not be adequate to provide rabbit control. Nevertheless, intensive snaring and trapping could be utilized to eliminate a small number of rabbits, or a known rabbit in an area where hunting has proven infeasible or unsuccessful.

Since a snare or trap is in one location for a certain period of time and daily inspection trips are required, impacts from soil compaction and creation of trails would be expected. The magnitude of the impact would depend on the number of traps set. Impacts would be greatest on the sides of canyons or on cliffs, where safety or the presence of cactus patches often limits the choice of travel routes. Mitigating measures would include placing snares and traps in locations where they could be checked without the need for close approach, not placing them in areas where native vegetation would be disturbed during checking operations, not placing them on slopes or canyon sides, and frequent movements to reduce the length of placement at any one site.

Since rabbits would not be controlled under this alternative, impacts to native vegetation from rabbit foraging would continue. Impacts would be similar to Alternative A, except of a greater magnitude as trapping is a less effective means of control. In addition, minor vegetation trampling and some creation of trails would occur during periodic checking of the trapline.

Wildlife dependent on native plant communities would be prevented from extending their range and could face further reduction if plant communities continue to be impacted. Some non-target species would be caught during trapping operations. Burrowing owls would most likely be affected due to their use of rabbit burrows as nesting sites. Impacts on owls would be minimized by checking for sign at burrow entrances, but some inadvertent trapping would be expected.

No impacts to endangered species, water resources, or cultural resources would result under this alternative.

Impacts on visitor use and experience would include the potential for seeing a dead rabbit in a snare or trap or a live rabbit in a snare. This would be minimized by locating traps away from visitor use areas and checking trap lines early in the day. Visitor injury due to contact with a snare or trap would be possible under this alternative. The large Conibear trap could conceivably break a person's ankle. Steps to mitigate potential injury would include flagging of trap locations, locating traps away from visitor use areas, and verbal warnings to visitors.

D. Alternative D - Poisons

1. Description

Under this alternative, several different types of poison would be utilized to control the rabbits. Pesticides which would be considered for use include: strychnine, compound 1080 (sodium monofleuracetate), zinc phosphide, anticoagulants and cyanide. In order to improve success, the animals would be conditioned by prebaiting, where appropriate. Bait acceptance would be further improved by the use of succulents during the dry season. The bait would be dispersed by NPS personnel on foot in areas of high rabbit concentration and known rabbit use. Appropriate signing would be utilized to indicate a poisoning program is in progress.

2. Impacts:

Past experience indicates that this method would be relatively effective in providing control of rabbits. Total elimination may result, but it is also possible that some rabbits would avoid baits. Without total elimination, administration of this program would be continuous.

Impacts to soils under this alternative would be limited to minor disturbance during the periodic dispersal of baits.

Impacts on vegetation would be similar to Alternative B, except vegetation trampling by control personnel would be less.

Some impacts from the poisoning program to non-target species would be expected; however, they would be minimal. During the entire 1954 to 1958 control program, impacts to non-target species were limited to the poisoning of three western gulls and an unknown number of deer mice. Similar results were recorded in 1970 during a one-year poison control program. Though these two species are the most likely to be affected by primary poisoning, there is also the potential for impact to the threatened island night lizard. Since little is known of night lizard food habits or habitat requirements on the island, NPS is currently studying the life history of this animal. Secondary poisoning could occur in raptors, gulls, and ravens. If poison is used very selectively, in only a few areas of the island, the incidence of negative impacts is expected to be low.

Mitigation for primary poisonings of other species would include not placing baits where gulls or night lizards are likely to feed and selecting baits not likely to be eaten by birds or night lizards. It is doubtful that mitigation methods would be successful for deer mice, which would be likely to eat any bait for used for rabbits. Methods of mitigation for secondary poisoning would include: the scheduling of poisoning campaigns during those periods of the year when the fewest birds of prey are present, and retrieving carcasses of poisoned animals daily.

Mitigating measures for the use of cyanide in burrows would not be fail-safe, but would include scouting each burrow for use by rabbits not using cyanide when there is likelihood of burrow use by other animals, and using cyanide only when other methods of eliminating a specific rabbit have been attempted and repeatedly failed. There would be no impacts to endangered species, beyond those described above.

No impacts to water resources, or cultural resources would occur this alternative.

Impacts on visitor use and experience would include the possibility of visitors not being allowed on the island during poisoning activities. The possibility of seeing some dead or dying animals would vary, but could at times be high. This could have a nevative effect on the experience of those visitors. Mitigating measures would include daily, early removal of dead or dying animals from the island by field personnel, and extensive education of visitors.

E. Alternative E - Use of Myxoma Virus

1. Description:

Myxomytosis is a disease caused by Myxoma virus. It is transferred from rabbit to rabbit on the mouth or sucking parts of ectoparasites (fleas and mosquitos) which feed on rabbit blood. Depending on the strain of the virus and level of immunity, myxomytosis can achieve a kill rate of over 90 percent (Woodhouse, 1979). If conditions are not ideal, the kill rate could be much lower.

The disease would be introduced into the rabbit population by releasing a small number of infected animals on the island.

2. Impacts:

If the introduction works, and the disease becomes epidemic, most of the rabbits would become infected and die within several days under ideal conditions. However, with the currently small number of widely scattered rabbits, a very low kill rate would be expected, and this method would probably not result in their elimination.

There would be no impact on the natural or cultural environment. The disease is host-specific and affects only rabbits. Therefore, carcasses would not have to be collected and there would be no chance of secondary poisoning.

Impact on visitor use and experience would be similar to those discussed for poisons. However, the rabbit's physical appearance would be even more disagreeable to most persons, consequently leaving a more negative impact.

There is also a possibility that the disease would spread from Santa Barbara Island to infect domestic or native rabbits on the mainland. Though it is unlikely, it could happen if 1) an infected rabbit was removed from the island by a visitor, 2) infected fleas were transported back to the mainland, or 3) the virus was transported back to the mainland by a mosquito. Even if this were to occur, it is unlikely that serious problems would arise in wild populations of mainland rabbits (Sylvilagus sp.), since they are not as susceptible. In fact, there is a naturally occurring strain of Myxoma in the mainland population. However, impacts on domestic rabbit stocks could potentially be devastating.

F. Alternative F - Preferred Alternative (Hunting, Trapping, and Poisoning)

1. Description:

The recommended plan for totally eradicating European rabbits from Santa Barbara Island consists of shooting by two full-time hunters, as discussed in Alternative B. Additionally, if areas are identified in which rabbits are present but cannot be shot, due to terrain, proximity to sensitive resources, or the extra caution of individual animals, an intensive snaring trapping program could be undertaken. Finally, and only if necessary, poisoned bait would be site specifically placed in order to eradicate small groups or individuals which have consistently proven impossible to remove either by shooting or by trapping.

No time limit would be placed on this integrated plan, nor will snares/traps or poison automatically be used after a certain specified time. They will be used only after repeated attempts with the less impacting method or methods have failed.

2. Impacts

Impacts and mitigating measures have been previously discussed for all three facets of this program. If necessary, poison would be used so locally that negative impacts would be both local and minimal. Before poisoning is attempted, NPS will conduct necessary experiments as part of its ongoing island night lizard study to ensure that this species is not adversely affected by the poison campaign.

SUMMARY OF

IMPACTS ON THE NATURAL/CULTURAL ENVIRONMENT

Environmental Component	Alternative A (Status Quo)	Alternative B (Hunting)	Alternative C (Trapping)	Alternative D (Poisoning)	Alternative E (Myxoma virus)	Alternative F (Preferred alternative)
Soils/ Topography	Minor disturbance of soils on steep slopes.	Minor soil disturbance would be reduced by an education program.	Moderate soil disturbance/trailing could result from trap checking operations.	Same as B.	Same as B.	Same as B.
Vegetation	Native communities would continue to be impacted by rabbit foraging; Minor trampling during hunting.	Disturbance of native communities by rabbits would be reduced; Potential for reestablishment of native communities would increase; Minor trampling during hunting.	Impacts on native plant communities would increase due to lack of rabbit control; trampling impacts would be greater than in A.	Same as B, except trampling impacts would be reduced.	Same as D.	Rabbit control would eliminate continued impacts to native plant communities; other impacts same as B.
Wildlife	Indirect impacts to wildlife resulting from destruction of native communities would continue; Minor disturbance during hunting activity.	Temporary disturbance during hunting activity; Habitat for native wildlife would be enhanced.	Potential for impacts on non-target species (e.g. burrowing owls); Wildlife habitat would continue to be impacted.	Potential for impacts to non-target species (e.g. gulls, deer mice) and secondary impacts to predators/scavengers; Habitat for native wildlife would be enhanced.	No Impact.	Same as alternatives B, C and D, except the extent of impacts under alternatives C and D would be reduced due to a deemphasis of these programs.
Endangered Species	Survival of the Live Forever would continue to be jeopardized; Possible disruption of peregrine falcon and brown pelican during hunting activities.	Impacts on the Live Forever would be reduced; Possible disruption of the peregrine falcon and brown pelican would be eliminated by active avoidance of identified birds.	No Impact.	Possible poisoning of island night lizard (Extent of impact is unknown).	No Impact.	Same as alternatives B, C and D except potential impacts due to poisoning would be eliminated through research.
Water Resources	No Impact.	Same as A.	Same as A.	Same as A.	Same as A.	Same as A.
Cultural Resources	Potential for some minor disturbance of sites during hunting activity.	Potential for minor disturbance during hunting would be eliminated through education program.	Same as B.	Same as B.	Same as B.	Same as B.
Visitor Experience	Possible closure of island during hunting; Possible short term negative impacts on visitors who observe hunting activities.	Same as A.	Possible short term impact on visitors' experience if they observe trapping activities; Possible visitor injury due to encounter with trap.	Possible short term impacts on visitor experience if they observe poisoned animals.	Same as D, also there is a possibility that disease would spread to the mainland.	Same as B, C and D.

IV. CONSULTATION AND COORDINATION:

The following persons were consulted in the preparation of this document:

Mr. James Bellamy, Channel Islands National Park
Mr. Paul Collins, Santa Barbara Museum of Natural History
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Mr. Gary Davis, Channel Islands National Park
Dr. Walter Howard, University of California, Davis
Dr. David Regnery, Stanford University
Mr. Ralph Swanson, U.S. Fish and Wildlife Service
Dr. Charles Woodhouse, Santa Barbara Museum of Natural History
Dr. Gary Fellers, National Park Service

Copies of this document will be sent to the following for review:

Federal Agencies

U.S. Department of Commerce; Coast Guard (Eleventh Coast Guard District).
National Marine Fisheries Service (Southwest Regional Office).

U.S. Department of the Interior; Fish and Wildlife Service (Endangered Species Office,
CA area), Bureau of Land Management (Pacific OCS Office).

State Agencies

California Department of Fish and Game
California Department of Parks and Recreation
State Historical Preservation Office

County Agencies

Ventura County Agricultural Department
Ventura County Resource Management Agency (Planning Division)

Private Organizations

Audubon Society
Fund for Animals
Sierra Club
National Park and Conservation Association

Appendix A: Type of Traps

Snares are pieces of wire, tied to an anchoring object; arranged in a noose-like loop and placed where an animal is likely to pass. Snares are placed in identified travel routes and in burrow entrances.

In response to criticisms against the jaw trap, the Conibear trap was designed in the 1950s. Animals captured in it are killed immediately by the action of the trap jaws. Use of this trap is similar to that of a snare in that it is placed near a burrow or heavily traveled runway to capture passing animals.

Live traps, as the name indicates, are designed to catch animals alive and without injury. Bait is utilized to attract the target species. As with the other types of traps, the greatest success would be obtained by placing the trap in high use areas.