

**DRAFT**  
**Resources Management Plan**  
**and Environmental Impact Statement**  
**for**  
**Improvement of Water Quality**  
**and**  
**Conservation of Rare Species and Their Habitats**  
**on Santa Rosa Island**



**National Park Service**  
**Channel Islands National Park**  
**1996**



UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

DRAFT RESOURCES MANAGEMENT PLAN  
AND ENVIRONMENTAL IMPACT STATEMENT  
FOR  
IMPROVEMENT OF WATER QUALITY  
AND CONSERVATION OF RARE SPECIES AND THEIR HABITATS  
ON SANTA ROSA ISLAND

CHANNEL ISLANDS NATIONAL PARK  
Santa Barbara County, California

This plan proposes actions to 1) improve water quality in surface streams and protect riparian habitat areas on Santa Rosa Island, and 2) promote the conservation and recovery of rare species<sup>1</sup> of plants and animals on Santa Rosa, as well as the habitats upon which they depend.

Description of the Action: This plan proposes a combination of actions to improve water quality in two of Santa Rosa Island's pastures and to protect rare species islandwide. These actions include the immediate closure of one pasture to cattle and horses; construction of a fence dividing another pasture, and implementation of a seasonal grazing rotation to protect riparian areas from the effects of summer grazing; construction of small riparian exclosures to protect key resources, establish nursery areas, and to improve water quality; removal of the island's deer herd and reduction of the island's elk herd within three years; and an increase in grazing management standards to protect upland areas.

Summary of Environmental Impact and Adverse Environmental Effects: The proposed actions would improve water quality and riparian areas, in varying degrees, in five of the island's ten pastures. Water quality would be improved in eight of the island's 16 streams. Four rare plant species would be protected from grazing by the pasture closure, and removal of deer would reduce browsing pressure on five rare plant and on chaparral and woodland habitat. Mitigation measures will be implemented to prevent possible impacts to archeological sites from construction of exclosures and water developments.

Alternatives Considered: A) No Action; B) Minimal Action; C) Targeted Action (the Proposed Action); D) Conservation Team Recommendations; and E) Immediate Removal of Ungulates.

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<sup>1</sup> "Rare species" includes both species which have been **proposed** for listing as threatened or endangered under the Endangered Species Act, and those species which are **candidates** for such listing.

The Review Period for this document will end 60 days after its release for public review on May 6, 1996. All review comments must be received by July 5, 1996, and should be addressed to:

Superintendent  
Channel Islands National Park  
1901 Spinnaker Drive  
Ventura, CA 93001

For further information about this document, write the above address or call (805) 658-5776.



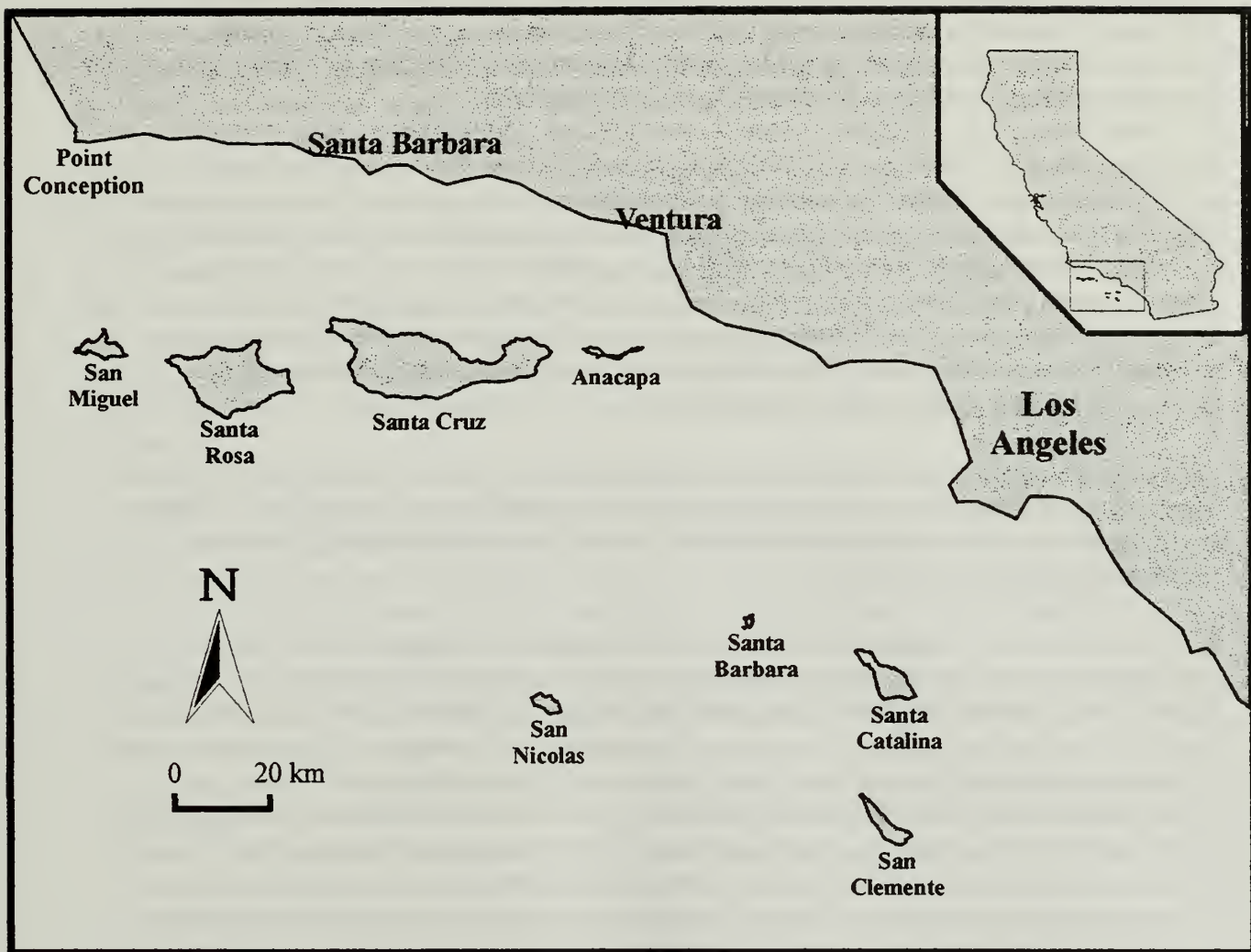


Fig. 1. Channel Islands National Park, southern California. The park includes San Miguel, Santa Rosa, Santa Cruz, Anacapa and Santa Barbara Islands.

## SUMMARY

This *Draft Resources Management Plan and Environmental Impact Statement* proposes measures to mitigate the adverse effects of ungulates on water quality, riparian areas, rare plants and habitats on Santa Rosa Island, Channel Islands National Park, Santa Barbara County, California. This will be done to improve island surface waters, as well as to have actions reviewed under the Endangered Species Act, and to comply with management policies of the National Park Service (NPS) and Channel Islands National Park.

Santa Rosa Island was purchased in 1986 from Vail and Vickers, Inc., who had operated a ranch on the island since the turn of the century. As a condition of sale, Vail and Vickers reserved a right of noncommercial use and occupancy for the developed ranch complex for 25 years from the date of sale. The Park's enabling legislation allows NPS to permit Vail and Vickers to continue existing uses of the island that are compatible with the administration of the Park and the protection of its resources. Under this provision, NPS has permitted Vail and Vickers to continue operation of a cattle ranch and commercial hunt operation on Santa Rosa Island, through a renewable Special Use Permit (SUP).

Long-term planning for NPS management of Santa Rosa Island will be accomplished through an amendment to the Park's General Management Plan. A Development Concept Plan for Santa Rosa Island was written in 1995 to guide development of support facilities and visitor use facilities on the island in the interim.

In 1995, several actions occurred which required development of management actions to address water quality and rare plant conservation on Santa Rosa Island. First, the U.S. Fish and Wildlife Service (FWS) proposed that 10 plant taxa which currently or historically occur on Santa Rosa be listed as Endangered under the provisions of the Endangered Species Act, as part of a listing package for the northern Channel Islands. In 1995, the Park and FWS also established an interagency conservation team to assess the status of and make recommendations for conservation of species which were candidates for the Federal list of threatened and endangered species. Second, the Central Coast Regional Water Quality Control Board issued a Cleanup or Abatement Order to the Park, directing NPS to abate range and road management practices which degrade water quality on Santa Rosa Island.

Alternatives Considered in this Draft RMP/EIS include: A. No Action; B. Minimal Action; C. Targeted Action; D. Conservation Team Recommendations; and E. Immediate Removal of Ungulates.

**Alternative A, No Action**, is the continuance of the status quo. Under this alternative, NPS would take no action to improve water quality or riparian values, or to promote the conservation of rare species, beyond those actions which have been taken already. Livestock and game species would be managed as they currently are. Cattle would continue to graze under a continuous use system, and use of riparian areas would continue to be heavy at times. The weed management program would be increased as funding allows, in order to address weed management problems on Santa Rosa Island. All grazing and hunt operations will cease by 2011. Effects of ungulates

on water quality, riparian areas, rare plants and habitats would continue at current levels until cattle grazing ceases in 2011.

**Alternative B, Minimal Action**, is the implementation of management actions least likely to affect operations of the grazing and hunting permittee, but that would achieve moderate improvement in water quality in three pastures, and in six of the island's 16 streams. This would be accomplished by the immediate closure of Old Ranch Pasture to cattle use, and the construction of small riparian exclosures (20 to 80 acres in size) in drainages in three other pastures. The exclosures would protect about 0.75 miles, or 20% of Arlington Canyon riparian corridor, and 0.75 miles, or 30% of the Canada Tecolote riparian corridor. Grazing and browsing pressure on some rare plants and habitats would be reduced by the closure of Old Ranch Pasture and the removal of the island's deer herd over a five year period. The weed management program would be increased as funding allows, in order to address ongoing and future weed problems on Santa Rosa Island. Although water quality, riparian areas, and vegetation would improve in Old Ranch Pasture and in the small riparian exclosures, the cattle would continue to have access to the majority of the island's streams. Mitigation would be required to prevent damage to archeological sites from fencing construction. The NPS operation would be slightly affected by this alternative. The permittee's operation would be slightly affected by this alternative.

**Alternative C, Targeted Action (The Proposed Action)**, is the implementation of a combination of management actions intended to achieve significant improvement in water quality in two pastures, and in eight of the island's 16 streams. This would be accomplished by the closure of Old Ranch Pasture to cattle and horses, and the implementation of rotational grazing in North Pasture. The latter would be split by construction of a fence along the Smith Highway, and the riparian areas in the lowland areas (Brockway Pasture) would not be grazed during the hot season. To facilitate summer grazing in the upland portion of North (Black Mountain Pasture), three water developments would be constructed. Water quality improvement would be significant in Old Ranch Pasture, and would be significant in Brockway if higher seasonal stocking rates do not hinder recovery of riparian vegetation. Cattle would continue to have access to the island's other riparian areas. Grazing and browsing pressure on some rare plants and habitats would be reduced by the closure of Old Ranch Pasture and the removal of the island's deer herd over a three year period, as well as a the reduction in the island's elk herd from 1100 to 450 animals. Small riparian exclosures would be used as restoration tools and to protect key riparian resources. Residual Dry Matter (RDM) standards would be raised to protect upland areas. The weed management program would be increased as funding allows, in order to address ongoing and future weed problems on Santa Rosa Island. Mitigation would be required to prevent damage to archeological sites from fencing and water development construction. The NPS operation would be moderately affected by this alternative. The permittee's operation would be moderately affected by this alternative.

**Alternative D, Conservation Team Recommendations**, combines some of the elements from the Targeted Action alternative with phased pasture closures and reduction in stock, in order to effect changes at the habitat management level, and to prepare the Park to address issues arising from removal of ungulates. Pocket Field would be added to the pasture rotation proposed in the previous alternative. Winter grazing would alternate between Brockway and Pocket Field,



allowing each of those pastures an 18 month rest period. Improvement in water quality and riparian areas would be significant in all pastures but South and Black Mountain, until significant reduction in stocking rate occurred in those pastures. Grazing and browsing pressure on rare plants would be reduced by phased pasture closures and by the removal of the island's deer herd over a three year period, as well as a significant reduction in the island's elk herd. Residual Dry Matter (RDM) standards would be raised to protect upland areas. The weed management program would be increased as funding allows, in order to address weed problems that may arise on Santa Rosa Island. The NPS operation would be moderately affected by this alternative. Effects on the permittee would be heavy.

**Alternative E, Immediate Removal of Ungulates**, would require the permittee to remove all livestock, including cattle, horses, deer, and elk, from Santa Rosa Island within three years. This would allow for rapid recovery of riparian areas and improvement in water quality in all drainages, and would remove all grazing and browsing pressure from rare plant species and their habitats. Several species of weeds which are currently being controlled by grazing would probably spread in extent. The weed management program would be increased as funding allows. The NPS operation would be moderately affected by this alternative. Effects on the permittee would be heavy.



Table 1. Summary of alternatives for Resources Management Plan, Santa Rosa Island.

ELEMENT	ALTERNATIVE A NO ACTION	ALTERNATIVE B MINIMAL ACTION	ALTERNATIVE C TARGETED ACTION	ALTERNATIVE D CONSERV. TEAM RECOMMENDATIONS	ALTERNATIVE E IMMEDIATE REMOVAL
Pastures Targeted for Management Actions	none	Old Ranch North Pocket Field	Old Ranch North	Old Ranch North Pocket Field Carrington Wire Field	All
Pasture Closures	none	Old Ranch closed to cattle	Old Ranch closed to cattle and horses	Closures phased in for all the above	All
Small Riparian Exclosures	none	Are primary tool to improve water quality and riparian areas. 3 each in 5 drainages in North, South and Pocket Field	Are restoration tools, for protection of key resources and establishment of nursery areas. 1 each in 9 drainages in Pocket Field, North, South, and Wire Field	none	none
Removal of Deer	no	within 5 years	within 3 years	within 3 years	within 3 years
Reduction of Elk Herd	no	no	Reduced to 450 within 3 years	Reduced to 400 by 2004	Removal within 3 years
Rotational Grazing	no	no	Seasonal grazing rotation implemented between two pastures created by dividing North into Brockway (cool season) and Black Mountain (warm season). Riparian areas in Brockway protected from summer grazing.	Same as in Targeted Action, though Pocket Field added to winter grazing. Cattle graze Pocket Field and Brockway in alternate winters, giving each pasture 18 months rest.	No

ELEMENT	ALTERNATIVE A NO ACTION	ALTERNATIVE B MINIMAL ACTION	ALTERNATIVE C TARGETED ACTION	ALTERNATIVE D CONSERV. TEAM RECOMMENDATIONS	ALTERNATIVE E IMMEDIATE REMOVAL
Changes in Grazing Management	none	none	Minimum Residual Dry Matter (RDM) raised from 400 to 1000 lb./ac	Minimum Residual Dry Matter (RDM) raised from 400 to 1000 lb./ac	Not applicable
Weed Management	Expanded Program	Expanded Program	Expanded Program	Expanded Program focused on as they are progressively closed or phase out from grazing	Expanded Program
Management Action in 2011	Rapid removal of all ungulates islandwide	Rapid removal of all ungulates islandwide	Rapid removal of all ungulates from 95% of the island	Remove last 400 elk and last cattle	Continue island restoration programs
Monitoring	Current program: Residual Dry Matter (RDM) monitoring for range management, monthly water quality monitoring in 3 drainages.	Same as under No Action	Range monitoring is the same as under previous alternatives. Annual monitoring of water quality and riparian areas in targeted pastures	Same as under Targeted Action.	No range monitoring after three years. Quarterly water quality monitoring in targeted and untargeted pastures. Annual monitoring of riparian areas.
Mitigation Required	Not applicable	Mitigation required for possible adverse effects to archeological sites from fence construction for small riparian exclosures. Oversight required for deer removal. Other mitigation measures may be identified during consultation with USFWS regarding impacts to proposed and listed species.	In addition to mitigation required under Minimal Action, also required for possible adverse effects of fence construction and water development construction on archeological sites. Other mitigation measures may be identified during consultation with USFWS regarding impacts to proposed and listed species.	Mitigation required for possible adverse effects of water development construction on archeological sites. Oversight required for deer and elk removal program. Other mitigation measures may be identified during consultation with USFWS regarding impacts to proposed and listed species.	Oversight required for removal program. Other mitigation measures may be identified during consultation with USFWS regarding impacts to proposed and listed species.

Table 2. Summary of impacts associated with alternatives for Resources Management Plan, Santa Rosa Island.

IMPACT TOPIC	ALTERNATIVE A NO ACTION	ALTERNATIVE B MINIMAL ACTION	ALTERNATIVE C TARGETED ACTION	ALTERNATIVE D CONSERV. TEAM RECOMMENDATIONS	ALTERNATIVE E IMMEDIATE REMOVAL
Soils	Where cattle trail and concentrate, there will be continued heavy effects of trampling on soil, causing decreased soil stability, increased erosion and soil loss, and decreased water availability for plants. Impacts will be eliminated when grazing ends in 2011.	Same as under No Action, except that removal of cattle from Old Ranch will result in decreased trampling of soils, increased soil stability, and increased water availability for vascular plants in that pasture.	Same as under Minimal action, except that increase of Residual Dry Matter (RDM) standards from 400 to 1000 lb./ac will confer some protection to upland soils. Local erosion could increase near water sources in Black Mountain and Brockway Pastures, due to increased seasonal stocking density.	Same as under Targeted Action, except that impacts to soils will be eliminated, and stabilization and recovery of those soils should commence on significantly greater areas of the island as pastures are phased out of grazing	Impacts to soils will be reduced and then eliminated, and stabilization and recovery of those soils should subsequently occur. There will thus be decreased trampling of soils islandwide, resulting in increased soil stability.

IMPACT TOPIC	ALTERNATIVE A NO ACTION	ALTERNATIVE B MINIMAL ACTION	ALTERNATIVE C TARGETED ACTION	ALTERNATIVE D CONSERV. TEAM RECOMMENDATIONS	ALTERNATIVE E IMMEDIATE REMOVAL
Water Quality and Riparian Areas	Continued heavy effects on most streams. With no streams except a portion of Lobo protected, riparian vegetation will be nonexistent, stream banks will remain unstable, and erosion will continue.  Most streams will remain non-functional in ability to trap sediment. Sediment levels will remain high during storm events. Water quality will remain low, with high coliform levels from cattle fecal inputs.	Up to 20% of the riparian corridor in Arlington Canyon and 30% in Canada Tecolote would be protected by exclosures from year-long grazing. In areas where cattle are excluded (Old Ranch Pasture and the small riparian exclosures), riparian vegetation will recover, stream banks will stabilize, and water quality will improve. Water quality may also improve for a short distance downstream of riparian exclosures.  Still, the majority of streams will remain unprotected from grazing, and effects will be as described under No Action.	Effects from closure of Old Ranch Pasture and construction of small riparian exclosures would be the same as described under Minimal Action.  Riparian areas and water quality in Brockway Pasture may improve, due to protection from grazing during the hot season. Summer seasonal grazing in Black Mountain Pasture may impact riparian areas and cause a decline of water quality in that pasture.  Most streams in South and Pocket Field Pastures will remain unprotected from the effects of grazing.	Effects from closure of Old Ranch Pasture would be the same as described under previous alternatives.  Riparian areas and water quality in Brockway and Pocket Field will improve significantly, due to the alternating 18 month rest of each of those pastures. Effects in Black Mountain Pasture are the same as described under Targeted Action.  Riparian areas and water quality in closed pastures will improve significantly, and progressively, as grazing is phased out on a greater proportion of the island.  Most streams in South Pasture will remain unprotected from the effects of grazing.	Complete removal of ungulates would remove all grazing impacts to riparian areas. Some restoration may still be required to restore some elements of native riparian vegetation. Increase in vegetative cover would facilitate stabilization of streambanks, sediment would be trapped, and streams would become functional riparian areas. Cattle fecal input to riparian areas would cease, and water quality would improve in all drainages.



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Vegetation Communities	Maintaining the current ranch and Park operations would continue present heavy effects on vegetation communities. Shrub communities will continue to be impacted by grazing, and chaparral and coastal sage scrub communities will be limited in range by grazing. Chaparral will continue to be heavily browsed by deer. Annual grassland will continue to dominate the island. Impacts will diminish after grazing is removed in 2011.	Removal of cattle from Old Ranch Pasture will allow recovery of shrub communities in that pasture. Construction of small riparian exclosures will have positive but limited effects on vegetation. Removal of deer will facilitate recovery of chaparral, woodland and shrub communities.  Otherwise, effects on vegetation will be as described under No Action.	Increased stocking density in Black Mountain Pasture may impact chaparral and woodland communities in that pasture, though this may be mitigated by the 1000 lb./ac RDM standard. Concentration of livestock around water development in Cherry Canyon may impact chaparral and woodland communities.  Increase in RDM standards and reduction of elk will have generally beneficial effects on vegetation. Otherwise, effects on vegetation will be as described under Minimal action.	Effects will be the same as described under Targeted Action, except that there will be significant recovery of upland and riparian vegetation in Pocket Field and Brockway due to the alternating 18 month rest period in each pasture. Additionally, closure of pastures will have beneficial effects on vegetation communities in each.	In response to the removal of grazing pressure, native vegetation would increase in plant size, density, and areal extent, with significant reproduction and recruitment. Riparian, shrub, chaparral and woodland communities would begin recovering from the effects of grazing and browsing, with increases in understory, litter, and age/size class diversity. Recovery of native perennial grasslands will be slow and may require active restoration efforts.  Microphytic crust will recover, enhancing moisture and nutrient availability to plants.

IMPACT TOPIC	ALTERNATIVE A NO ACTION	ALTERNATIVE B MINIMAL ACTION	ALTERNATIVE C TARGETED ACTION	ALTERNATIVE D CONSERV. TEAM RECOMMENDATIONS	ALTERNATIVE E IMMEDIATE REMOVAL
Weeds	Current weed trends are likely to continue. Cattle are likely to increase the spread of most weed species. Thistle populations are likely to continue to increase, fennel is likely to continue to be controlled through grazing. Incremental increases in the weed management program will provide opportunities to prevent the spread of weeds to new locations as well as to eradicate current populations. Weeds may increase after grazing is removed in 2011.	NPS will be able to address weed problems that may arise from the removal of cattle from Old Ranch Pasture. Though there are currently heavy thistle infestations in that pasture, removal of cattle may not affect them, because cattle do not feed on these prickly species, and are thus not currently controlling them. Otherwise, effects on weeds will be as described under No Action.	Effects on weeds will be as described under Minimal action, except that thistle populations will establish near water developments. Additionally, the increase in RDM may reduce establishment of weeds due to lack of bare ground for seedling establishment.	Same as described under Targeted Action, except that phased removal of cattle from selected pastures allow NPS to successively address weed problems that arise in each pasture.	Fennel plants may be released from control by grazing, leading to expansion of fennel on the island. Black mustard and wild radish may also increase.
Wildlife	Moderate effects would continue. Wildlife populations would continue at or near current levels, though species currently at low population levels be at risk of extirpation. Impacts will diminish once grazing is removed in 2011.	Wildlife will benefit from removal of cattle from Old Ranch Pasture, due to habitat recovery. Construction of small riparian exclosures will have positive but limited effects on wildlife. Otherwise, effects on wildlife will be as described under No Action.	Increase in RDM will be generally beneficial to wildlife. The split of North Pasture and implementation of seasonal grazing will have undetermined effects on wildlife, depending on direction of vegetation change. Water developments may be used by wildlife. Otherwise, effects on wildlife will be as described under Minimal action.	Same as described under Targeted Action, except that wildlife will generally benefit from increased vegetation cover and forage resources as vegetation recovers as pastures are closed and grazing is phased out	The removal of all ungulates will significantly improve habitat values for wildlife. Recovery of vegetation following removal will increase cover and forage resources for wildlife.

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Rare Species (Listed, Proposed, and Candidate Species)	Heavy effects on rare species would continue. Rare plant populations and their habitats would continue to be subject to the direct effects of grazing, browsing, and trampling by cattle, deer, and elk, as well as to the indirect effects of soil erosion, weed and other alien plant competition, and pollinator loss. Cumulative effects include the loss of habitat, reduction in population size, and lack of reproductive vigor which will prevent re-establishment and long-term viability for sensitive plant populations	Removal of cattle from Old Ranch Pasture will remove grazing threats to 4 plant species proposed for listing as Endangered. Removal of deer will remove browsing pressure from 5 proposed species, and will allow recovery of habitats for those species.	Effects on rare species and their habitats are the same as under Minimal action, except for the following.  Rare plant species islandwide may benefit from the increase in RDM and the reduction of elk. Increased stocking density in Black Mountain Pasture may impact rare plant species in chaparral and woodland habitats.	Grazing pressure on rare plant populations will be significantly reduced and eventually eliminated in closed pastures. These effects will occur over a progressively greater proportion of the island over time, as pastures are closed and grazing is phased out. The removal of deer and significant reduction in elk will greatly reduce browsing and grazing pressure on rare plant species.	All grazing and browsing pressure on rare plants, and their habitats, will cease. This will facilitate recovery of all rare plant populations.



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Archeological Resources	Moderate effects would continue. Cattle will continue to graze on most archeological sites with attendant damage. Erosion will continue to disrupt cultural materials at current levels of impact.  Burials would continue to erode at their present rate. Elements introduced after European contact will be present on the island.	Closure of Old Ranch would eliminate cattle impact to the archeological sites in this area, which could include the remains of the first island ranch structures.  Construction of fenced riparian exclosures could damage archeological sites. However, impacts could be reduced by careful siting of the fence line and construction and storage areas, with appropriate monitoring of the construction process.  Removal of cattle from the Old Ranch pasture would return a more traditional appearance to a portion of the island. Reduction of erosion should reduce the rate at which burials are exposed. Historic Chumash villages in the Old Ranch pasture would be less impacted by erosion.	Same as under Minimal action, except that a decrease in the elk population would decrease the minimal impact of elk on archeological sites. Vehicular traffic associated with the elk hunt would continue to offer the potential to impact archeological sites.	Same as described under Targeted Action, except that phased removal of non-native ungulates would decrease direct trampling of archeological sites and add further protection from erosion in closed pastures.  The removal of non-native ungulates will reduce erosion and the rate at which burials are exposed. Preservation of European contact villages would be enhanced.	Removal of all ungulates will have significant, positive effects on cultural resources. All direct trampling of archeological sites will cease, and vegetation recovery will decrease the adverse effects of erosion on sites.  Measures which will reduce erosion will slow the rate at which prehistoric burials are exposed and will present a setting more closely resembling the traditional appearance of the islands before European contact.
Historical Resources	There would be no effect on historic structures or the surrounding historic landscape preservation area.	There would be no effect on historic structures or the surrounding historic landscape preservation area.	There would be no effect on historic structures or the surrounding historic landscape preservation area.	There would be no effect on historic structures or the surrounding historic landscape preservation area.	There would be no effect on historic structures or the surrounding historic landscape preservation area.



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Cultural Landscape	There would be no effect on the existing cultural landscape.	Within Old Ranch Pasture, the removal of cattle would replace the current cultural landscape with a landscape more nearly resembling the prehistoric cultural landscape. The remainder of the cultural landscape would be substantially unaffected, except that construction of exclosures would clutter the existing cultural landscape with modern fencing.	Same as described under Minimal Action.	Removal of non-native ungulates would alter the present cultural landscape from one displaying the characteristics of a rural ranch to one more nearly displaying the appearance of the prehistoric landscape.	The landscape which will evolve from this action will more closely resemble the prehistoric cultural landscape in all areas of the island except the historic landscape preservation area centered upon the Beecher's Bay Ranch.
Visitor Use	No direct effects on visitor use. Current restrictions on visitor use will continue: reduced access during the elk hunt, required NPS escort in backcountry, etc. Under No Action, aesthetics of the island may decline over time (erosion on slopes, etc.), further impacting the visitor's experience.	Visitor access to Old Ranch Pasture may increase. Deer removal operations may reduce visitor access on island. Removal of deer may cause recovery of shrub communities, thus improving the island aesthetics. However, some visitors may miss viewing the deer. Construction of small riparian exclosures will have negligible effects on visitor use.	The split of North Pasture and implementation of seasonal grazing may have both positive (recovery of Brockway riparian areas) and negative (increased stocking density, additional fence, impacts to Black Mountain riparian areas) effects on the visitor experience.  Raising the RDM level may enhance the visitor experience, since no pasture would appear overgrazed.	Same as under Targeted Action, except that progressive recovery of riparian areas and upland habitats in closed pastures and as grazing is phased out may enhance the visitor experience. There may be expanded visitor access to areas as they are phased out of grazing.	There may be increased opportunities for recreation on the island following the removal of all ungulates in three years. Visitor access to parts of the island may increase. Recovery of riparian areas and vegetation communities may enhance the visitor experience.
		Otherwise, effects are as described under Minimal action.			

IMPACT TOPIC	ALTERNATIVE A NO ACTION	ALTERNATIVE B MINIMAL ACTION	ALTERNATIVE C TARGETED ACTION	ALTERNATIVE D CONSERV. TEAM RECOMMENDATIONS	ALTERNATIVE E IMMEDIATE REMOVAL
Permittee	No effects on ranch operations.	Closure of Old Ranch would reduce island grazing capacity by 7%, and may decrease ranch profits. Ranch would lose revenue from deer portion of annual hunt, and would incur the costs of deer removal prior to 2011. Construction of small riparian exclosures will have negligible effects on ranch operations.	In addition to effects described under Minimal action, the permittee would bear the costs of elk reduction, and would have to adjust ranch operations to implement seasonal grazing in the split North Pasture.  Raising the minimum RDM level could impact ranch operations during drought years, when forage production is lower.	In addition to the effects described under Targeted Action, each pasture closure and subsequent reduction in islandwide grazing capacity would have commensurate effects on ranch profits. Grazing capacity would be reduced 24% six years after implementation of this plan.	Complete removal of ungulates would have substantial effects on the permittee. Future revenue from grazing and hunting operations would be lost, and the permittee would bear the cost of removing all stock from the island prior to 2011.
NPS	No effects on Park operations, beyond costs of an expanded weed management program.	The Park would bear cost of construction of riparian exclosures, removal of exclosure fencing in 2011, and expanded weed management program. The Park would lose revenue from grazing fees from cattle in Old Ranch Canyon.	Same as described under Minimal action, except that the Park would also bear the costs of construction of the fence dividing North Pasture and costs for construction of water developments in Black Mountain Pasture, as well as the cost of removing those structures once grazing ceases in 2011.	Same as under Targeted Action, except that there are no small riparian exclosures to build and subsequently remove. Park loses revenue from grazing fees, as pastures are closed. Costs of weed management may be less overall, due to phased removal of grazing. NPS will bear costs of restoration and weed management prior to 2011.	The Park would lose revenue from grazing fees, once livestock is removed. Park may incur significant costs of weed management program required to control weeds released by removal of grazing.

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Wilderness	Santa Rosa Island will remain unsuitable for wilderness designation until sometime after 2011, when grazing has been removed and restoration completed.	Same as described under No Action.	Same as described under No Action.	Wilderness values may be improved somewhat in that wilderness suitability will be improved in closed pastures, as recovery occurs. Restoration efforts will be completed 3-15 years earlier than in previous alternatives. However, since most of South Pasture will remain grazed until 2011, Santa Rosa Island as a whole will remain unsuitable for wilderness designation.	Wilderness values may be improved. Wilderness suitability of island will improve after all grazing is removed, and all restoration is completed. Under this alternative, restoration efforts may be completed 10-15 years earlier than in all other alternatives.

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## **PURPOSE AND NEED**

The purpose of this resources management plan for Santa Rosa Island is 1) to conserve and restore rare plant and animal species, as well as their habitats upon which they depend; 2) to ensure that non-native plant species will not threaten restoration of rare species and their habitats; and 3) to ensure that management of non-native ungulates (e.g., cattle, deer, elk, horses) and island infrastructure (e.g., roads and culverts) will protect or recover riparian habitat and water quality sufficiently to ensure compliance with the Clean Water Act.

## **INTRODUCTION**

National Park Service management of the Channel Islands began in 1938 with the establishment of Channel Islands National Monument, which included Anacapa and Santa Barbara Islands. Public Law 96-199 (March 5, 1980) redesignated the Monument as a National Park and added San Miguel, Santa Rosa, and Santa Cruz Islands to the unit. The latter two islands were privately owned, and the park's enabling legislation contained provisions for acquisition of lands within the newly designated Park boundaries.

In 1986 the National Park Service (NPS) purchased Santa Rosa Island from the Vail and Vickers Company, which had operated a cattle ranch on the island since the turn of the century. As part of the purchase agreement, Vail and Vickers retained a right of noncommercial use and occupancy for the Beecher's Bay ranch house site (approximately 8 acres) for 25 years from the date of purchase. Additionally, the Park's enabling legislation allows NPS the discretion to lease or permit the former owners to continue existing uses of the island that are compatible with the administration of the Park and the protection of its resources. Under this provision, NPS permits Vail and Vickers to continue operation of a cattle ranch and commercial hunt operation on Santa Rosa Island, through a revocable Special Use Permit (SUP) renewable every five years. Under a range management plan developed for Santa Rosa Island (Bartolome and Clawson 1992), stocking rates are adjusted via residual dry matter (RDM) monitoring in upland sites.

## **NEED FOR THE ACTION**

The need for this plan results from recently discovered water quality problems and threats to rare species on Santa Rosa Island.

### **Water Quality**

On August 18, 1995 the Central Coast Regional Water Quality Control Board issued a Cleanup or Abatement Order (CAO 95-064) to Channel Islands National Park directing the Park to take measures which would improve water quality on Santa Rosa Island. Although the Park has filed an appeal with the California State Water Resources Control Board, asking that the CAO be

rescinded and a replaced with a memorandum of agreement, the Park has agreed to implement various interim actions to improve water quality.

The Park had previously documented high fecal coliform and pH levels in Santa Rosa streams, as part of the Park's inventory of water resources on that island (Sellgren 1995). The Cleanup or Abatement Order stated that the Park was in violation of the Water Quality Control Plan for the Central Coast Basin, due to current range and road management practices which allow the discharge of bacteria and sediment into the surface waters of Santa Rosa Island. Specifically, the Order directed the Park to:

- 1) abate rangeland and road management practices which degrade riparian habitat, degrade water quality, and induce sediment transport into surface waters of Santa Rosa Island;
- 2) submit to the Board by January 1, 1996, a report containing temporary plans and measures to clean up and restore areas impacted by current rangeland and road management practices, and to implement said plan by February 1, 1996; and
- 3) submit to the Board by June 1, 1996, a report containing final implementation plans and a time schedule for implementation actions.

A letter from the Board to the Park on December 22, 1995, amended the CAO by dropping the requirement to submit a report containing temporary plans and mitigation measures to the Board by January 1, 1996. Instead, the Park was required to submit a draft plan for mitigation and restoration by March 15, 1996. However, the recent shutdown of the federal government has delayed the development of mitigating plans by NPS. Consequently, the Board approved an extension of the deadline for submitting a plan. The Park will present a draft plan to the Board by April 30 and a final plan, following public review of the draft, by August 1, 1996.

### **Rare Species and Their Habitats**

As in other island ecosystems, the northern Channel Islands flora and fauna include many endemic species, which occur only on one or more of the Channel Islands. Due to low population sizes and various threats, many of these endemic species have either been designated as endangered or threatened under the Endangered Species Act, or are candidates for such listing. Management agencies have recently begun to recognize the threats to such species, and have begun to address the long-term conservation requirements for listed and candidate plants and animals, implementing measures intended to manage rare species in an ecosystem context. For the purposes of this plan, the term *rare species* refers to species which have been proposed for listing as endangered under the Endangered Species Act, or species which the U.S. Fish and Wildlife Service (FWS) has identified as candidates for such listing.

National Park Service managers have clear responsibilities under the Endangered Species Act for species listed as threatened or endangered. Additionally, NPS management policies (NPS 1988) direct park managers to promote the conservation and recovery of species which are candidates

for the federal list of threatened and endangered species. In September, 1994, NPS began working jointly with FWS on development of a conservation agreement for management of candidate species on the northern Channel Islands. A team of biologists from both agencies has recently assessed the status of candidate species as well as the habitats on which they depend, and has developed ecological standards for recovery of species and habitats, as well as conservation measures to achieve recovery (Coonan et al. 1996).

On July 25, 1995, FWS proposed endangered status for 16 plant taxa from the northern Channel Islands. Included in this proposal were 10 plant species which currently occur or historically occurred on Santa Rosa Island. In their listing proposal, FWS identified such threats to these taxa as soil loss, habitat alteration and predation caused by cattle grazing and elk and deer browsing, competition with alien plant taxa, and vulnerability to random extinction by storm, drought, or fire. The current moratorium on listing precludes USFWS from finalizing the listing of these species. Although these taxa have not yet been listed as endangered, NPS is required to confer with USFWS regarding potential actions which may affect these taxa.

## **Conclusion**

This comprehensive Resources Management Plan attempts to integrate protection of water quality, riparian communities, and rare species and their habitats on Santa Rosa Island. This plan is accompanied by an Environmental Impact Statement. The EIS will address all long term impacts of proposed and alternative management actions.

## **GUIDELINES FOR MANAGEMENT**

Guidance for development of this plan is found in various laws, NPS management policies and guidelines, and previous park planning efforts. The following is a discussion of the influence of such factors on various subjects relevant to the development of this plan.

### **Acquisition of Santa Rosa Island**

The enabling legislation for the Park (PL 96-199, March 5, 1980) addresses the acquisition and management of Santa Rosa Island, directing the Secretary of the Interior to acquire the island as soon as possible following establishment of the Park. Santa Rosa Island was subsequently acquired from the Vail and Vickers Company on December 29, 1986, for \$29.5 million. All of the 54,000 acre island was acquired in fee simple title with the exception of the 8 acre ranch complex at Beecher's Bay. Vail and Vickers reserved a 25-year right of noncommercial use and occupancy for the 8 acre ranch complex. This right of use and occupancy ends on December 29, 2011.

The Park's enabling legislation authorized, as part of the acquisition of private property, that the owner could reserve a right of use and occupancy. This was not reserved by the former owner. Further, the act allowed the Secretary to enter into a lease agreement with the former owner



under which the former owner could continue any existing use of such property, provided the use was compatible with the administration of the park and with the preservation of the resources therein. No lease has been entered into. The National Park Service did permit Vail and Vickers to continue cattle and game ranching via a revocable Special Use Permit (SUP). The two successive permits issued to date each have had a 5 year duration; the maximum allowed under NPS policy.

### **Guidance for Natural and Cultural Resources Management**

Because the issues of natural and cultural resources management on Santa Rosa Island were raised during the scoping sessions for this EIS process, the following is a summary of the laws and NPS policies which guide resources management at Channel Islands National Park, as in other NPS units.

The 1916 NPS Organic Act, (16 USC 1 et seq.) directed that NPS lands be managed to conserve the resources contained within “in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” The Redwoods Act of 1978 (16 USC 1a-1) reaffirmed this principle. In general, these two statutes confer upon the Secretary of the Interior the discretion to determine how best to protect and preserve park resources.

Since the establishment of Yellowstone National Park in 1872 and the subsequent founding of the National Park Service in 1916, the philosophy of natural resources management has gradually evolved from such simple concepts as protection from poaching to the complexities of comprehensive ecosystem management in a regional and global context (NPCA 1989).

In 1961, the Secretary of the Interior convened a blue-ribbon panel to evaluate how NPS should manage large mammals and other animals. The resultant report (Leopold et al. 1963) clearly directed NPS toward *ecosystem management*, which is the management of all components of an ecosystem as a whole, rather than single-species management. The Leopold Commission promoted the notion that national parks should be managed as “vignettes of primitive America” in order to preserve, to the extent possible, the biota that existed or would have evolved had European humans not colonized North America. Although this has been interpreted by some as a call for “hands-off” management of a static primitive condition or scene, the Leopold Commission actually promoted an aggressive stewardship of parklands with “hands-on” management techniques, and perpetuation of dynamic, evolving ecosystems. For example, the report called for restoration of natural fire regimes in parks.

More recent work has built upon the findings of the Leopold Commission regarding resources management in NPS units. Parsons et al. (1986) state that the principal aim of National Park Service resource management in natural areas is the unimpeded interaction of native ecosystem processes and structural elements. Parks should protect not only structural elements such as plants, animals, soil, water and air, but also dynamic ecosystem processes such as natural fire and nutrient cycling.



In 1989, NPS convened a blue ribbon panel to assess the role of resource management and research in the future of the national parks. The resulting report (NPCA 1989) validated the findings of the Leopold Commission, affirming that the focus of park management should be to maintain or restore native biota and ecosystems and to resist establishment of alien organisms. Where possible, ecosystem management should attempt to preserve natural processes operating at a scale consistent with the evolution of the ecosystem being managed. The report recommended that NPS move well beyond static scene management to provide stewardship for the elements and processes contained in parks.

National Park Service management policies (NPS 1988) reflect the development of ecosystem management concepts. In part, the policies state that natural resources should be managed with a concern for fundamental ecological processes as well as for individual species and features:

Managers and resource specialists will not attempt solely to preserve individual species (except threatened or endangered species) or individual natural processes; rather, they will try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity and ecological integrity of the plants and animals. (Ch. 4:1)

National Park Service management of cultural resources seeks to preserve and foster appreciation of the cultural resources in NPS' custody through appropriate programs of research, treatment, protection, and interpretation (NPS 1988). Guidance for cultural resources management in NPS units is found in National Park Service Management Policies (1988) and Cultural Resource Management Guidelines (NPS-28). Management of cultural resources in NPS units is subject to the provisions of the National Historic Preservation Act (16 USC 470 et seq.), the National Environmental Policy Act (42 USC 4371 et seq.), the American Indian Religious Freedom Act (42 USC 1996), the Advisory Council on Historic Preservation's regulation regarding "Protection of Historic Properties" (36 CFR 800), the Secretary of the Interior's "Standards and Guidelines for Archeology and Historic Preservation (FR 48:44716-40) and "Federal Agency Responsibilities under Section 110 of the National Historic Preservation Act" (FR 53:4727-46).

Significant Santa Rosa Island cultural resources identified by the Park's general management plan (NPS 1985) include sites related to 19<sup>th</sup> century marine mammal hunting, structures associated with ranching operations, archeological sites related to prehistoric and historic occupation of the islands, abandoned military sites, and submerged cultural resources, such as shipwrecks. The GMP states that, upon acquisition of Santa Rosa Island, NPS would conduct adequate research programs and would provide for the preservation, restoration, protection, interpretation, use, study, and management of significant cultural resources. These actions would include:

- inventory of cultural sites;
- nomination of appropriate cultural resources to the National Register of Historic Places;

- evaluation of and appropriate listing of aboveground historic or archeological structures to the List of Classified Structures, an internal NPS list that assists park managers in planning and programming.
- preservation, where possible, of existing exterior features of historic structure;
- preparation of a historic structure report and preservation guide for each property or complex of related historic properties.

### **Management of Water Quality Values and Riparian Resources**

The federal Clean Water Act includes a limited waiver of sovereign immunity which requires federal agencies to comply with certain federal, state and local laws and regulations relating to water quality. In California, water quality is managed by the California State Water Resources Control Board. The Regional Water Quality Control Board for Santa Rosa Island is the Central Coast Region. In 1989, the Board published water quality standards and criteria for surface waters in Santa Barbara County, in the Water Quality Control Plan for the Central Coast Region (commonly referred to as the “Basin Plan”) (Regional Water Quality Control Board, Central Coast Region 1989). The Basin Plan for the Central Coast Region assigned beneficial uses and water quality objectives for coastal waters off Santa Rosa Island (as well as San Miguel and Santa Rosa Islands), but did not address surface waters on any of the islands. In a 1994 amendment to the Basin Plan, the Board identified nine specific surface waters on Santa Rosa Island (Canada Lobos, Old Ranch Canyon, Arlington Canyon, Water Canyon, Cow Canyon, Clapp Springs, Old Ranch Canyon Estuary, Old Ranch House Canyon, and Cherry Canyon) and assigned to them beneficial uses, to be protected (Table 3, Table 4). The Park, however, was never specifically informed of the ability to comment on the designation of beneficial uses for Park waters.

According to the Basin Plan, streams which have not specifically been assigned beneficial uses have “implied beneficial use designations for protection of both recreation and aquatic life”, though the Basin Plan does not state that specific beneficial uses are implied for these unnamed waters.

Table 3. Beneficial uses<sup>1</sup> assigned to water bodies on Santa Rosa Island (from 1994 amendment to 1989 Water Quality Control Plan, Central Coast Region).

Water body	MUN	AGR	RE1	RE2	WIL	WAR	BIOL	RAR	EST	FRE	COM
Canada Lobos Creek	X	X	X	X	X	X	X	X			X
Old Ranch Canyon Creek	X	X	X	X	X	X	X	X			X
Arlington Canyon Creek	X	X	X	X	X	X	X	X			X
Water Canyon Creek	X	X	X	X	X	X	X	X			X
Cow Canyon Creek	X	X	X	X	X	X	X	X			X
Clapp Springs	X	X	X	X	X	X	X	X			X
Old Ranch Canyon Creek Estuaries		X	X	X	X	X	X	X	X		X
Old Ranch House Canyon Creek	X	X	X	X	X	X	X	X		X	X
Cherry Canyon Creek	X	X	X	X	X	X	X	X			X

<sup>1</sup>MUN Municipal and Domestic Supply

AGR Agricultural Supply

RE1 Water Contact Recreation (REC-1)

RE2 Non-Contact Water Recreation (REC-2)

WIL Wildlife Habitat

WAR Warm Freshwater Habitat

BIOL Preservation of Biological Habitats of Special Significance

RAR Rare, Threatened, or Endangered Species

EST Estuarine Habitat

FRE Freshwater Replenishment

COM Commercial and Sportfishing

Table 4. Definitions of beneficial uses assigned to Santa Rosa water bodies (from 1989 Water Quality Control Plan, Central Coast Region).

Beneficial Use	Description
Municipal and Domestic Supply	Uses of water for community, military or individual water supply systems including, but not limited to, drinking water supply.
Agricultural Supply	Uses of water for farming, horticulture or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
Water Contact Recreation (REC1)	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
Non Contact Water Recreation (REC2)	Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to picknicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities
Wildlife Habitat	Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
Warm Freshwater Habitat	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Preservation of Biological Habitats of Special Significance	Uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.
Rare, Threatened or Endangered Species	Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.



Beneficial Use	Description
Estuarine Habitat	Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).
Freshwater Replenishment	Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g, salinity) which includes a water body that supplies water to a different type of water body, such as, streams that supply reservoirs and lakes, or estuaries.
Commercial and Sportfishing	Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

### Management of Rare Species and Their Habitats

Guidelines for management of species federally listed as threatened , endangered or candidates for listing are found in NPS management policies and natural resources management guidelines. National Park Service management policies (NPS 1988) and guidelines for natural resources management (1991) establish the affirmative responsibility of NPS, and the individual park, for managing both listed and candidate species. They also stress that management actions should emphasize removal of threats, but also include active recovery efforts, and that management should be done in an ecosystem context.

In addition, the Endangered Species Act requires that actions authorized, funded, or carried out by Federal agencies not jeopardize the continued existence of listed species. It also requires that Federal agencies use their authorities to further the purposes of the Endangered Species Act, including the conservation of listed species.

Under section 7(a)(2) of the ESA (16 U.S.C. Section 1536), Federal agencies are required to consult with the U.S. Fish and Wildlife Service (USFWS) on actions which may affect listed species or critical habitat. If a Federal agency determines that its actions may adversely affect a listed species or critical habitat, the Federal agency requests formal consultation with the Service, and submits a description of the proposed action, identification of any listed species which may be affected, and a description of the likely effects on those species. The USFWS then prepares a biological opinion, which states the opinion of the USFWS as to whether the proposed Federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

There are currently no listed plant species on Santa Rosa Island. Wildlife species listed as threatened or endangered include the peregrine falcon, brown pelican, and western snowy plover. In 1994, NPS prepared a biological assessment which evaluated the effects of park activities on the western snowy plover and brown pelican, and submitted a request to USFWS to

initiate formal consultation. The USFWS subsequently issued a biological opinion in 1995 that required NPS to take actions to protect plovers and pelicans from effects of Park authorized activities. In accordance with the Biological Opinion, NPS has implemented actions to protect plovers and pelicans (see section on Rare Species in Affected Environment).

In regard to species proposed for listing, section 7(a)(4) of the Endangered Species Act requires Federal agencies to confer with USFWS on any action that is likely to jeopardize the continued existence of those species. A conference is a procedure intended to assist the agency in identifying and resolving potential conflicts early in the planning process. During the conference, the USFWS will make advisory recommendations on ways to minimize or avoid adverse impacts. If the proposed species is subsequently listed, the Federal agency must review the action to determine if formal consultation under Section 7(a)(2) is required.

Because the proposed actions in this Resources Management Plan concern 10 plant taxa which USFWS has proposed for listing as endangered, NPS will confer with USFWS on likely effects of these actions on those species.

### **Park Planning Documents**

In addition to the guidance provided by Servicewide guidelines, management of National Park Service units is guided by planning documents developed specifically for each unit. *General management plans* are broad, long-range strategies for development and management of parks. Other, more specific plans tier off of general management plans. These include *resources management plans*, which address natural and/or cultural resources management issues in parks, and *development concept plans*, which address facilities development for specific sites or areas.

Planning efforts for Santa Rosa Island were begun prior to its acquisition by NPS in 1986, and have gradually evolved since NPS began management of the island. Early planning efforts treated future development of Santa Rosa Island very generally. The Park's general management plan (NPS 1980, 1985) contained a very broad conceptual plan for Santa Rosa Island, leaving specifics to future plans to be developed following acquisition. The only specific treatment thus far is the recently completed Development Concept Plan for Santa Rosa Island (NPS 1995), which addresses facility development to serve management and visitor needs in the near future. A future amendment to the Park's general management plan will address long-term development plans for the island. Although resources management plans are generally developed subsequent to general management plans, recent concerns regarding the management of water quality and rare species and their habitats precipitated development of this plan prior to amendment of the current GMP.

The Park's general management plan (NPS 1980, 1985) generally addressed management of Santa Rosa Island following anticipated acquisition by NPS. The plan assumed full ownership by NPS without continued ranching by Vail and Vickers, though the plan stated that most of the proposals could be implemented with minor variations, even if the owners wished to continue ranching. The plan stated that, at the main ranch complex at Becher's Bay, the buildings, cultivated fields and pastures would be preserved as a historic ranching scene. The plan

envisioned continuation of cattle and horse grazing in this area, as part of the interpretive program. In contrast to the cultural emphasis at Becher's Bay, the general management plan stated that the island's backcountry, over 95% of the land area, would be managed primarily as a natural area (the entire island was designated as both a natural and a cultural zone). Alien animal species were to be removed, and vegetation would be allowed to return to presumably natural conditions (those existing prior to the influence of European humans).

Long term planning for NPS management of Santa Rosa Island will be addressed in a future addendum to the Park's GMP, which will speak to the broader issues of NPS management following termination of grazing in 2011. A recently completed development concept plan for Santa Rosa (NPS 1995) addressed development of support facilities and visitor use on Santa Rosa in the near future. The DCP outlines an expanded NPS operation on that island and addresses various aspects of such an operation. Regarding natural and cultural resources management, the DCP calls for a resources management plan to be developed (this document), which would expand on existing resources management goals of inventorying island ecosystems, studying the effects of grazing on such, implementation of limited restoration in some areas, and expansion of the Park's ecosystem management program to the island. The DCP also calls for studies of cultural resources, including cultural landscapes, and development of appropriate National Register nominations. The DCP also addresses access for visitors, appropriate visitor activities, the construction of housing and administrative facilities, and attendant staffing and cost estimates.

## PLAN GOALS AND OBJECTIVES

The goals of this resources management plan for Santa Rosa Island are:

1. to conserve and restore rare plant and animal species, as well as they habitats upon which they depend;
2. to ensure that non-native plant species will not threaten restoration of rare species and their habitats;
3. to ensure that management of non-native ungulates (e.g., cattle, deer, elk, horses) and island infrastructure (e.g., roads and culverts) will protect or recover riparian habitat and water quality.

To achieve the above goals, the following objectives must be met.

### Rare Species

For each of the proposed species, the following will be achieved:

- Evidence of successful reproductive effort.
- Recruitment occurring within a majority of population units.
- Increase in total numbers of individuals and in proportion of appropriate habitat occupied.



## **Habitat Types**

For each habitat type which has been impacted by historic and recent grazing and on which rare species depend (chaparral, coastal sage scrub, lupine scrub, mixed woodlands, island oak woodlands, Bishop pine, Torrey pine, riparian, coastal wetlands):

- Achieve a natural increase in the extent of the habitat type.
- Increase cover and diversity of native species.
- Decrease frequency and diversity of alien plant species.
- Increase recruitment and reproduction of sensitive plant species.
- Recover vegetation structure sufficiently to allow fire to play its natural role.
- Achieve vegetative cover across the community sufficient to reduce sedimentation to streams and hold precipitation in soils.

## **Water Quality**

The Cleanup or Abatement Order identified problems with sediment transport and bacteria in island waters, in regard to water quality objectives for contact recreation and warm water habitat. Since management measures on Santa Rosa Island are best implemented on a pasture by pasture basis, the various alternatives being considered approach water quality management in this fashion. Therefore, in pastures and selected streams targeted for mitigation, management actions will attempt to meet the following objective:

- Significant improvement in bacteria and pH levels, as compared to current baseline levels.

## **Riparian Areas**

- Riparian areas in targeted pastures will be able to function as riparian areas (will be in properly functioning condition), or will exhibit recovery toward functional status.
- Riparian areas in targeted pastures will have increased canopy cover and increased cover and diversity of desirable species, both woody and herbaceous.



## ALTERNATIVES

The following elements are common to all five alternatives being considered.

### **Expanded weed management program**

The existing weed management program is comprised of volunteer removal efforts coordinated by Park personnel. Under all alternatives, the weed management program would be increased as funding allows, in order to address weed management problems on Santa Rosa Island (see Appendix A).

### **Road management**

Best management practices for road management would continue to be implemented. The Park is currently applying to U.S. Army Corps of Engineers for a permit to cover such practices.

### **Termination of Commercial Grazing and Hunting and Subsequent Management of Santa Rosa Island**

The current general management plan (GMP) for the Park will be amended to identify more specific actions to be taken following termination of grazing. According to the current GMP, the island's backcountry, or about 95% of the island, will be managed as a natural area, whereas the main ranch complex, buildings, and associated cultivated pastures in the Beecher's Bay area will be preserved as a historic scene. And although commercial grazing of Santa Rosa will cease in 2011, the general management plan directs that a small number of cattle and horses be allowed to stay in small pastures in the Beecher's Bay area as part of a demonstration ranch, in order to interpret to the public the history of ranching on Santa Rosa Island. The number of livestock and the size of these demonstration pastures will be determined by a historic resources management plan for the Beecher's Bay area, which will more comprehensively address its preservation as a cultural scene.

Prior to 2011, the Park will conduct a historic structures study and a cultural landscape study for Santa Rosa Island, and will develop appropriate plans. The Park is currently developing a nomination of Santa Rosa Island to the National Registry of Historic Places.

## **ALTERNATIVE A. NO ACTION**

**Pastures Targeted For Management Actions:**       None

Under this alternative, NPS would take no action to improve water quality or riparian values, or to promote the conservation of rare species, beyond those actions which have been taken already.

Livestock and game species would be managed as they currently are. Cattle would continue to graze under a continuous use system, with no management actions taken to improve distribution of cattle; use of riparian areas would continue to be heavy at times, during the hot season. Stocking rate would be adjusted via monitoring of residual dry matter (RDM) in pastures, with cattle being removed when RDM falls below critical values.

Elk and deer would also be managed as they currently are. The current maximum number of deer allowed is 1000, whereas there is no maximum for elk.

Existing cattle exclosures would be maintained. These include fenced populations of Hoffmann's gilia and munchkin dudleya in Old Ranch Pasture (approximately 10 acres), the Soledad island oak grove (approximately 2 acres), the Lobo Canyon exclosure (approximately 100 acres), and the plover exclosure on Skunk Point. The exclosures are built to exclude cattle, but do not exclude deer or elk.

Under this alternative, as in all other alternatives, the weed management program would be increased as funding allows, in order to address weed management problems on Santa Rosa Island (see Appendix A). A comprehensive weed management program would need to be in place by 2011, when cattle, deer and elk would be abruptly removed from the island.

Best management practices for road management would continue to be implemented under permit from U.S. Army Corps of Engineers.

Resource monitoring would be maintained at existing levels: spring and fall RDM monitoring for range management, and monthly water quality monitoring in three streams.

Under this alternative, all grazing and hunt operations would cease by 2011. There are currently no plans for a phaseout of grazing or hunt operations, though the logistics of removing all stock by 2011 may dictate that the permittee begin phasing out operations prior to that time.

## **ALTERNATIVE B. MINIMAL ACTION**

### **Closure of Old Ranch Pasture, Construction of Small Riparian Exclosures in North and Pocket Field Pastures, Removal of Deer, Expanded Weed Management Program**

**Pastures Targeted for Management Actions:**      Old Ranch  
    North  
    Pocket Field

This alternative would achieve improved water quality in three pastures: Old Ranch, North, and Pocket Field. Water quality in Old Ranch would be improved by the immediate closure of that pasture to all cattle. Water quality in portions of North and Pocket Field would be improved by the construction of 15 small riparian exclosures. Rare plant populations in Old Ranch Pasture would be protected by closure of that pasture, and removal of deer from the island would reduce impacts on several rare plant species with wider distributions. In 2011 there would be rapid removal of all ungulates from the island.

#### **Closure of Old Ranch Pasture**

Old Ranch Pasture would be immediately closed to cattle. Currently, maximum number of cattle that forage in Old Ranch Pasture is approximately 400 in winter and 200 in summer (actual stocking varies), and the number of cattle on the island would be reduced by approximately this number. Due to this pasture closure, islandwide available AUM's would decrease from current 41,102 to 38,383, a decrease of 7% (grazing capacities for each pasture are taken from the Range Management Plan, Bartolome and Clawson 1992). The horse herd in Old Ranch would be allowed to stay, though the maximum number of horses in the pasture would be set at the existing level.

#### **Construction of Small Riparian Exclosures in North and Pocket Field Pastures**

Water quality values in two other pastures would be improved through creation of small riparian exclosures called Strategically Identified Streams, Tactically Located Exclosures (SISTLE's). The SISTLE's are intended to:

- restore riparian function to stream segments, which will
- improve water quality values within and downstream of exclosures, and
- create source areas for restoration of entire drainages, once grazing is removed.

The size and shape of each SISTLE will depend upon the resources being protected. Generally, each SISTLE would protect a quarter or half mile section of stream, with a corridor width of up to a quarter mile. Thus, each SISTLE would protect 20 to 80 acres. Under this proposal, three SISTLE's would be emplaced in all drainages in North and Pocket Field in which construction is feasible and for which objectives could be attained. Three exclosures would be constructed in each of the following five drainages (Table 5, Figure 2):

- Tecolote
- Arlington
- Verde
- Soledad
- Water

Exact size, shape and location of each exclosure would be determined on site by an interdisciplinary team. The 15 exclosures would protect from 300 to 1200 acres of riparian corridor. Since each exclosure requires 0.75 to 1.5 miles of fence, 15 SISTLE's would require 12 to 23 miles of fence. Exclosure fencing would be removed upon termination of commercial grazing in 2011.

Active restoration efforts may need to be implemented in SISTLE's, if native seed sources are not present. These efforts may include revegetation along streambanks with willow, baccharis and cottonwood, from cuttings or seed collection/propagation, as required. Restoration efforts will be implemented in at least one SISTLE in each drainage.

Table 5. Location of SISTLE's on Santa Rosa Island, under Alternative B.

Drainage	Pasture	Number of SISTLEs	Location	Purpose
Arlington Canyon	South	1	in South Pasture	Restoration nursery
	Pocket Field	2	in Pocket Field	Restoration
Canada Verde	North	3	To be determined	Restoration
Water Canyon	North	2	Near lower corral	Protection
	South	1	Near drift fence	Restoration nursery
Soledad Canyon	North	3	To be determined	Restoration
Tecolote Canyon	Pocket Field	3	To be determined	Restoration

### Removal of Deer

The permittee will have 5 years to remove all deer from the island. The deer (and the elk) are property of the permittee. Although choice of removal method will be left to the discretion of the permittee, NPS will oversee the removal efforts to insure no impact to other resources, and to insure safety of visitors and staff. The permittee will be required to submit a detailed removal plan, with timetable, subject to NPS approval.

There will be no reduction in elk, which will be managed as they are currently, at the discretion of the permittee.



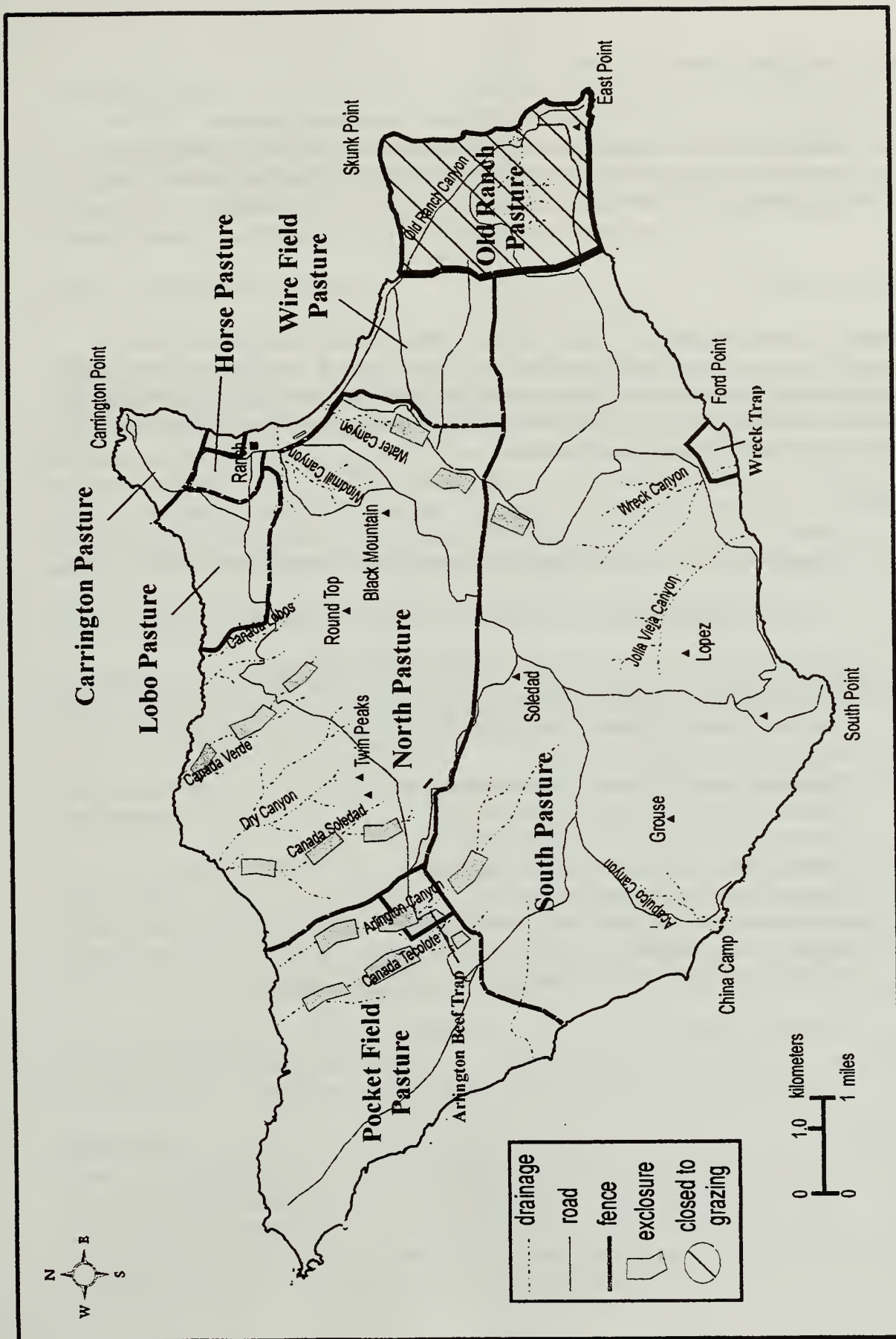


Fig. 2. Pasture closure and location of small riparian exclosures under Alternative B, Minimal Action.

## Expanded Weed Management Program

Under this alternative, as in all other alternatives, the weed management program would be increased as funding allows, in order to address weed management problems on Santa Rosa Island (see Appendix A). A comprehensive weed management program would need to be in place by 2011, when cattle and elk would be abruptly removed from the island.

## Grazing Management

Current range management practices would continue. Cattle would continue to graze under a continuous use system, with no management actions taken to improve distribution of cattle; use of riparian areas would continue to be heavy at times during the hot season. Stocking rate would be adjusted via monitoring of residual dry matter (RDM) in pastures, with cattle being removed from pastures when RDM falls below critical values.

## Monitoring

The Park would conduct limited monitoring of range conditions, water quality and riparian areas.

Table 6. Implementation schedule for Alternative B, Minimal Action.

Year	Action
1997	Close Old Ranch Pasture to cattle Construct three SISTLE's in Arlington Permittee begins removal of deer
1998	Construct three SISTLE's in Canada Verde
1999	Construct three SISTLE's in Water Canyon
2000	Construct three SISTLE's in Canada Soledad
2001	Construct three SISTLE's in Canada Tecolote Permittee completes removal of deer
2011	All livestock have been removed from the island Begin removal of SISTLE fencing
2012	Complete removal of SISTLE fencing

## **ALTERNATIVE C. TARGETED MANAGEMENT ACTION (THE PROPOSED ACTION)**

**Closure of Old Ranch Pasture with Removal of Horses, Split of North Pasture and Implementation of Rotational Grazing, Construction of Water Developments, Construction of Small Riparian Enclosures, Removal of Deer, Reduction of Elk Herd, Changes in Grazing Management, Expanded Weed Management Program**

**Pastures Targeted for Management:**            Old Ranch  
   North (Brockway)

This alternative differs from the previous in the tool of choice for addressing water quality improvement in pastures other than Old Ranch. Whereas the previous alternative (Minimal Action) relies upon small riparian enclosures to protect water quality and riparian values, this alternative adds rotational grazing on a portion of the island, and some water developments to improve distribution of cattle. This alternative also adds management measures for elk, a shorter time frame for removal of deer, removal of horses from Old Ranch Pasture, and changes to current grazing management practices in order to afford greater protection to upland resources. In 2011 there would be rapid removal of ungulates from 95% of the island.

### **Closure of Old Ranch Pasture**

Old Ranch pasture would be immediately closed to cattle and horses. Due to this pasture closure, islandwide available AUM's would decrease from current 41,102 to 38,383, a decrease of 7%. The horse herd in Old Ranch would be moved to another pasture.

### **Split North Pasture and Implementation of Rotational Grazing, Construction of Water Developments**

Under this alternative, North Pasture would be split in two by construction of a fence along the Smith Highway (Figure 3). Such a fence would be approximately 6 miles in length. The northern portion of North Pasture would be renamed Brockway Pasture. It contains significant riparian reaches of the drainages in North Pasture. The new southern pasture, which contains upland areas, would be named Black Mountain Pasture.

The existing grazing capacity of North Pasture as calculated in the Range Management Plan (Bartolome and Clawson 1992) was split to estimate grazing capacity for Brockway and Black Mountain pastures. This allows implementation of the following six-month rotation.

During the hot season (May 1 to October 30), Brockway Pasture would be rested, and cattle formerly grazing in that area would graze in Black Mountain Pasture (Figure 4). To facilitate this, three water developments would need to be constructed (at Round Top, Army Camp and at another site to be determined; Figure 3). During the cool season, Black Mountain would be rested and cattle would graze in Brockway. Thus, the significant riparian areas in Brockway would be rested during the hot season.

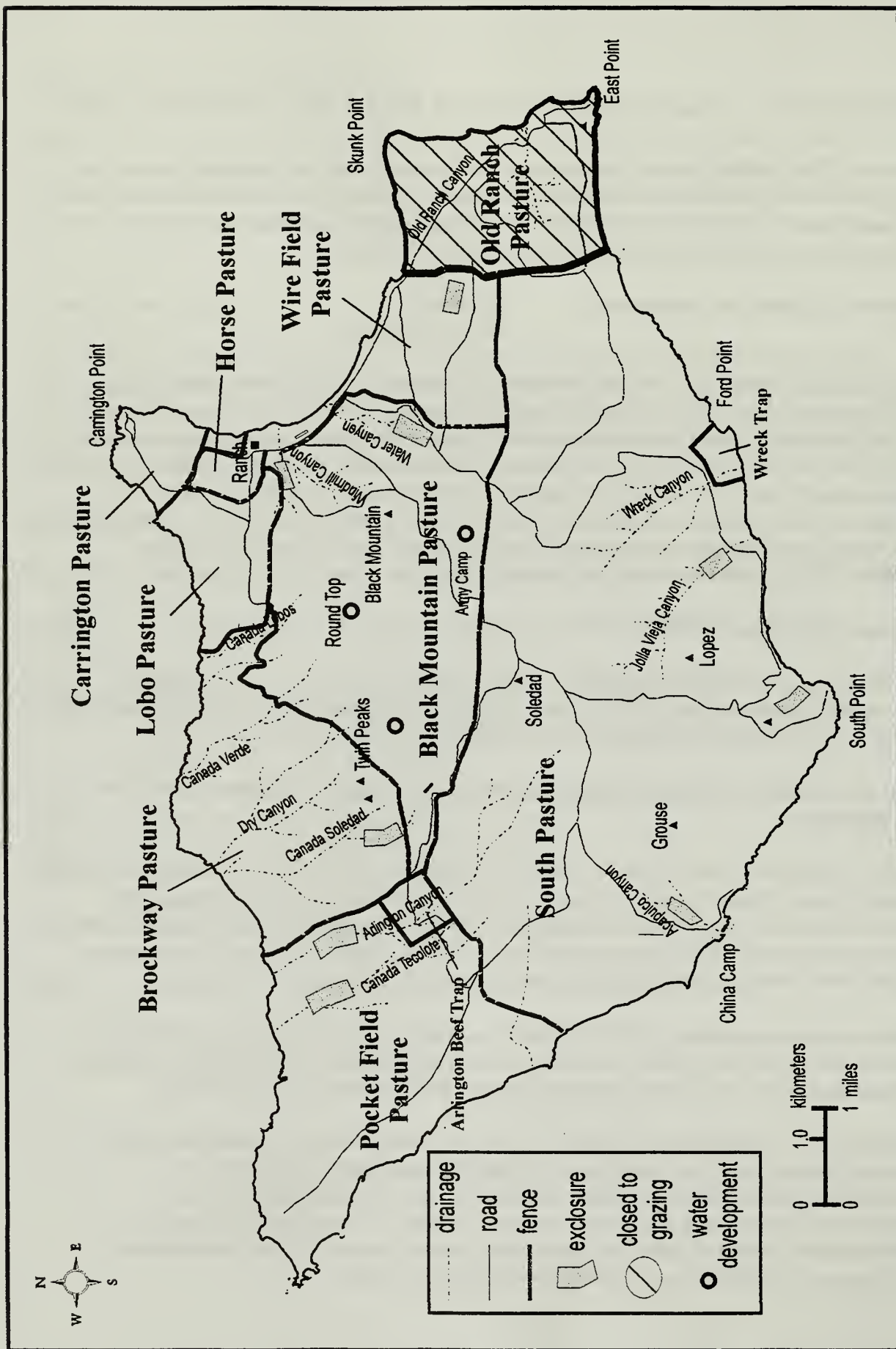
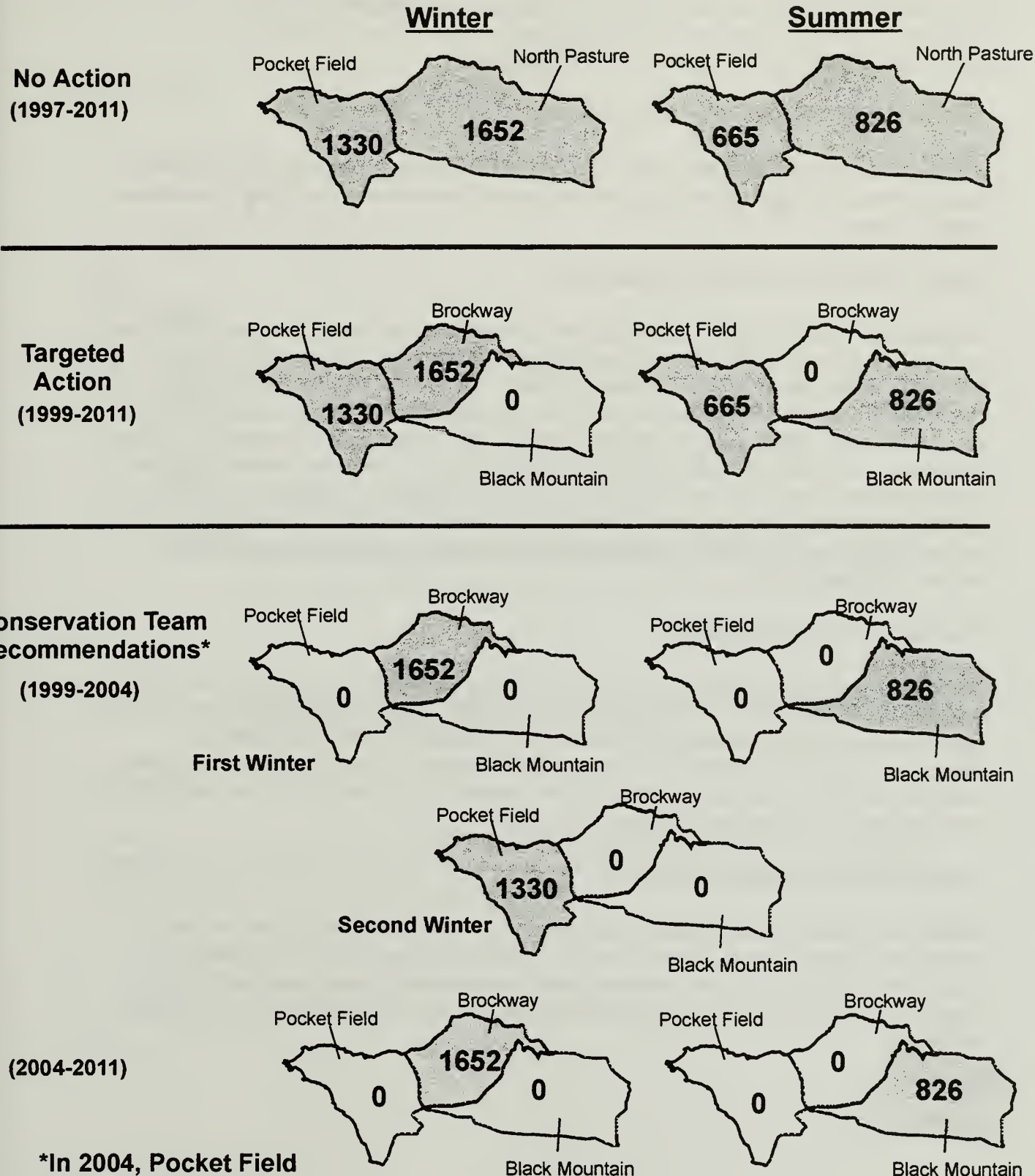


Fig. 3. Pasture closure and location of small riparian exclosures and water developments under Alternative C, Targeted Action. North Pasture has been divided into Brockway and Black Mountain Pastures.



Fig. 4. Rotational grazing system for Alternative C, Targeted Action, and Alternative D, Conservation Team Recommendations. Values are maximum number of cattle in pasture during a good precipitation year. Rested pastures are unshaded.



**\*In 2004, Pocket Field will be closed, and AUM's reduced by another 1300.**

Given the current grazing capacity for North Pasture, 826 cattle could graze in Black Mountain Pasture during the summer season; 1652 would graze Brockway in winter. There would be no permanent loss of AUM's, or grazing capacity, from current levels (beyond the 7% loss due to the closure of Old Ranch Pasture).

### **Construction of Small Riparian Exclosures**

A total of nine riparian exclosures (SISTLE's) would be placed in certain drainages to serve as nursery stock areas, to protect existing resources, and to improve water quality on stream reaches (Table 7, Figure 3).

### **Removal of Deer and Reduction of Elk Herd**

The permittee would have three years to remove all deer from the island, with targeted removal goals of 50% by year 2 and 100% by the end of year 3. Additionally, the permittee would be required to reduce the elk population from its current level of 1100 animals to 450 animals within ~~five~~<sup>three</sup> years. The elk population dropped to approximately 450 animals during the drought years of the early 1990's, and has since increased (Fig. 5). Accordingly, a maximum of 450 has been chosen as a minimum viable population number. Choice of reduction method would be left to the permittee, since the elk and deer are property of the permittee. Nonetheless, NPS will oversee the removal efforts to insure no impact to other resources, and to insure safety of visitors and staff. The permittee will be required to submit a detailed removal plan, with timetable, subject to NPS approval.

### **Changes in Grazing Management**

The following changes in grazing management would be implemented. The minimum RDM would be raised from 400 to 1000 lb./ac (pounds per acre). Cattle would need to be removed from a pasture when the average RDM for that pasture fell below 1000 lb./ac. Leaving a minimum of 1000 lb./ac of RDM on pastures in the fall would ensure enough forage to sustain cattle through the early portion of green up. One thousand lb./ac is the RDM value currently being used on U.S. Forest Service lands in California.

### **Expanded Weed Management Program**

Under this alternative, as in all other alternatives, the weed management program would be increased as funding allows, in order to address weed management problems on Santa Rosa Island (see Appendix A). A comprehensive weed management program would need to be in place by 2011, when cattle, deer and the remainder of the elk would be abruptly removed from the island.

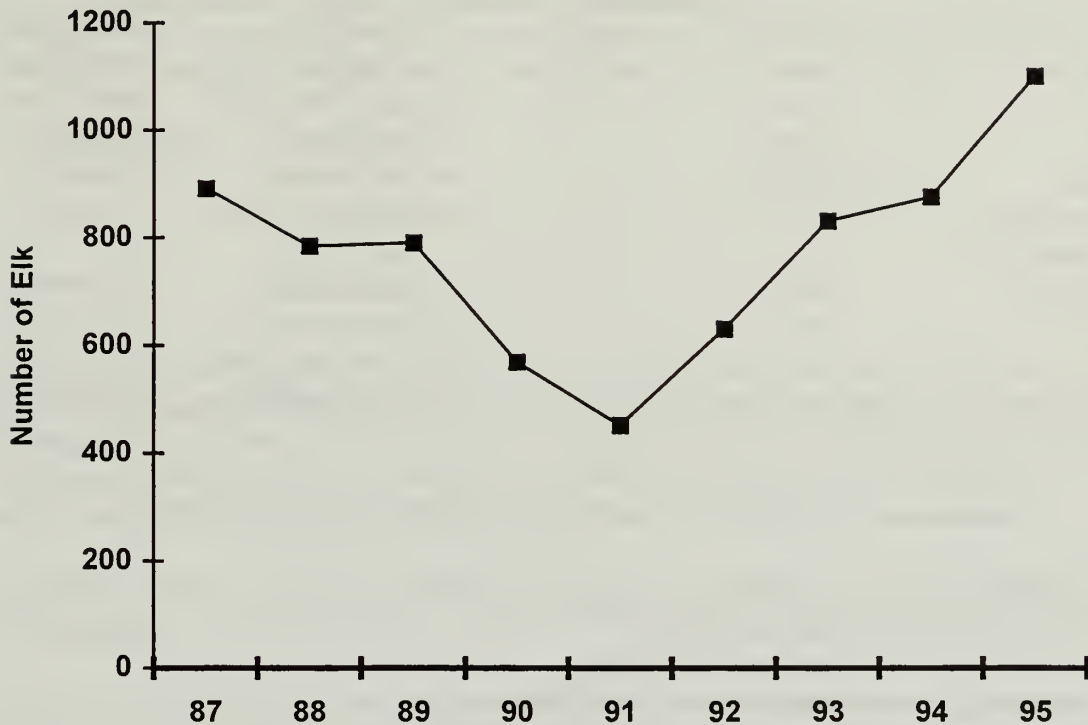


Figure 5. Estimated elk numbers on Santa Rosa Island (data from annual helicopter surveys by Vail and Vickers).

### Monitoring

The schedule for water quality monitoring would be changed from monthly to annually, and would focus on drainages in targeted pastures, and some in untargeted pastures (Appendix B). Annual monitoring of riparian areas would be added.



Table 7. Location of SISTLE's on Santa Rosa Island, under Alternative C.

Drainage	Pasture	Number of SISTLEs	Location	Purpose
Arlington	Pocket Field	1	in Pocket Field	Restoration
Water Canyon	North	1	Near lower corral	Protection
Acapulco	South	1	Above China Camp	Restoration
Jolla Vieja	South	1	At cattail pond	Protection
Box Canyon	Wire Field	1	At Box Spring	Protection
Unnamed drainage above Johnson's Lee	South	1	At remnant willows	Protection
Soledad Canyon	North	1	To be determined	Restoration
Windmill	North	1	at confluence of Windmill and Cherry	Protection
Tecolote	Pocket Field	1	To be determined	Restoration

Table 8. Implementation schedule for Alternative C, Targeted Management Action.

Year	Action
1997	Close Old Ranch Pasture to cattle Construct fence along Smith Highway Construct water developments in Black Mountain Pasture Permittee begins removal of deer and elk reduction Implement increase in minimum RDM
1998	Begin rotational grazing between Brockway and Black Mountain Pastures Construct SISTLE's in Arlington, Water and Jolla Vieja Permittee continues removal of deer
1999	Construct SISTLE's in Windmill, Box and Johnson's Lee Permittee completes removal of deer
2000	Construct SISTLE's in Acapulco, Soledad and Tecolote
2002	Permittee completes reduction of elk herd
2011	All livestock have been removed from the island Begin removal of SISTLE fencing and Smith Highwayfencing
2012	Complete removal of fencing

## **ALTERNATIVE D. CONSERVATION TEAM RECOMMENDATION**

### **Split of North Pasture and Implementation of Rotational Grazing, Construction of Water Developments, Phased Removal of Grazing, Removal of Deer, Reduction of Elk Herd, Changes in Grazing Management, Expanded Weed Management Program**

**Targeted Pastures:** Old Ranch  
North  
Pocket Field  
Carrington  
Wire Field

This alternative, developed by a team of NPS and USFWS biologists, uses the tools of rotational grazing and gradual phaseout of grazing to achieve improvement of water quality and riparian values and the conservation of rare species. It differs from the other alternatives in the scope of management actions and in that management efforts are directed primarily at habitat improvement.

#### **Split North Pasture and Implementation of Rotational Grazing, Construction of Water Developments**

As in the previous alternative, North Pasture would be split into Brockway and Black Mountain Pastures by the construction of a fence along Smith Highway (Figure 3). Pocket Field would be added to the winter rotation. Seasonal rotational grazing would be implemented between Black Mountain and either Pocket Field or Brockway; the winter pasture not grazed is thus rested for an 18 month period (Figure 4). In this way, the riparian areas in Brockway and Pocket Field would not be grazed during the hot season. Moreover, the 18 month alternating rest between Brockway and Pocket Field would allow significant recovery of riparian vegetation in those pastures. As in the previous alternative, water developments will be constructed in Black Mountain Pasture to facilitate the distribution of cattle during the hot season.

#### **Phased Removal of Grazing**

This alternative progressively phases out cattle throughout the approximately 13 years remaining for the commercial ranch operation on Santa Rosa Island. A slow and deliberate approach to cattle removal is taken in order to minimize potential weed problems, minimize the need for new ranch infrastructure, and target the most rapid recovery of ecosystems, riparian zones, and the rare species most greatly altered by ranch activities. The focus is on closing smaller pastures and reducing cattle numbers by 35% in the first 8 years (approx. 2006). Cattle are rotated among open pastures during the final years.

Under this alternative, grazing will be phased out in selected pastures over a 15 year period, according to the following schedule:

- 1997: Close Old Ranch pasture with permanent reduction in AUM's (7% of current islandwide grazing capacity). Begin construction of fence along Smith Highway to divide North pasture into Brockway and Black Mountain Pastures (Figure 3). Construct water developments in the new upper North (Black Mountain) Pasture.
- 1999: Begin pasture rotation among Black Mountain, Brockway and Pocket Field, resting the latter two in alternate winters (Figure 4). Of the three pastures, cattle will graze only in Black Mountain during the dry season. The number of animals allowed in Black Mountain Pasture for 6 months (maximum of 950, according to scorecard method) will be determined by RDM and other monitoring standards measured during the spring. This represents a permanent reduction of 11% of current grazing capacity, or approximately the number of AUM's currently assigned to Pocket Field. Cattle numbers in Black Mountain will be limited to that number which will not bring RDM's below minimum levels prior to removal of cattle in the fall. Excess cattle will be removed from the island.
- Alternately graze Pocket Field and the new lower North (Brockway Point) Pastures during the cool season. That is, Pocket Field and Brockway will be rested during alternate winters.
- 2000: Close Carrington Pasture with reduction in AUM's (3%).
- 2001: Reduce numbers in Wire Field by 50% with reduction in AUM's (1.5%).
- 2003: Permanent closure of Wire Field with reduction in AUM's (1.5%).
- 2004: Close Pocket Field. Reduce island-wide AUM's by the amount remaining in Pocket field (11%). Continue rotation between Black Mountain and Brockway Point Pastures.
- 2007: Begin annual reduction of AUM's by approximately 4000 (10%) for remaining 4 years in each of the pastures remaining open.

### **Removal of Deer and Reduction of Elk Herd**

The island's 700 deer will be reduced to 300 in Year 1, 100 in Year 2, and 0 in Year 3. The island's elk population will be reduced from 1100 animals to 400 by year 7, and to 0 by 2009-2011. Although choice of removal method will be left to the discretion of the permittee, NPS will oversee the removal efforts to insure no impact to other resources, and to insure safety of visitors and staff. The permittee will be required to submit a detailed removal plan, with timetable, subject to NPS approval.

### **Changes in Grazing Management**

The following changes in grazing management would be implemented. The minimum RDM would be raised from 400 pounds per acre to 1000. Cattle would need to be removed from a pasture when the average RDM for that pasture fell below 1000 pounds per acre.



## Monitoring

Appropriate monitoring of range conditions, water quality and riparian areas would be conducted.

## Expanded Weed Management Program

Under this alternative, as in all other alternatives, the weed management program would be increased as funding allows, in order to address weed management problems on Santa Rosa Island (see Appendix A). The weed management program would need to develop gradually into a comprehensive program, as more pastures are closed and grazing phased out.

Table 9. Implementation schedule for Alternative D, Conservation Team Recommendations.

Year	Action
1997	Close Old Ranch Pasture to cattle Construct fence along Smith Highway Construct water developments in Black Mountain Pasture Permittee begins removal of deer and elk reduction Implement increase in minimum RDM
1999	Begin rotational grazing between Brockway, Black Mountain, and Pocket Field Permittee completes removal of deer
2000	Close Carrington Pasture
2001	Reduce cattle numbers in Wire Field
2003	Close Wire Field to cattle
2004	Close Pocket Field to cattle
2007	Begin annual reduction of AUM's by 4000
2011	All livestock have been removed from the island Begin removal of Smith Highway fencing
2012	Complete removal of fencing

## **ALTERNATIVE E. IMMEDIATE REMOVAL OF UNGULATES**

### **Immediate Removal of Non-native Ungulates, Expanded weed management program**

**Targeted Pastures:** All

Under this alternative, NPS would improve water quality and riparian values and promote the conservation of rare species by the immediate removal of all non-native ungulates from Santa Rosa Island.

#### **Immediate Removal of Non-native Ungulates**

The permittee would have three years in which to remove all cattle, horses, elk and deer from Santa Rosa Island. Although choice of removal method will be left to the discretion of the permittee, NPS will oversee the removal efforts to insure no impact to other resources, and to insure safety of visitors and staff. The permittee will be required to submit a detailed removal plan, with timetable, subject to NPS approval.

#### **Monitoring**

Appropriate monitoring of water quality and riparian areas would be conducted.

#### **Expanded Weed Management Program**

Under this alternative, as in all other alternatives, the weed management program would be increased as funding allows, in order to address weed management problems on Santa Rosa Island (see Appendix A). Weed problems associated with removal of cattle would be encountered earlier under this alternative (three years) than in most other alternatives (after 2011). Under this alternative, NPS would need to quickly develop a weed management program capable of dealing with possible spread of fennel, wild radish and black mustard, the weedy species currently controlled by cattle.

Table 10. Implementation schedule for Alternative E, Immediate Removal of Ungulates.

<b>Year</b>	<b>Action</b>
1997	Permittee begins removal of all ungulates from SRI NPS begins comprehensive weed management program
1999	Permittee completes removal of all ungulates from SRI

## AFFECTED ENVIRONMENT

### NATURAL RESOURCES

#### Physical Setting and Geology

Located about 15 miles south of Santa Barbara, California, the 54,000 acre Santa Rosa Island is one of five islands that comprise Channel Islands National Park. With the 1574 foot Soledad peak at its hub, a highly-dissected, radial drainage network has evolved on the island. There are 16 second order intermittent and perennial drainages on the Island, including Windmill Canyon, Cherry Canyon, Water Canyon, Quemada Canyon (includes Old Ranch Canyon), San Augustine Canyon, Wreck Canyon, Jolla Vieja Canyon, Trancion Canyon, Acapulco Canyon, Whetstone Canyon, Bee Canyon, Canada Garanon, Arlington Canyon, Soledad Canyon, Verde Canyon, and Canada Lobo.

The Island is divided by the Santa Rosa fault. North of the fault, the underlying parent material is primarily tertiary sandstones and shales, as is much of the rest of southern California's Transverse Ranges. Underlying rock south of the fault is more volcanic in origin, produced during a Miocene episode of volcanism. The unstable landscapes of the islands are visually evident by numerous soil slips and small landslides throughout the Island, a condition that is generally consistent with the geology and landscape of the California coastal mountain ranges (Swanston 1971).

#### Soils

Current knowledge of park soils is limited to a study by Johnson (1979), who conducted a cursory investigation of soils, geology and erosion problems on Santa Barbara, Anacapa, and San Miguel Islands. Santa Rosa and Santa Cruz Islands were not surveyed. Soils generally range from fine sandy loams to clay loam, and are easily erodible.

The soils of Santa Rosa Island have not been adequately surveyed. A preliminary overview of the soils showed that soil textures range from fine sandy loam to clay loam, with the clay content of many areas being high enough that the soils exhibit shrink-swell characteristics. On gentle grass covered slopes, these soils are generally thick and dark brown in color with a relatively high organic matter content.

Soils in this area are highly erodible. Low levels of organic matter and very limited, if any, soil freezing results in compactible soils with slow dilation rates. Compaction of soils results in less water infiltration, increased runoff, and less locally available water (Webb, 1983; Wilshire, 1983), which in turn influences soil biota activity, N cycle dynamics (Torbert and Wood 1992), vascular plant vigor and reproduction (Crawford 1979; Skujins 1984) and decomposition rates of soil organic matter (West 1981). Soil aggregates and pore space, important for soil stability, infiltration and as microenvironments for soil biota, are reduced by compaction (Dregne, 1983; Stolzy and Gundy 1968).



Surveys of cyanobacterial soil crusts on the Channel Islands show that these crusts should cover the soil surface in most of the vegetation types (Belnap, 1994b; pers. obs.). However, these crusts did not evolve under grazing pressure (Mack and Thompson, 1982), and are impacted by soil surface disturbance, including grazing (Harper and Marble, 1988; Jeffries and Klopatek, 1987), people and off-road vehicles (Cole, 1990; Belnap et al., 1994; Belnap, in press). Crusts on the Channel Islands are especially susceptible to impacts from hooved animals (Belnap, pers. obs.). These crusts are important for increased soil stability, water infiltration, and fertility of soils (Harper and Marble, 1988; Johansen 1993; Metting 1993; Belnap and Gardner, 1993; Evans and Ehrlinger, 1994; Belnap, 1994a; Belnap et al. 1994). Absence of these crusts can lead to increased erosion, with resultant loss of organic matter, fine soil particles, nutrients and microbial populations in soils (Schimel et al. 1985).

Normal nutrient cycles can also be disrupted by soil surface disturbance. Experiments have demonstrated that all types of surface disturbance tested dramatically decreased nitrogenase activity in these crusts (Belnap et al., 1993; Belnap, in press). Plants growing in crusted areas have significantly more nitrogen in their tissue than plants growing in trampled areas without crusts (Belnap and Harper, 1995; Harper and Pendleton, 1993). Cyanobacterial-lichen soil crusts are also an important source of fixed carbon for sparsely vegetated areas (Beymer and Klopatek, 1991). In addition, soil disturbance can alter soil food webs and thereby affect nutrient availability in these systems (Ingham et al., 1989). Disruptions of soil food webs can reverberate throughout the ecosystem, affecting macro-floral and faunal components (Hendrix et al., 1992; Coleman et al. 1992). Recovery is extremely slow, taking 100-150 years for soils to dilate, and over 250 years for crusts to fully recover (Webb and Wilshire, 1980; Belnap, 1993).

Plant community composition and architecture can also be affected by soil surface disturbance. Changes in these critical habitat components has been shown to affect invertebrate and vertebrate populations (MacMahon 1987).

Cattle and, formerly, sheep and alien pigs have accelerated soil erosion and increased slope failures on Santa Rosa Island. The NPS has analyzed a 5 meter / 5,200 year-old soil core collected in 1989 from a small estuary at the eastern end of the island. The core showed an increase in sedimentation rates from an average of 9 mm per year for the 5,000 year period prior to settlement to an average of 58 mm per year for the post settlement period. The period of sheep grazing in the late 1800's produced the period of highest sedimentation (Cole and Liu, 1994).

### **Water Quality and Riparian Areas**

There are 16 second order intermittent and perennial drainages on the Island, including Windmill Canyon, Cherry Canyon, Water Canyon, Quemada Canyon (includes Old Ranch Canyon), San Augustine Canyon, Wreck Canyon, Jolla Vieja Canyon, Trancion Canyon, Acapulco Canyon, Whetstone Canyon, Bee Canyon, Canada Garanon, Arlington Canyon, Soledad Canyon, Verde Canyon, and Canada Lobo. The majority of the streams and their associated riparian areas on Santa Rosa Island are in poor condition.

Many of the stream reaches are deeply incised. This is probably the result of thousands of years of development of arroyo systems, which are common in the southwestern United States (Schumm 1977, Bull 1979, Harvey et al. 1995). This process likely intensified during the 19th Century when sheep grazing reached its peak. Continued cattle grazing has prevented recovery. Consequently many stream reaches are deeply entrenched.

Riparian vegetation is influenced by stream channel morphology. The riparian zone in the upper reaches of Santa Rosa Island streams is usually very narrow. Consequently, vegetation adjacent to the streams in these reaches tends to be dominated by upland trees, shrubs, grasses, and forbs which take advantage of the extra water the stream provides. Toyon (*Heteromeles arbutifolia*), coast live oak (*Quercus agrifolia*), island oak (*Q. tometella*) most likely represent the canopy of the potential natural community for the upper reaches of streams. The herbaceous understory for these reaches includes miner's lettuce (*Claytonia perfoliata*), goldenback fern (*Pityrogramma triangularis*), California polypody (*Polypodium californicum*), and western brackenfern (*Pteridium aquilinum* v. *pubescens*). Upper Lobo Canyon is the best example of this community type. However, most drainages lack many of the tree and shrub species found in Lobo. In many cases the riparian areas associated with upper reaches of streams are dominated by non-native annual grasses, leaving little difference between these areas and adjacent uplands.

As the slope of the stream decreases and the streams become more winding, the riparian area broadens. Point bars form where sediments are deposited. These bars provide the substrate for an array of tree, shrub, and herbaceous species. Cottonwood (*Populus fremontii*), arroyo willow (*Salix lasiolepis*), elderberry (*Sambucus mexicana*), California wild rose (*Rosa californica*), Southern California blackberry (*Rubus ursinus*), and poison oak (*Toxicodendron diversilobum*) form the overstory. Saltgrass (*Distichlis spicata* ssp. *stolonifera*) Douglas' baccharis (*Baccharis douglasii*), waterbent (*Agrostis semiverticillata*), brass buttons, (*Cotula coronopifolia*), Bermuda grass (*Cynodon dactylon*), common monkey flower (*Mimulus guttatus*), and Rabbit's foot grass (*Polypogon monspeliensis*) form the understory. Again, portions of Lobo Canyon are the best examples of this community type.

However, the lower reaches of most streams are heavily impacted by unrestricted cattle grazing, and consequently are devoid of all woody and shrubby species, and in some cases of any vegetation at all. The use of the continuous grazing system has been particularly detrimental to many riparian areas on the island because there is no opportunity for plants to recover from the effects of defoliation and trampling (Kinch 1989). Vegetative cover along stream banks is important because it reduces the erosive energy of water (especially during flooding), reduces the velocity of water, and traps suspended sediments. Without proper vegetative cover, stream banks are unstable. Unstabilized stream banks easily erode into the stream column, causing the stream's width to increase. With the increased width, the depth of the water column decreases. This in turn leads to increased stream temperatures and a decline in the quality of habitat for insects, amphibians, and other wildlife.

Unrestricted cattle grazing along the streams of Santa Rosa Island has lead to the selective browsing of riparian plants, such as willows. This caused major decreases in reproduction and survival of riparian species. In many cases where there are willows present, the plants have been browsed into tree-like forms, an indication of extreme browsing pressure. In most cases existing



willow plants are decadent and there is no recruitment. Within Lobo Canyon there are three cottonwood tress, the only ones left on the island. These trees are so old that they have not flowered in over three years. It is not known what gender the trees are. It is possible they are all the same sex (either male or female). If this is the case, then natural reproduction of cottonwoods may have already been lost.

In March 1995 an interdisciplinary team assessed several streams on Santa Rosa Island. Using methodology developed by the Bureau of Land Management (BLM) segments of streams were assessed based upon hydrologic, vegetation, and erosion/deposition criteria (Rosenlieb et al. 1995). The team found the vast majority of the streams to be non-functional in dissipating flood water energies, trapping sediments, and forming/maintaining adequate riparian habitat. Lobo Canyon was one exception, receiving a rating of "proper functioning condition" (PFC). Although the team found a number of problems with the streams on the island, the team determined that the streams, as a whole, were vertically stable and no longer downcutting. This is an important determination, because it means the restoration potential of the streams is excellent with proper grazing management.

Since October 1993, the Park has been monitoring water quality at a number of sites within the Lobo, Water, and Quemada (Las Cruces) drainages. Water quality in the streams on the island reflect the lack of a functioning riparian community and the impacts of grazing by cattle (Sellgren 1995). With no riparian vegetation to slow water flows down and capture excess water for later release into the stream, stream flows tend to dramatically peak during storm events. Summer flows tend to be very low, most likely lower than what would be expected if there was adequate riparian vegetation. The lack of riparian vegetation also leads to increased sediment transport during storm events. Total suspended sediment levels have been recorded at thousands of times of baseline levels during moderate storm events (less than one inch of precipitation in 24 hours). The scarcity of shrubby and woody riparian vegetation to shade the stream waters leads to high peak water temperatures. Conductivity, salinity, pH, and total dissolved solids levels indicate that many of the streams on SRI have alkaline properties. The alkalinity of the streams is most likely unrelated to grazing activity, past or present. Dissolved Oxygen levels indicate super-saturated levels during the day. This may reflect release of Oxygen into the stream column by *Cladophora* algae. Predawn measurements of dissolved Oxygen indicate that levels are suppressed before sunrise. This further supports the impacts of the algae population. Finally, coliform levels indicate that in the streams monitored there is a serious pollution problem associated with cattle feces. Most sites monitored have consistently failed to meet the standards for water contact recreation. Increased use by cattle in the immediate vicinity of a water quality monitoring site has frequently led to substantial increases in the total and fecal coliform levels.

## **Vegetation**

### **Vegetation Communities**

The vegetation of Santa Rosa Island can be divided into three general formations: 1) grasslands, 2) shrublands, and 3) woodlands. Each of these formations have both upland and riparian



expressions. This section discusses the upland plant communities. Riparian communities are discussed in the previous section. Vegetation formations are divided into communities based on the presence of key species or on the combination of species present. Clark et al. (1990) discuss 15 plant communities on the island, providing much of the baseline understanding of island ecosystems.

Of approximately 8000 plant species occurring in California, nearly 500 occur on Santa Rosa Island. While the majority of these are quite common and widespread throughout the state, there is also a significant number of species that are unique to Santa Rosa Island, the Channel Islands, and the nearby mainland. Ten species with current or historical occurrences on Santa Rosa Island are proposed for listing as Endangered by USFWS. Detailed discussions of these plants and their habitats may be found in the Federal Register (1995) and Coonan et al. (1996).

Currently, island vegetation is dominated by grasslands, which cover about two-thirds of the island's surface. The grassland community is composed primarily of alien annuals such as wild oats (*Avena* spp.), wild barley (*Hordeum*), and chess (*Bromus* spp.). Common herbs in this community are also alien annuals, such as burclover (*Medicago polymorpha*), and include such invasive species as milk thistle (*Silybum marianum*), tocalote (*Centaurea melitensis*), and spiny cocklebur (*Xanthium spinosum*). Native perennial grasses on the island are needlegrass (*Nasella*, a bunchgrass genus) and saltgrass (*Distichlis spicata*, a rhizomatous species). The current scattered distribution of these native perennials across the island, occurring on several soil types, may be a remnant of a formerly more continuous distribution.

Few of the USFWS proposed plant species are known to occur in grasslands. Expansion of annual grasslands into areas that formerly supported shrublands (Minnich 1980, Hobbs 1983) may have significantly reduced populations of plants that are now considered endangered. Species which are now found in habitats less accessible to grazers may have occurred in grassland prior to the introduction of livestock and alien wildlife.

Shrublands, made up of chaparral and six other scrub communities, cover about 25% of the island. The woody vegetation ranges from just a few inches to several feet in height. Vegetative cover may be almost non-existent in some dune and bluff scrubs or may approach 100% in chaparral. Reproduction of shrub species is low to nonexistent in many of the communities. This, in combination with browsing, has led to a decrease in cover of key species. As woody cover decreases, so does the litter layer on the ground below, allowing herbaceous species to colonize the exposed soil. The herbaceous understory in all the communities is dominated by alien species. Nevertheless, native grasses and herbs do persist, frequently nestled beneath the canopy of established shrubs (Clark et al. 1990). Coastal sage scrub and chaparral (characterized by *Artemisia californica* / *Baccharis pilularis* and *Adenostoma fasciculatum* var. *fasciculatum*, respectively) are the most common shrub communities and are widely scattered on the island. Other communities are much more restricted. Caliche scrub, characterized by goldenbush (*Isocoma menziesii* var. *sedoides*) and locoweed (*Astragalus miguelensis*), occurs only in Pocket Field; lupine scrub, characterized by *Lupinus albifrons* and *L. arboreus*, occurs only at Carrington Point. Coastal bluff scrub, coastal dune scrub, and chaparral scrub are also limited in distribution.

Shrub communities are highly significant because of both the overall number of plant species occurring there and the high number of listed and sensitive species found there. The coastal sage community, for example, is habitat for at least 103 species, three of which are proposed for listing. Chaparral is made up of over 80 species, six of which are proposed (Coonan et al. 1996). This richness is due to the environmental diversity and protection created by the woody species. Sustained representation of all age and size classes of these species is necessary to preserve the richness of these communities.

Woodlands are an ecologically important though uncommon component of the Santa Rosa Island vegetation. Altogether, upland and riparian woodlands account for less than 1% of the island's cover. Upland woodlands are dominated by pines, oaks, or other mixed hardwoods (oak, cherry, and/or ironwood). Eight native and three alien tree species occur on the island. Two of the native species, Island oak (*Quercus tomentella*), and ironwood (*Lyonothamnus floribundus* ssp. *asplenifolius*), are known to occur nowhere else in the world other than on the Channel Islands. Torrey pine (*Pinus torreyana* ssp. *insularis*) occurs only on Santa Rosa and a portion of the mainland near San Diego.

The alien trees, eucalyptus (*Eucalyptus globulus*), Monterey pine (*Pinus radiata*), and tamarisk (*Tamarix aphylla*), are currently confined to the ranch headquarters area. Native trees occur in discrete groves rather than being widely distributed across the landscape. There are two stands of Torrey pine and nine known groves of ironwood. Closed cone pines occur in two stands, in addition to several isolated individuals. Island oaks have a somewhat broader distribution, occurring in 17 groves. Willows (*Salix lasiolepis*) and cottonwoods (*Populus trichocarpa*) occur in a few riparian areas, the three cottonwood trees on the island being confined to a single drainage. Holly-leaf cherry (*Prunus ilicifolia* ssp. *lyonii*), toyon (*Heteromeles arbutifolia*), and scrub oak (*Quercus pacificus*) occur occasionally as understory trees in the mixed hardwood community. Shrub and herbaceous understories are generally sparse; the herbaceous layer is composed mostly of alien species. Reproduction of the tree species is minimal in most stands. An exception to this is the Torrey pines, where significant recruitment is occurring. It is believed that the native trees currently occupy most of their potential range (Clark et al. 1990). Fragmentation within that range and lack of structural diversity within the stands threaten continued viability of these communities.

### Alien Plants (Weeds)

In contrast to sensitive plant species, which the Park is charged with conserving, there is another component of island vegetation that is managed for reduction or elimination. This is the alien pest plants (weeds). For the purposes of this document, weeds are defined as invasive non-native plants taking up space and resources that could be utilized by native species.

On Santa Rosa Island, pest species can be categorized by three broad behavior types: 1) opportunistic species that rapidly colonize available habitat, 2) slow spreading species that are very persistent once established, and 3) omnipresent species that have replaced native plant communities over large areas.



Opportunistic species of concern are bull thistle (*Cirsium vulgare*), milk thistle (*Silybum marianum*), Russian thistle (*Salsola iberica*), and spiny cocklebur (*Xanthium spinosum*). These species have seeds that are dispersed over long distances by wind or animals. Because of this, the direction of dispersal is random and unpredictable. New seedlings readily establish in any bare soil, such as road sides, construction sites, streambanks, animal trails, and salt grounds. "Explosions" of these plants may occur in years when favorable weather coincides with availability of disturbed habitat. These four species are currently increasing on Santa Rosa Island, in size, number, and range of populations. Bull thistle, milk thistle, and spiny cocklebur occur island-wide, as scattered individuals and in large patches. Russian thistle currently occurs on approximately 20 acres near Officers' Beach and is spreading to the north and northwest. All of these species have the potential to form dense monotypic stands, completely excluding native island species. None of these species are known to be preferred forage for wildlife or livestock. All may be effectively controlled through a combination of herbicide applications and physical removal. Due to their potential for rapid population growth and domination of plant communities, these species are high priorities for immediate and ongoing control.

Slow spreading, persistent weed species include fennel (*Foeniculum vulgare*), lavatera (*Lavatera cretica*), black mustard (*Brassica nigra*), tamarisk (*Tamarix aphylla*), kikuyu grass (*Pennisetum clandestinum*), rice grass (*Piptatherum miliacea*), tall fescue (*Festuca arundinacea*), and Bermuda grass (*Cynodon dactylon*). While these species also have the ability to form dense populations, they may take several years to reach this condition. Their seeds are generally larger and heavier than the opportunistic species, and are spread through animal feces or in mud on vehicle tires or animals' feet. These species occur predominately around the Beecher's Bay dock and ranch area, though black mustard is ubiquitous throughout island grasslands. Individuals of fennel and tamarisk have been found on other parts of the island and have been eliminated by physical removal. Eradication of fennel in the ranch area is currently being pursued through herbicide applications and physical removal. Fennel and black mustard are readily grazed by livestock, which serves to simultaneously control them, by keeping their height down and reducing flowering, and to spread them, through seed dispersal in feces. Because of their concentrated range and slow rate of spread, all these species except black mustard are good candidates for complete eradication.

Some alien plant species have become extremely widespread, replacing thousands of acres of native grasslands and shrublands. These species are primarily annual grasses and herbs and are included in the discussion of island communities. Many provide forage for cattle, horses, and elk. Chemical and physical control of these species is currently unfeasible due to their widespread presence.

Both the Vail and Vickers Co. and the National Park Service engage in weed control efforts. The ranching operation has worked to prevent introduction of weed species to the island through careful inspection and quarantining of all incoming animals that may carry seeds in their coats or digestive tracts (Sellgren, pers. comm., 1996). The ranch has also practiced physical removal of some weeds. Park staff has generally focused their efforts on eradicating exploding populations and new occurrences in disjunct locations. Current funding levels for weed control on Santa Rosa Island are inadequate to pursue an effective weed management program.

## Forage Production and Availability

Santa Rosa Island is dominated by grasslands. The majority of the grasslands consist of annual grasses, although Santa Rosa Island contains some of the best perennial grasslands left in southern or central California. Annual grasses are adequate forage. They make better forage in the winter, when they are tender, green, and palatable. After the annual grasses set seed and die in the late spring, they cure. Cured grasses are less palatable. If there are early summer rains, many of the nutrients can be leached out.

Perennial grasses also make good forage. Unlike annual grasses, perennial grasses live for several years. During the summer drought, many perennial grasses go dormant. On Santa Rosa Island most perennial grasses continue to grow throughout the summer, taking advantage of the summer fog drip. During the summer months, when annual grasses are all cured, cattle prefer the perennial grasses and utilize them heavily.

Overall, Santa Rosa Island produces considerable amounts of forage. Results from the range monitoring program indicate that several thousand pounds of forage per acre can easily be produced in an average rain year. Some sites produce well above what is considered "normal" for its range site. One type of range site, which performs poorly, are those areas with heavy clay soils. Monitoring sites on heavy clay soils have consistently had problems producing adequate forage. These sites are not common on the island.

Utilization of forage on Santa Rosa Island is patchy and irregular, due to the current grazing system of continuous use in large pastures, with no measures to regulate distribution of cattle. Areas far from water tend to be underutilized, while areas near water tend to be overutilized. Because the pastures are so large, and water developments are so few, cattle are forced to obtain their water from the streams. Once there, the cattle take advantage of any green forage available and rest in the shade created by the incised banks. It is important to emphasize, however, that Santa Rosa Island is not overstocked; there are adequate amounts of forage to support the number of animals currently on the island. Problems lie in the control of the distribution of the cattle.

In Western rangelands, riparian areas, and in some cases grasslands near streams or water developments, tend to be overgrazed. Most riparian areas on Santa Rosa Island are devoid of any vegetation whatsoever. The poor condition of riparian areas has lead to a loss of forage in this community. Riparian areas tend to be some of the most productive range; Bartolome and Clawson (1992) estimated 2000 lb./ac of available forage in healthy riparian areas. However, very few riparian areas on Santa Rosa Island appear to be capable of producing this amount of forage.



## Wildlife

Compared to the flora, the fauna of Santa Rosa Island is not well known.

### Mammals

Santa Rosa Island supports four species of native mammals. The largest is the island fox (*Urocyon littoralis santarosae*), which is distributed over the entire island. Distinct subspecies of island fox have been identified for each of the six largest Channel Islands. The entire species is officially listed by the State of California as threatened and by the U.S. Fish and Wildlife Service as a candidate for federal listing as threatened or endangered.

Channel Islands spotted skunks (*Spilogale gracillis amphiola*) are known to inhabit brush and woodland areas, and have also been found in association with buildings. This subspecies of spotted skunk exists only on Santa Cruz and Santa Rosa Islands, having been extirpated from San Miguel Island. The skunk and is listed as a "Species of Special Concern" by the State of California and has been designated by the U.S. Fish and Wildlife Service as a candidate for federal listing as threatened or endangered. The Channel Islands spotted skunk may currently be limited in distribution and may exist at low population levels on Santa Rosa Island. According to von Bloeker (1967), spotted skunks were once very common on Santa Cruz and Santa Rosa Islands, but by 1967 they were rarely found on either island, at least near human dwellings. Possible continued threats to skunks include habitat loss and severe habitat degradation due to overgrazing and associated damage to habitat by both domestic stock and introduced deer and elk. The apparent rarity of spotted skunks may reflect normal population fluctuations, or it may reflect a real decline in numbers (Williams, 1986).

Each of the Channel Islands has its own subspecies of deer mice. The deer mice (*Peromyscus maniculatus santarosae*) population on Santa Rosa Island is distributed widely; however, very little is known about their basic biology, ecology, and population status.

By far the most dominant feature of the island fauna is introduced species. In the last half of the 19<sup>th</sup> century the island was used as a sheep ranch, and much of the loss of vegetation and soil stems from this period of the island's history. While the pigs and feral sheep have been removed, four species of alien animals continue to graze and browse the island's vegetation. These are elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), and domestic cattle and horses. Vail and Vickers maintain approximately 3,000-5,000 cattle, 700-800 deer, 125-150 horses, and 600-1,000 elk on the island.

### Reptiles and Amphibians

Three species of reptiles are found on Santa Rosa Island. Western fence lizards (*Sceloporus occidentalis*) and southern alligator lizard (*Gerrohontus mulicarinatus*) are found in scattered areas throughout the island.

The endemic Santa Cruz gopher snake (*Pituophis catenifer pumilis*) has been recorded on Santa Cruz and Santa Rosa Islands and is found in a wide variety of habitats on the island, but their numbers are low on Santa Rosa Island. Grazing by ungulates may have both direct and indirect effects on snake populations. Grazing decreases shrub cover and maintains open annual grasslands on the island, in contrast to the shrub communities which occurred historically on the island. This decrease in vegetative cover may substantially increase the risk of predation for gopher snakes. The prey base for the snake may also be substantially affected by changes in vegetation communities caused by grazing. Two species of amphibians inhabit Santa Rosa Island. The Pacific tree frog (*Hyla regilla*) is found in all canyons that have standing pools or slow moving streams. The Pacific slender salamander (*Batrachoseps pacificus major*) is commonly found in moist canyon settings, but can also occur in other areas with suitable moisture and cover.

### Landbirds

At present, 30 species of land birds are known to breed or may potentially breed on Santa Rosa in the future (Diamond and Jones 1980). Many of the resident species on Santa Rosa Island are recognized as endemic subspecies distinct from their relatives on the mainland and other islands. Areas of special concern to these and other land birds include all island oak stands, the Torrey pines especially for future nesting of bald eagles, Lobos Canyon, the estuary area, and the thick scrub and mixed woodland areas of Cherry Canyon, Water Canyon and Windmill Canyon. Santa Rosa Island is also an important wintering ground and migration stop over for many migrating birds.

### Rare Species (Includes Listed, Proposed and Candidate Species)

#### Plants

Ten plant species on Santa Rosa Island have been proposed for listing by the FWS as Endangered (Table 11, Fig. 6). Two species are currently presumed to have been extirpated from Santa Rosa Island. Last seen in the 1930's, repeated searches by botanists have failed to relocate *Berberis*, or *Helianthemum*. *Arabis* was recently (March 1996) found in Lobos Canyon, but was previously thought to be extirpated on Santa Rosa.

The primary factors endangering the proposed species are soil loss, habitat destruction by mammals alien to the Channel Islands, direct predation by these same alien animals, competition with alien plant taxa, reduced genetic viability, depressed reproductive vigor, and the chance of stochastic (random) extinction resulting from small numbers of individuals and populations (Federal Register 60[142]:37993-38011).

Table 11. Santa Rosa Island plant taxa proposed for listing as Endangered by U.S. Fish and Wildlife Service.

Scientific Name	Common Name
<i>Arabis hoffmannii</i>	Hoffmann's rock-cress
<i>Arctostaphylos confertiflora</i>	Santa Rosa Island manzanita
<i>Berberis pinnata</i> ssp. <i>insularis</i> *	Island barberry
<i>Castilleja mollis</i>	Soft-leaved paintbrush
<i>Dudleya blochmaniae</i> ssp. <i>insularis</i>	Santa Rosa Island dudleya
<i>Dudleya</i> sp. nov. "East Point"	Munchkin dudleya
<i>Gilia tenuiflora</i> ssp. <i>hoffmannii</i>	Hoffmann's slender-flowered gilia
<i>Helianthemum greenei</i> *	Island rush-rose
<i>Heuchera maxima</i>	Island alumroot
<i>Phacelia insularis</i> ssp. <i>insularis</i>	Island phacelia

\*presumed extirpated from Santa Rosa Island

Several of the proposed species occur in shrublands. As discussed previously, shrubland communities have been significantly reduced in extent and replaced by annual grasslands. Current shrublands are heavily utilized by deer, further threatening the communities and the proposed plant species within them.

In addition to the 10 proposed species, 74 Park "Species of Concern" occur on Santa Rosa Island (Coonan et al. 1996). These are native plant species that regional botanists who are familiar with island and adjacent mainland flora believe to be declining in abundance in the Park. These species also occur predominantly in shrubland communities.

The majority of Proposed species and Species of Concern occur in upland habitats. *Heuchera maxima* is the only Proposed species to occur in riparian areas (in addition to its shrubland and woodland locations). Seven Species of Concern are known to occur in riparian or wetland habitats.

## Animals

The federally listed Peregrine Falcon (*Falco peregrinus*) bred historically on many of the northern Channel Islands but disappeared in the early part of this century due to the adverse effects of pesticides, hunting and human disturbance. Thanks to an aggressive reintroduction program, Peregrine Falcons have recently recolonized many of the northern Channel Islands, including Santa Rosa. Bald eagles also historically bred on Santa Rosa, but no longer breed on any of the northern Channel Islands.



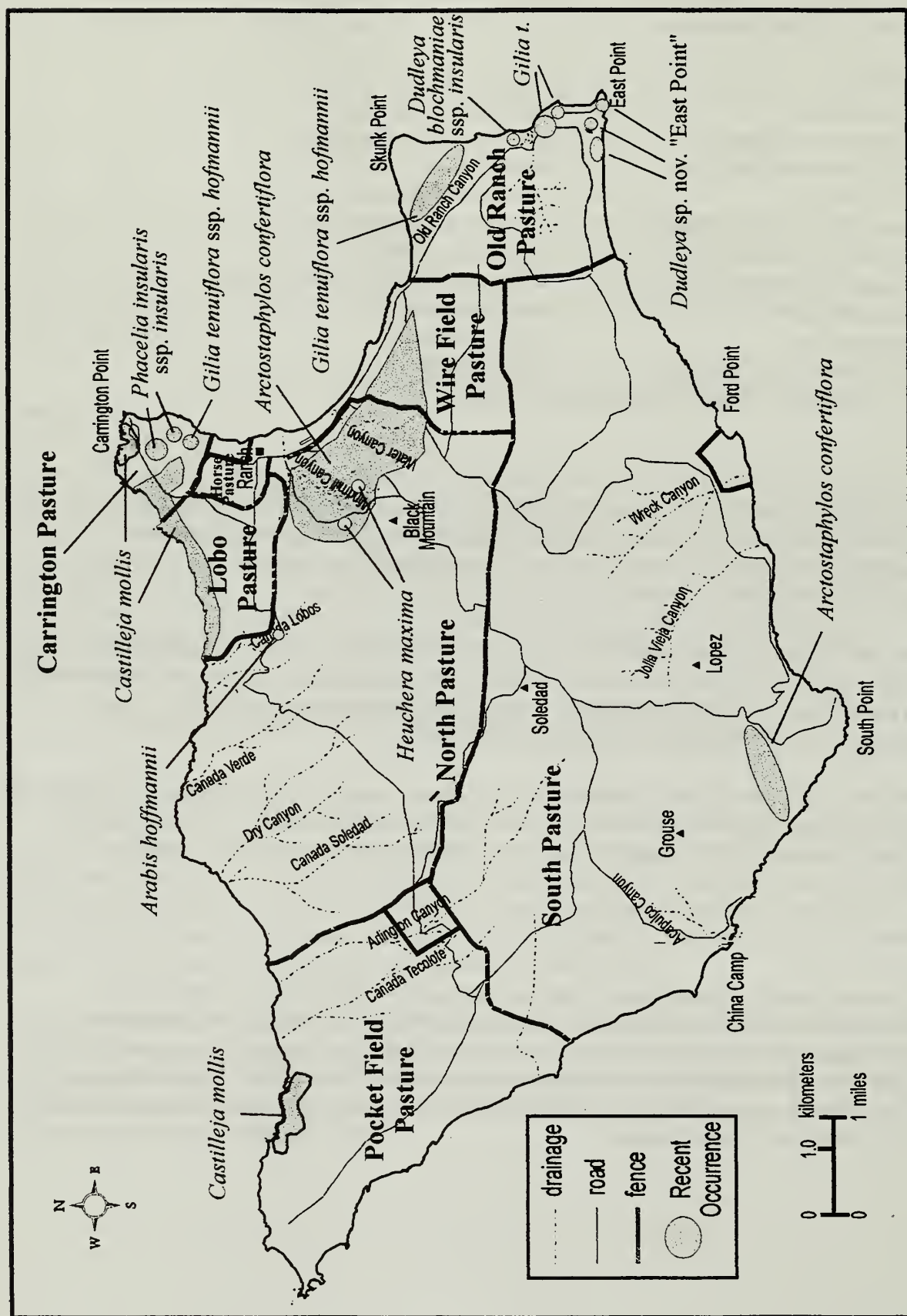


Fig. 5. Recently recorded occurrences of plant species proposed for listing as endangered by U.S. Fish and Wildlife Service, Santa Rosa Island. Data from unpublished surveys by National Park Service and National Biological Service.



The federally listed western snowy plover (*Charadrius alexandrius nivosus*) breeds primarily on coastal beaches from southern Washington to Baja California. Eight areas, including Santa Rosa Island, support 78% of the California coastal breeding population (Page et al. 1991). On Santa Rosa, plovers breed on many beaches on the northeast, southwest, and northwest coasts of the island. A total of 121 breeding adults bred on Santa Rosa in 1993, or 8.7% of the coastal California breeding population. The Skunk Point and East Point beaches are particularly important on Santa Rosa; between 50 and 75 plovers nest there annually. Nest sites typically occur in flat, open areas with sandy or saline substrates; vegetation and driftwood are usually sparse or absent (Wilson 1980, Stenzel et al. cf. Federal Register 1993). Nesting success, at least on Santa Rosa Island, is low. In a two-year study at Skunk Point, percentage of nests that failed was 68% in 1992 and 89% in 1993 (Keimel 1992, Stein 1993). Wind and predation were identified as major factors causing nest failure. Trampling by livestock accounted for 4.3% of nest failures in 1992 and 6% of nest failures in 1993.

In 1995, FWS issued a biological opinion evaluating the effects of Park activities on Western Snowy Plover and Brown Pelicans at Channel Islands National Park. In order to minimize incidental take of plovers from NPS-approved activities, FWS identified the following reasonable and prudent measures to be taken by NPS:

- establishment of a permanent closure for the Skunk Point area for protection of nesting plovers;
- limitations on and monitoring of beach camping, beach use, and associated activities on Santa Rosa and San Miguel Islands for protection of nesting plovers.

To gain protection of nesting snowy plovers on Skunk Point, in 1995 NPS and Vail and Vickers constructed an electric fence in Old Ranch Pasture to exclude all cattle and horses from the Skunk Point closure during the plover breeding season. The fence has been breached by cattle several times since installation.

## CULTURAL RESOURCES

### Historical and Archaeological Resources

Extensive and numerous archeological sites characterize Santa Rosa Island. Early occupation on the island commenced approximately 10,000 years ago, near the end of the Pleistocene; sites dating 8,000 years ago are fairly common on the island. An estimated 2,000-3,000 sites contain a record of the development and adaptation of Chumash culture from this period until the group's departure from Santa Rosa Island in 1815. In contrast to comparable mainland sites, archeological localities on Santa Rosa have been relatively undisturbed and retain great research potential. Phil Orr's find of "Arlington Man," a partial human skeleton is at least 10,000 years old, and may be as much as 1,000 years older. Even the most recent of these dates places this individual as one of the oldest ever found in North America. Santa Rosa Island is eminently suitable for nomination to the National Register of Historic Places as an archeological district.

While sites have been degraded by livestock grazing and rooting and foraging by pigs, the lack of burrowing animals on the island has resulted in excellent preservation of archeological stratigraphy. Numerous small caves and rock shelters containing perishable materials retain unique data critical for understanding cultural processes and past environments. There is high potential for submerged prehistoric sites offshore from the island which could provide unique insights into the archeological record.

The Santa Barbara Museum of Natural History recorded 182 archeological sites on Santa Rosa Island from 1945 to 1963. A Park Service archeological survey, which is still in progress, has covered approximately 30% of the island, recording 580 sites, suggesting that the total site inventory for the island may approach 2000 sites. Recorded sites range in age from early period locales nearly 9000 years old to historic camps dating from World War II, and include Chinese abalone camps, historic shipwrecks, military construction, and oil field camps, as well as the more frequent prehistoric sites. Items recorded range in size from single, isolated artifacts to one which is 480,000 square meters in extent. This survey has given coastal areas high priority in order to assess losses of archeological material resulting from coastal wave action. The survey data will be used to prepare a nomination to the National Register. Like the other park islands, all of Santa Rosa Island will probably be nominated as an archeological district.

The present ranch complex preserves a tradition of island ranching that began during the 1840's. Several of the structures, including the main ranch house and the two red barns, date from the early 1870's, while other structures are much more recent. Fourteen of the structures at Becher's Bay are listed on the current List of Classified Structures. Houses and barns built with square-cut nails adjacent to satellite TV dishes show the innovation and conservatism that characterize the present cattle operation on the island. Other historical locations related to Spanish exploration, Aleut sea otter hunting, Chinese abalone fishing, and World War II military activities embellish the historical tradition of the island. The beaches and offshore waters of Santa Rosa contain at least six historic shipwrecks which illustrate the development of fishing and marine mammal hunting and worldwide commercial trade as southern California integrated into the global economy.

The ranch buildings at Bechers Bay, together with their surrounding fields and pastures, and the China Camp cabin are in the process of nomination to the National Register.

### **Cultural Landscapes**

The immediate environs of the Bechers Bay Ranch constitute a historic landscape preservation area which will retain the rural aspects of isolated island ranch life and provide a suitable setting for the historic ranch complex. The other landscapes and viewsheds of the island, if maintained in their present state, represent the current ranching practices; if returned to more natural conditions, these landscapes will represent the environment within which the Chumash cultural sequence developed.

A Cultural landscape Study is scheduled in the park's current Resources Management Plan. This study will refine the current understanding of the cultural landscapes of the island.

## **Ethnography**

Descendants of the Chumash are greatly concerned with the treatment of their historical remains, both human burials and archeological sites. An assessment of ethnic concerns is needed to provide information to guide management decisions in this sensitive area. The Chumash are particularly concerned that burials and associated artifacts remain undisturbed. Reburial of human remains taken from the islands is a current issue of concern. On Santa Rosa Island, as on other park islands, eroding burials in areas accessible to the public have been recovered in place. Descendants of the Chumash island lineages and other appropriate groups will be consulted on proposed actions that affect prehistoric sites.

## **Paleontological Resources**

The best studied aspect of Santa Rosa Islands paleontology is the numerous fossil bones of the pygmy mammoth, *Mammuthus exilis*, a unique species found on the northern Channel Islands, most commonly on Santa Rosa Island. This species descended from full sized ancestors who swam the Santa Barbara Channel to the islands during the Pleistocene and became isolated on the islands. Dying off at about the end of the Pleistocene (12,000 years ago), these animals are represented by fossils which are often exposed in sands, silts, and gravels of Pleistocene age anywhere on the island. Most specimens have been found in the sediments comprising the coastal terraces of the island. Due to the numerous questions about many aspects of this species evolution and development, any fossil may potentially be of crucial importance in answering important research questions. Other fossil localities containing smaller terrestrial species of Pleistocene age and invertebrate fossils embedded within the Miocene strata of the island remain unstudied. Today, bones are often exposed by erosion, and unless collected properly and promptly, they may be scattered and lost due to weather and the actions of large mammals on the island.

## **SOCIOECONOMIC RESOURCES**

### **Regional Demographic Profile**

The population of the Los Angeles Basin was determined to be 13,887,100 in 1988, with more than half of that total residing in the Los Angeles/Long Beach area. The population of Ventura County in 1993 was 693,900 (BEA, 1995). In recent history this has been one of the fastest growing areas of the nation. The Los Angeles Basin is expected to experience a 21.4% increase in growth between the years 1988 and 2000. Population density figures indicate that the region is very heavily populated, with Orange County registering the highest figure, over 2,000 people per square mile. The percentage of the population classified as urban is extremely high. Education, age, and income statistics demonstrate that the regional population is slightly more educated, slightly younger, and generally more affluent than the comparable national standards. In 1993, Ventura County had a per capita personal income of \$22,003, which ranked 56<sup>th</sup> in the United States and was 106% of the national average. (BEA, 1995). Santa Barbara County had a



per capita personal income of \$24, 013, which ranked 28<sup>th</sup> in the United States and was 115% of the national average.

### **Regional Economic Environment**

On a Regional scale, the economy of Southern California is generally well developed and highly structured, and it includes economic sectors representing energy, tourism, agriculture, military services, and manufacturing. Economic activities occurring in and around the Santa Barbara channel and relevant to Channel Islands National Park are the recreation, oil and gas, fisheries, and ranching industries. The latter is especially relevant due to the current commercial ranching operation on Santa Rosa Island. In 1994, 597,622 acres of privately owned rangeland were located within Santa Barbara County with a total value of \$4,350,979. These rangelands produced 54,099 head sold in 1994 with a total value of \$26,511,318 (W. Jensen, personal communication).

In addition, the Southern California Bight has a long history as a commercially important region for fishery activities (both commercial and sport) and for recreational resources. Recreational resources are extensive in the region and are a significant basis of economic activity. The coastal environment is a national attraction with a large number of opportunities for water-related recreation. Recreational use generates millions of dollars of revenue for the regional economy.

More specifically, Channel Islands National Park hosts a variety of different types of fishery activities including commercial operations and sport fishing from private and party boats, both from the surface and by diving. Additionally, the relatively undisturbed underwater environment of the islands is a significant attraction for an increasing number of skin and scuba divers who come to see the underwater resources rather than to fish.

### **Visitor Use**

The Park's enabling legislation (Public Law 96-199) directed that visitor use within Channel Islands National Park be limited in order to minimize adverse impacts to the Park's fragile and sensitive resources. Although potential opportunities for recreation on Santa Rosa are significant, access is also restricted to avoid conflicts with the current ranching operation. The expense of transportation to the island also limits the number of visitors.

Numerous private and commercial fishing boats utilize the anchorages around Santa Rosa Island, but these vessels have not been systematically counted. Few private boaters come ashore and those who do primarily spend a few hours on the beaches, rarely venturing farther inland. During the main visitor use season (May through early September) island personnel estimate approximately 20 private boaters come ashore and contact NPS employees each week. The campground in Water Canyon holds up to 30 campers per night. It is popular, but not heavily used, probably because access to the island is not simple or inexpensive.



The Island Packers Company (IPCO) is the concessionaire providing boat transportation to Park islands. The company transports approximately 200 visitors per month during the summer and about 50 people per month during the remainder of the year. Channel Islands Aviation provides commercial air service to the island, primarily on weekends. Transportation by air is estimated at 30 visitors per week in the summer and perhaps 30 per month the rest of the year. Estimated annual visitation to Santa Rosa is thus 2,050.

### **Grazing/hunting Permittee**

Santa Rosa Island has a history of ranching on the island which continues through today. The National Park Service purchased Santa Rosa Island for \$28.5 million from Vail & Vickers in 1986. Currently, Vail and Vickers operate a stocker system for cattle and a hunting operation for elk and deer through a Special Use Permit (SUP) issued by the National Park Service. The SUP is renewable every five years, and the ranching and hunt operations are scheduled to terminate on December 29, 2011. The permittee's operation is for-profit and also generates revenue to the National Park Service through grazing fees. The current grazing fee for the 1993-1997 supplemental use permit is set at \$1.00 per head month (one month of use for one adult cow or horse). The purpose of setting these fees is to charge a fee for domestic livestock grazing and National Park Service land that represents fair market value of the use of the land and which is fair and equitable to the Federal Government and the users. The permittees maintain approximately 42,000 Animal Unit Months (AUMs) annually, or between 4500 and 6500 head of cattle.

Under the Vail and Vickers stocker operation, calves are brought to the island, usually in the fall, and fattened on the island for approximately 18 months, then taken off the island to a feed lot (Bartolome and Clawson 1992). Using the stocker system gives the ranch important flexibility to adjust numbers of animals quickly if drought occurs. For the most part the ranch uses a continuous grazing system, where cattle spend an entire year (or more) in one pasture. There is little pasture rotation of cattle.

The island is broken up into ten pastures. Only five of these pastures (comprising approximately 50,000 acres) are used to graze cattle with the continuous grazing system. The other five pastures are holding pastures. Because the pastures are so large (up to 24,000 acres) and water sources so few, the island experiences very patchy use by the cattle. In these types of situations, forage resources are underutilized in upland areas, while in areas near streams, the forage is more intensively utilized (Valentine 1990). The ranch has created few water developments, and so the cattle obtain water primarily from streams.

The 1992 SUP directed that "A range management plan (RMP) will be developed by the Permittee and the NPS for the purposes of continuing the enhancement of the rangelands and to accommodate the grazing stock and revegetation of the grasslands". A range management plan for Santa Rosa Island was subsequently developed (Bartolome and Clawson 1992). The range management plan estimated grazing capacities for Santa Rosa Island using the "scorecard"

method, which is based on estimated forage production and recommended residual dry matter under proper grazing use, and recommended the following:

- Continue livestock grazing operation and fee hunting.
- Implement a program of range monitoring in 1992 to measure residual dry matter (RDM) and guide stocking rates.
- Fence snowy plover nesting areas and marsh in Old Ranch Pasture.
- Take immediate steps to protect the existing reproduction of closed-cone pines on Black Mountain.
- Construct a fence to exclude livestock from a portion of Lobos Canyon.
- Implement a program to monitor areas of special concern to the NPS, including canyon/riparian areas, chaparral, closed-cone pine, grasslands, and habitats for candidate plants.
- Develop a time table and program for monitoring browse utilization and managing deer numbers.
- Obtain more detailed information on distribution of native plants, soils, and restoration techniques to work towards the goal of reduction of alien species and enhancement of natives.

The 1992 SUP also called for preparation of a deer management plan.

The following elements of the range management plan have been implemented thus far:

- A fence to protect snowy plover nesting areas on Skunk Point was built in 1995. A fence to protect the lower portion of Lobos Canyon was built in 1993. A limited number of wire exclosures were built around Bishop pine seedlings on Black Mountain in 1994.
- Spring and fall RDM monitoring was initiated in 1992 (see description of methods in Appendix B, and in Bartolome and Clawson 1992). Thirty-four RDM sites, located at least 1/4 mile from water sources and on slopes less than 25%, are monitored on the island. The park does not monitor forage in riparian areas, areas less than 1/4 mile from water sources or on steep slopes.

Sixteen of the RDM sites have at least 30% frequency of perennial grasses. These perennial grass sites tend to produce more forage than annual grass sites, especially during the summer drought. These sites also require less intensive utilization than annual grasses.

Although results from RDM monitoring can be used to adjust stocking rates, rates thus far have been set by customary practice, e.g., the permittee adjusts stocking rate according to past experience and current needs. Results from RDM monitoring may be most valuable for adjusting stocking rates between average precipitation years and drought years.

The permittee incurs annual expenses to maintain their operations on Santa Rosa Island, including payment to the National Park Service of \$1.00 per AUM annually. The permittee also earns revenue from cattle sales and the elk and deer hunting operation on the island. In general, stocker operations generate larger returns than cow-calf or cow-yearling operations and

generally earn a profit in the long run. However, shrinkage and transportation costs of procuring stocker cattle from distant locations on the mainland to the island can have a major impact on returns, and the operator must assume the market price risk between purchasing and resale. As a result, returns can be quite variable among ranches using purchased stocker systems, depending on location with respect to stocker supplies, markets and the operator's ability to buy and sell. Thus, economic considerations will be treated in a general sense throughout this document, as opposed to the use of specific numerical data.

## **NPS Operations**

The National Park Service spends an annual average of \$350,000 to maintain basic operations for Santa Rosa Island. These costs are paid from appropriated funds and include items such as NPS salaries, transportation costs, and on-island support of NPS programs. Expenses for these activities are necessary for park operations and are unrelated to the continuation of the permittee operations on the island. However, NPS generates revenue from the SUP fees which have totaled \$456,060.45 since 1986.

## **Wilderness Values**

A National Wilderness System was established in 1964 with the passage of the Wilderness Act (P.L. 88-577). The Act provides that wilderness shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness. The Act defined "wilderness" as federal land "...where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain...(and) which is protected and managed to preserve its natural conditions..."

The Park's General Management Plan (NPS 1985) states that formal wilderness studies and recommendations for all the Park islands will be deferred until predominantly natural conditions have been restored on the islands, and no further intensive resource management efforts are required. The GMP stated that, currently, Santa Rosa would not meet wilderness criteria due to the presence of domestic stock and exotic grazing animals. However, the GMP also stated that natural areas in the Park would be managed to the extent feasible as wilderness so as not to preclude later qualification for such designation.



## ENVIRONMENTAL CONSEQUENCES

In this section, each alternative is analyzed for effects on natural resources (soils, water quality and riparian areas, vegetation, wildlife, rare species and their habitats), cultural resources (archeological and historical resources, cultural landscapes, and ethnography), and the socioeconomic environment (visitor use, effects on the grazing/hunting permittee, effects on NPS operations, wilderness). Types of effects analyzed include direct and indirect, and short-term and long-term.

*Cumulative impacts* are those impacts on the environment which result from the incremental impact of the action when added to other past, present, and foreseeable future actions, regardless of what agency or other person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative impacts are discussed at the end of the respective sub-section for each alternative. Unavoidable adverse impacts of each alternative are discussed at the very end of the Environmental Consequences section, as well as the relationship of short-term uses and long-term productivity, and irreversible and irretrievable commitments of resources.

Both *beneficial* (positive) and *adverse* (negative) effects are discussed. Where possible, the severity of effects on resources is quantified as *negligible*, *slight*, *moderate* or *heavy* (*substantial*). Additionally, impacts are identified as *significant* depending upon both the context and the intensity (severity) of the effect.

### ALTERNATIVE A: NO ACTION

Alternative A, No Action, is the continuance of the status quo. No major resource developments or changes would take place. Under this alternative, NPS would take no action to improve water quality or riparian values. NPS would consult with U.S. Fish and Wildlife Service regarding effects on listed and candidate species, and would implement any mitigation actions identified in the consultation process. Livestock and game species would be managed as they currently are. Cattle would continue to graze under a continuous use system. The weed management program would be increased as funding allows, in order to address weed management problems on Santa Rosa Island. All grazing and hunt operations would cease by 2011.

### Natural Resources

#### Soils

Under this alternative, continued grazing in all pastures will maintain the current heavy effects on soils and biotic crusts. These impacts include: continued trampling of soils, resulting in decreased soil stability, decreased water availability for vascular plants, and increased soil loss; decreased nutrient content of plants; increased vegetation loss; and decreased soil temperatures, which can affect success of vascular plant establishment, nutrient content of plants and activity

levels of soil biota. These effects would occur in areas where cattle concentrate, such as around water sources, and in areas where ungulates trail.

These impacts will be eliminated when grazing ends in 2011, and stabilization and recovery of soils should subsequently occur.

### **Water Quality and Riparian Areas**

Under the No Action alternative, cattle would continue to have unrestricted access to the vast majority of streams and riparian areas, and there will continue to be heavy effects on water quality and riparian areas. With the exception of the final two-mile length of Lobo Canyon and a portion of Windmill Creek within Horse Pasture, no stream would receive any protection from the effects of continuous cattle grazing. Most stream reaches would continue to lack any shrubby or woody riparian plants. Existing trees and shrubs would most likely not be able to successfully reproduce. Many of the riparian trees and shrubs are very old and eventually will die. Under the No Action alternative some populations of old riparian plants may perish before they can reproduce, causing the extirpation of that population. Particularly at risk are the three cottonwood trees in Lobo Canyon. Although cattle are now excluded from the stream reaches containing the cottonwood trees, deer are still present and devour seedlings of many riparian tree and shrub species. At this point the cottonwood trees are no longer flowering. Without active restoration efforts, the island would most likely lose this species altogether. Willows are also at risk, but the risk would be considerably less due to the higher number and wider distribution of plants on the island.

Without adequate vegetation cover, stream banks would likely remain unstable. Accelerated rates of erosion (currently nine time pre-European levels) would continue. Streams would continue to remain non-functional in their role to dissipate flood energies and trap sediments. Suspended sediment levels would continue to dramatically peak during storm events, indicating the continued loss of limited soil resources. Once gone, these resources can not be regained. Streams may continue to widen and the water column may become more shallow.

Water quality would remain poor. Water temperatures would continue to be unnaturally high, especially during warm sunny days. *Cladophora* algae would likely continue to seasonally choke the streams, flooding the streams with dissolved Oxygen during the day, when they photosynthesize, and removing dissolved Oxygen at night, when they respire. There would be insufficient dissolved Oxygen to support aquatic animal populations. Nutrient inputs into the stream would continue to be high and promote heavy growth of algae within the streams. Coliform levels would likely remain high, especially during the summer months when cattle tend to congregate near streams. Coliform levels would likely continue to exceed standards set for the water contact (REC-1) beneficial use.

## **Vegetation**

Maintaining the current ranch and Park operations would result in the continuation of current effects on vegetation communities. Shrub communities will continue to be heavily impacted by grazing. Chaparral and coastal sage scrub communities will be limited in range by grazing and browsing. Chaparral will continue to be heavily browsed by deer. Annual grassland will continue to dominate the island.

Implementation of no action will have moderate effects on weed management. Current weed trends are likely to continue. Thistle populations are likely to continue to increase, fennel is likely to continue to be controlled through grazing. If funding becomes available, then incremental increases in the weed management program will provide opportunities to prevent the spread of weeds to new locations as well as to eradicate current populations. The weed management program may reduce introduction of new weeds to the island through educational efforts directed toward Park staff and visitors.

Under the No Action alternative, forage utilization would continue to be patchy. Some areas, particularly in the uplands, would continue to be underutilized, while other areas, particularly in the riparian zones, would continue to be overutilized. Monitoring of forage would continue to use the rank yield method, and the minimum level for residual dry matter (RDM) would remain at 400 lb./ac. This is the bare minimum recommended for annual grasslands. Grazing utilization leaving only this amount would likely have moderately adverse impacts on perennial components of the island's grasslands, and would contribute to upland erosion.

## **Wildlife**

Under the No Action alternative, there will continue to be moderate effects on wildlife. Wildlife populations would probably continue to exist at or near their current levels. However, species currently existing at low population levels may continue to be at risk of extirpation.

The Channel Islands spotted skunk and Santa Cruz gopher snake may exist at relatively low population levels on Santa Rosa Island. Under the No Action alternative, habitat for skunks and gopher snakes would not be improved until grazing ends in 2011.

Effects on deer mouse populations are unknown, since little is known about deer mice populations on Santa Rosa Island.

## **Rare Species, and Their Habitats**

Under this alternative, there would continue to be heavy effects on rare plant populations and their. Direct effects would include grazing, browsing, and trampling by cattle, deer, and elk. Rare species would also continue to be subject to the indirect effects of soil erosion, weeds and other alien plant competition, and pollinator loss.



Observed direct impacts on proposed species in Old Ranch Pasture are trampling and uprooting of *Dudleya blochmaniae* ssp. *insularis* and *D. sp. nov.*, and grazing of *Gilia tenuiflora* ssp. *hoffmannii* (S. Chaney, pers. comm. 1996, K. McEachern, 1996). Habitat for the *gilia* is threatened by cattle trampling and consumption of ambrosia (C. Sellgren, 1996), a plant essential for the stabilization of the dunes where *Gilia* grows. *Heuchera* currently occurs only on slopes inaccessible to cattle, despite widespread suitable habitat. *Phacelia* no longer occurs in Old Ranch Pasture, which is much more heavily grazed than Carrington Pasture, where that plant is currently growing. Both *dudleya* species have been subject to crushing by vehicles. Unless mitigated, these effects on proposed species in Old Ranch Pasture are likely to continue under this alternative.

Existing cattle exclosures would be maintained. These include fenced populations of Hoffmann's *gilia* and munchkin *dudleya* in Old Ranch Pasture (approximately 10 acres), the Soledad island oak grove (approximately 2 acres), the Lobo Canyon exclosure (approximately 100 acres), and the plover exclosure on Skunk Point. The exclosures are built to exclude cattle, but do not exclude deer or elk.

Proposed plant species that are believed to be affected by deer browsing are *Berberis pinnata* ssp. *insularis*, *Arctostaphylos confertiflora*, *Arabis hoffmannii*, *Helianthemum greenii*, and *Castilleja mollis*. *Berberis* and *Helianthemum* are no longer found on the island. They were last seen during the early 1930's, the same time at which deer were becoming established on the island. It is possible that the extirpation of these rare species is the direct result of habitat alteration or predation by mule deer. Predation (S. Chaney, pers. comm. 1993) and trampling (K. McEachern, pers. comm. 1996) of *Castilleja mollis* by deer has been observed at Carrington Point. *Manzanita* (*A. confertiflora*) has undergone severe form alteration due to heavy browsing by deer. Clark et al. (1990) reported that most individuals are either strongly hedged or arborescent, and that seedling establishment is rare to nonexistent. It is this failure to successfully reproduce that is the severest threat to the continued existence of Santa Rosa Island *manzanita*, as well as to all the other proposed species.

Hedging, mushrooming, and lack of reproduction of shrubs and trees is common throughout the shrub and woodland communities on Santa Rosa Island. In addition to impacts seen on *manzanita*, similar damage has been observed on at least 15 Park Species of Concern. These include *Adenostoma fasciculatum*, *Arctostaphylos tomentosa insulicola*, *Ceanothus megacarpus insularis*, *Comarostaphylos diversifolia planifolia*, *Prunus ilicifolia*, *Rhamnus pirifolia*, *Pinus remorata*, *Lyonothamnus floribundus asplenifolius*, *Quercus tomentella*, *Q. agrifolia*, *Q. dumosa*, *Rubus ursinus*, *Sambucus mexicanus*, *Populus trichocarpa*, *Rosa californica*, and *Salix lasiolepis*. (Clark et al. 1990, K. McEachern, 1996)

Implementation of this alternative will have no effect on Peregrine Falcons nesting on Santa Rosa Island.

Current beneficial and adverse effects on Western Snowy Plover would continue, under this alternative. The exclusion of livestock from plover nesting habitat on Skunk Point would continue to have substantial beneficial effects on plovers. Cattle grazing would continue to have unknown, but probably negligible, effects on nesting snowy plovers on other beaches of the

island. Occasional deaths of cattle may continue to have slight to moderate adverse effects on plovers, since carcasses attract and support artificially high populations of Common Ravens (*Corvus corax*). Ravens which were responsible for ½ to 2/3 of depredated plover nests on Skunk Point (Keimel 1992, Stein 1993).

## **Cultural Resources**

### **Archeological Resources**

Under the No Action alternative, there will continue to be moderate effects on archeological sites. Cattle will continue to graze on most archeological sites, with attendant trampling damage. In addition, erosion will continue to disrupt archeological materials at or near current moderately severe levels of impact.

### **Historical Resources**

This alternative would have no effect upon historic structures on the island or the surrounding historic landscape preservation area.

### **Cultural Landscapes**

This alternative would have no effect upon the existing cultural landscape.

### **Ethnography**

Under this alternative, there would continue to be moderate effects on ethnographic materials. Burials will continue to erode at their present rate. Elements introduced after European contact will be present on the island.

## **Socioeconomic Environment**

### **Regional Economic Environment**

Implementation of this alternative would have no effect on the existing regional economic environment. The ranch would generate the same revenue as it currently does, the regional recreational business would stay the same, as would the NPS operation.

## **Visitor Use**

Implementation of the No Action alternative would continue to have slight effects on the visitor experience. Visitor activities currently stress low-impact, low-volume activities. This approach would not change under the no action alternative. In addition, visitor use facilities currently available on Santa Rosa Island would not change and the nature of the visitors' experiences and activities are also not expected to change. However, with no measures directed at erosion mitigation and weed eradication, aesthetics of the island may decline over time, negatively impacting the visitor's experience.

## **Grazing/hunting Permittee**

Implementation of the No Action alternative would have no effect on ranch operations, which would not change from the status quo. The ranch would continue to graze five of the ten pastures under a continuous grazing system, whereas the other five pastures would remain holding pastures. Stocking rates would continue to be set by customary practice, as determined by the permittee.

## **NPS Operations**

Implementation of the No Action alternative would have no effect on the current operation of the National Park Service

## **Wilderness**

Implementation of the No Action alternative would have no effect on wilderness values. Santa Rosa Island would remain unsuitable for wilderness designation until sometime after 2011, when grazing has been removed and restoration efforts have been completed.

## **Summary**

Under implementation of the No Action alternative, there would continue to be heavy effects on soils, water quality, riparian areas, rare species and their habitats, and vegetation. There would continue to be moderate effects on weed management, wildlife, and archeological resources. There would be slight effects on visitor use. There would be no effect on historical resources, cultural landscapes, the regional economic environment, ranch operations, NPS operations, or wilderness values. Identified effects would continue until cattle grazing ceases in 2011.

## **Cumulative Effects**

The definition of cumulative impact is "the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable



future actions" (40 C.F.R. § 1508.7). The cumulative impacts of this No Action alternative therefore are those impacts which result from the incremental impact of this alternative when added to other past, present and reasonably foreseeable future actions, including those effects on a resource in areas beyond the scope of this plan. For example, cumulative impacts to water quality associated with this alternative would result from the incremental impacts of this alternative on water quality when combined with the impacts of other past, present and future actions affecting water quality on other islands in the park and on other grazing lands along the Central Coast of California.

On other islands in the Park, past sheep and cattle grazing have led to heavy impacts on soils (Brumbaugh 1980, Johnson 1980). These impacts include intense hillside gully development and loss of soil from wind and water erosion, due to direct and indirect effects of sheep and cattle grazing, as well as loss of microphytic crust. These impacts have largely abated now that sheep and cattle are gone from these islands. Heavy, adverse effects have occurred to soils on Santa Rosa Island as a result of past and current ranching operations. These ongoing impacts would not change under this alternative. Because the impacts of the ranching operation on SRI would not change under this alternative, the impacts to soils described above would not experience any incremental change.

Other past, present and future actions affecting water quality and riparian areas in the Central Coast region include the ongoing impacts of ranching activities throughout the Central Coast Region (this region includes Santa Cruz, Santa Clara, San Benito, Monterey, San Luis Obispo and Santa Barbara counties). The water quality problems identified for Santa Rosa Island (discharge of bacteria and sediment) are common among other rangelands in the Central Coast Region (Michael Thomas, Central Coast Regional Water Quality Control Board, personal communication, April 26, 1996). Although the CCRWQC Board has been working with the USFS to incorporate BMPs for water quality improvement into allotment management plans on the Los Padres National Forest, BMPs are not yet in place for most of these rangelands. As a result, there are ongoing, adverse impacts to water quality and riparian areas in other areas of the Central Coast region. If BMPs are implemented on these rangelands, these adverse impacts may be reduced.

As stated in this draft EIS, past grazing by the current permittee on Santa Rosa Island has rendered many drainages non-functional as riparian areas (Rosenlieb et al. 1995). Future grazing at present levels will maintain riparian areas in a non-functional state, at least until 2011 when cattle are removed. Under the No Action alternative, NPS is not undertaking any actions that would change this scenario. This alternative would therefore not result in any additional cumulative impacts to local or regional water quality or to the condition of riparian areas.

Current distribution of vegetation on Santa Rosa Island reflects the effects of past and current ungulate use. Rooting by feral pigs caused substantial damage to native plant communities until pigs were eradicated from the island by NPS in the early 1990's. Under No Action, the current distribution of plant communities on Santa Rosa Island will be maintained until cattle are removed in 2011. As a result, shrub communities will continue to be restricted in range, especially chaparral and coastal sage scrub communities, and annual grassland will continue to dominate the island.

Cumulative effects on vegetation include effects of other activities on vegetation communities on the other Channel Islands. Effects of past ranching activities on vegetation communities have not been restricted to Santa Rosa Island. Across all of the northern Channel Islands, there has been widespread conversion of native shrublands and perennial grasslands to communities dominated by non-native annual grasses and weeds (Brumbaugh 1980, Coblenz 1980, Hobbs 1980, Johnson 1980, Minnich 1980, Coonan et al. 1996). Native plant communities are fragmented and discontinuous, with understories of alien grassland species. Effects on native plant communities on other islands include:

- Reduction in native species cover, density and biomass;
- Increase in cover, frequency and biomass of non-native species, particularly annual grasses and short-lived perennial herbs;
- Lack of recruitment in dominant native woody species;
- Loss of fire-induced successional communities due to inadequate fuels and lack of seed banks.

These effects will continue on Santa Rosa until ungulates are removed, and on Santa Cruz Island until feral pigs and sheep are removed. Future grazing on Santa Rosa at present levels will cause shrub communities to continue to be restricted in range, especially chaparral and coastal sage scrub communities, and annual grassland will continue to dominate the island, at least until 2011 when cattle are removed. Under the No Action alternative, NPS is not undertaking any actions that would change this scenario. This alternative would therefore result in no additional cumulative impacts to vegetation.

As stated previously in this EIS, the effects of past grazing on Santa Rosa Island on island spotted skunk and Santa Cruz gopher snake are not known. However, the effects of such grazing have probably diminished habitat for the skunk, which may prefer riparian areas and upland shrub habitat (Crooks 1994). Similarly, past grazing on Santa Rosa Island has contributed to the maintenance of open annual grasslands and a reduction in shrub communities on the island; these conditions may increase the risk of predation for snakes and may adversely affect the prey base.

The status of the island spotted skunk and Santa Cruz gopher snake on Santa Cruz Island is unknown. Although habitat is generally better on Santa Cruz due to increased cover and greater areal extent of shrub communities, current feral pig rooting and sheep grazing on Santa Cruz may decrease or limit available habitat for both island spotted skunk and Santa Cruz gopher snake. The effects of this limitation of habitat for both species, when combined with the limitation of habitat on Santa Rosa, are unknown. Since these two taxa are limited in geographic range to Santa Cruz and Santa Rosa Islands, the status of the skunk and the snake will not change under current conditions. Limitation of habitat will continue on both islands until ungulates are removed and shrub and riparian habitats begin to recover and expand. Under the No Action alternative, NPS is not undertaking any actions that would change this scenario. This alternative would therefore result in no additional cumulative impacts to wildlife.



Past and current grazing and browsing by non-native ungulates have resulted in heavy, significantly adverse impacts to proposed species and their habitats on Santa Rosa Island (Federal Register 60[142]:37993-38010): . These effects are not limited to Santa Rosa Island, but have occurred on all of the northern Channel Islands. In an assessment of the status of rare species and their habitats on the northern Channel Islands, an interagency team concluded that ranching era land-use practices of the past 150 years have resulted in a reduction of geographic range for rare species, and for certain species, a reduction in reproductive success (Coonan et al. 1996). The team's assessment identified the following problems common to rare species on the northern Channel Islands:

- Fragmentation of populations into small, isolated units;
- Lack of reproduction or recruitment in populations;
- Soil loss that exposes root systems to damage;
- Lack of adequate seed banks and seed beds for regeneration from seed;
- On Santa Cruz and Santa Rosa islands, continued rooting, browsing and grazing that removes living plant tissue;
- For wildlife species, lack of adequate cover and forage for successful breeding and rearing of young.

A total of 12 of the 16 northern Channel Islands plants proposed for listing by USFWS occur on islands other than Santa Rosa. The USFWS has determined that these plant taxa and their habitats have been variously affected or are currently threatened by one or more of the following: soil loss, habitat alteration and direct predation by non-native ungulates, habitat alteration by native seabirds, habitat alteration due to vehicular traffic, overcollection for scientific or recreational purposes, competition with alien plant taxa, reduced genetic viability, depressed reproductive vigor, and the chance of stochastic extinction resulting from small numbers of individuals and populations.

Past and current land use practices on Santa Rosa Island have been identified by U.S. Fish and Wildlife Service as a factor contributing to the rarity and possible extirpation of the 10 Santa Rosa species proposed for listing as endangered. Under the No Action alternative, the continuation of current level and extent of grazing/browsing on Santa Rosa Island will continue to degrade habitat, restrict population size, restrict geographical range, reduce recruitment, prevent re-establishment, and diminish long-term viability for the 10 plant species proposed for listing as endangered by USFWS. These effects will not be abated until non-native ungulates are removed from the island in 2011. As a result, some populations may become extirpated from Santa Rosa Island. When combined with current and past adverse effects to proposed species on other northern Channel Islands, these comprise significant, heavy, adverse cumulative effects on proposed species under the No Action alternative.

Although significant past and present effects on western snowy plover, California brown pelican and peregrine falcon populations on a regional and national level have led to their designation as threatened or endangered, implementation of this No Action alternative will result in negligible cumulative effects on these listed species. Recovery of populations of the latter two species in the Southern California Bight will occur regardless of the alternative chosen in this plan. There are now about eight successful breeding pairs of peregrines which nest annually on the northern



Channel Islands. Although Channel Islands peregrines still exhibit reproductive and survival problems due to accumulation of organochlorines, USFWS has proposed that peregrines be removed from the list of threatened and endangered species due to overall recovery of the species (Federal Register 60 [126]:34406-409). Cumulative effects on western snowy plover will also be negligible. Although plover nesting habitat in Old Ranch Pasture would continue to be protected by a cattle exclosure under the No Action alternative, nest failure at Skunk Point may remain high due to high winds and predation, and the site may not add significantly to plover production over the range of the species.

Past grazing by non-native ungulates on Santa Rosa Island has led to the trampling of some cultural resources. These resources would continue to experience occasional trampling under the No Action alternative. In other areas of the Channel Islands, removal of non-native ungulates has resulted in protection of cultural resources from trampling, although the effects of current pig rooting and sheep grazing on cultural resources on Santa Cruz island are unknown. Thus, the cumulative impacts to cultural resources at the Park under this alternative would be significant due to the continued trampling of archeological sites on Santa Rosa Island.

### **Mitigation Required**

Not applicable, since no actions are proposed.

## **ALTERNATIVE B: MINIMAL ACTION**

Alternative B, Minimal Action, is the implementation of management actions least likely to affect operations of the grazing and hunting permittee, but that would achieve moderate improvement in water quality in three pastures. This would be accomplished by the immediate closure of Old Ranch Pasture to cattle, and the construction of small riparian exclosures (20 to 80 acres in size) in drainages in two other pastures. Grazing and browsing pressure on rare plants would be reduced by the closure of Old Ranch Pasture and the removal of the island's deer herd over a five year period. The weed management program would be increased as funding allows, in order to address weed management problems on Santa Rosa Island.

## **Natural Resources**

### **Soils**

Under this alternative, there would be heavy effects on soils, as described under the No Action alternative, for all pastures except Old Ranch. In the latter, there would be substantial beneficial effects on soils. Removal of cattle from that pasture would remove the impacts of grazing cattle on soil resources. In Old Ranch, there would thus be decreased trampling of soils, resulting in increased soil stability, increased water availability for vascular plants, and decreased soil loss; increased nutrient availability to plants; and decreased vegetation loss.

Effects on soils in other pastures would not change under this alternative. These impacts would not be reduced until grazing ends in 2011. Stabilization and recovery of those soils should subsequently occur.

### **Water Quality and Riparian Areas**

Under the Minimal Action alternative, there would be substantial beneficial effects on riparian areas and water quality within exclosures, and overall, in pastures with exclosures (Pocket Field and North). Water quality within the exclosures, as well as immediately down stream, would also likely improve.

Under this alternative Old Ranch pasture would be closed to cattle, but brood mares would be allowed to remain. The closure of Old Ranch Pasture would likely have substantial beneficial effects on riparian areas, as well as on water quality. Within all of these areas where cattle are excluded, riparian vegetation would likely grow rapidly if appropriate vegetation and/or seed sources are available. However, most riparian areas on the island are devoid of native riparian plants. In these situations restoration efforts would likely be required. Whether recovery occurs naturally or with the assistance of restoration, vegetative cover along stream banks would likely increase. This will have substantial, beneficial effects on riparian areas. The increase in cover would facilitate stabilization of stream banks. As riparian cover increases, sediments would likely be trapped by the vegetation, forming new stream banks and point bars. This in turn would likely provide new riparian habitat. As the process continued, stream width would likely decrease, while stream column depth would increase with the result being narrower and deeper streams.

The improvement in riparian habitat and channel morphology would have substantial, beneficial effects on water quality, which would markedly improve. This would be especially true in Old Ranch Pasture, where a longer segment of the stream would be protected from the effects of unrestricted cattle grazing. With a narrower and deeper stream column, water temperatures would likely decrease. Establishment of shrubby and woody riparian vegetation would likely contribute to this process by providing shade for the stream waters. Suspended sediment levels during storm events would likely not rise as high within excluded areas. Fecal inputs from cattle would likely cease entirely within the exclosures, but some coliform bacteria would likely drift downstream. Newly established riparian vegetation would likely filter out much of the nutrient inputs flowing downstream into exclosures. Water quality would also likely improve immediately downstream of exclosures. But these beneficial effects would likely quickly dissipate downstream due to the condition of the riparian areas within unprotected areas, as well as the continued unregulated access (and therefore inputs) of cattle.

Ten of the 16 streams on the island would not be protected from the effects of unrestricted cattle grazing under this alternative. Effects on those stream reaches would be the same as described for unprotected riparian areas under the No Action alternative.

## Vegetation

### Exclusion of Cattle from Old Ranch Pasture

The removal of cattle from Old Ranch Pasture will have substantial, beneficial impacts on the vegetation communities in that pasture. Coastal sage scrub and chaparral are two plant communities occurring in Old Ranch Pasture that are habitat for many Park Species of Concern. Effects on coastal sage scrub would be substantial and beneficial. Because cattle are known to browse soft shrubs, such as those that occur in coastal sage scrub, removal of the cattle may lead to improved condition of this community. Removal of cattle would likely have little impact on chaparral. Coastal dune scrub is known to provide habitat for eight of the 10 proposed species. The coastal dune scrub community would likely benefit from the removal of the de-stabilizing effects of trampling and consumption of soil-binding vegetation.

The current impacts of grazing on the marsh in Old Ranch Pasture, a unique habitat on Santa Rosa Island, are unknown. The consequences of removing cattle grazing and trampling is also unknown, but are likely to be beneficial, since cattle grazing and trampling of marsh vegetation would cease.

Portions of Old Ranch House Canyon, Quemada Canyon, and the upper and lower marsh have heavy thistle infestations. Species present include bull thistle, milk thistle, and spiny cocklebur. Wildlife and livestock do not forage on these prickly species, so are not currently controlling their spread. It is unlikely that removal of cattle grazing from Old Ranch pasture will cause any increase in extent or density of these weeds. Removal of trampling may lead to reduced spread of these opportunistic species due to decreased presence of disturbed ground for seedling establishment.

### Construction of Exclosures

Construction of small riparian exclosures will have positive but limited effects on vegetation. Placement of exclosures around existing native riparian species will protect them from cattle grazing and trampling. This may allow an increase in individual size as well as population size. The exclosures will not prevent grazing, browsing, and trampling by deer and elk. The vegetation within exclosures may become more appealing than outside vegetation, attracting more use by deer and elk. This may prevent any further development of those species favored by deer and elk.

Exclusion of cattle from sections of riparian corridors is likely to have little or no effect on weed populations in those corridors. Perennial weed populations within the exclosures may initially increase with the removal of trampling and grazing. Native vegetation may outcompete and replace opportunistic weeds in a short time. More persistent weeds may take decades to disappear naturally.



## Removal of Deer

Removal of deer from Santa Rosa Island will have substantial, beneficial effects on vegetation. likely allow recovery of shrubs and trees that are browsed by deer, including the proposed species *Arctostaphylos confertiflora*. *Castilleja mollis* will no longer be dug up and eaten. In addition to benefits to individual species, removal of deer will allow widespread recovery of shrub and woodland communities, which provide habitat for many rare species. Woodland and shrub communities will likely experience increased recruitment of juveniles and develop more complex understories. Soil erosion may be reduced and, in the long term, stabilization may occur as the native microphytic crust is re-established.

It is unknown whether deer are consuming and thereby controlling or spreading any weed species of concern. Removal of deer is likely to decrease trailing and subsequent soil erosion in shrublands. This may slow the spread of weeds due to lack of bare soil for seedling establishment.

An expanded weed management program would likely reduce the extent, density, and frequency of weed populations. An expanded weed management program would likely prevent the replacement of rare species by weedy species. It may facilitate the restoration of native plant communities where competition from aggressive exotic plants is adversely affecting those communities.

## Effects on Forage Production and Availability

As under the No Action alternative, forage utilization would likely remain patchy. Some areas, especially uplands, would likely be underutilized, while other areas, near water sources, would likely be overutilized. Riparian areas within SISTLEs would likely produce considerably more forage than adjacent riparian areas still subject to continuous grazing. Areas away from water would continue to be underutilized.

There are two main exceptions. The first is in Old Ranch Pasture, which under this alternative would be closed to cattle. Forage production would likely increase initially, especially for the perennial grasses like saltgrass (*Distichlis spicata*), and needle grass species like purple needle grass (*Nasella pulchra*). These, which are preferred by cattle, tend to be utilized fully within well-grazed areas of the pasture. Over a longer time interval (several decades), the grassland landscape within the pasture would slowly change into plant communities dominated by shrub species such as coyote bush (*Baccharis pilularis*) and California sagebrush (*Artemisia californica*). Ultimately this would lead to a net decline in forage. But in all likelihood, all non-native grazers and browsers would have left the island long before these changes would be noticeable.

Forage availability within Old Ranch Pasture is another story. Although there would be far more forage produced within the pasture, only elk and horses would have access to the pasture. For the first three years decreasing numbers of deer would also have access to the pasture and its forage. The net results would be that Old Ranch Pasture would produce far more forage than would be consumed by any herbivores.

The Park would continue to rely on the rank yield method to assess RDM for forage monitoring. The Park would also maintain the 400 lb./ac minimum RDM levels. This is the bare minimum recommended for annual grasslands. Grazing utilization leaving only this amount would likely have moderately adverse effects on perennial components of the island's grasslands, as well as on upland erosion.

## Wildlife

Under this alternative, the closure of Old Ranch Pasture to cattle would have substantial, beneficial effects on wildlife populations. Species breeding or utilizing habitat in Old Ranch Pasture include the western snowy plover, the endemic island fox, island spotted skunk, Channel Islands slender salamander and Santa Cruz gopher snake, as well as the Pacific tree frog and island deer mouse. Shorebirds and waterfowl feed on the invertebrate fauna within the lagoon, particularly during migration and wintering.

Small mammals which utilize Old Ranch Pasture would benefit from an increase in cover, seeds and other plant materials as the vegetation slowly recovers. Invertebrate populations within the pasture and lagoon would increase, which would then increase the food base for small mammals, shorebirds, waterfowl and lizards. Lizards would also benefit from an increase in cover. Passerine birds would benefit from an increase in nesting and roosting habitat as well as an increase in the understory and seed plants. Predators, including the gopher snake and birds of prey, would benefit from the increase in mice, lizard, and passerine bird populations.

The creation of small riparian exclosures, or SISTLES, is intended to restore riparian functions to stream segments, and would also have localized benefits for wildlife. Healthy riparian areas tend to support more wildlife species than non-healthy riparian areas, and studies have shown that some of the highest densities of breeding birds in North America occur in riparian habitats. More than 60% of the vertebrates in the arid Southwest are riparian obligates (they occur only in this habitat type), while another 10-20% of the vertebrates are facultative users (present for a portion of the annual cycle but not fully dependent on riparian habitats) of streamside vegetation (Cooperider et al. 1986). Recovery of riparian areas may be beneficial to island spotted skunks, which generally prefer ravines to grassy habitat types (Crooks 1994). Amphibians are much more dependent on riparian areas than are reptiles, due to the fact that amphibians are aquatic or semi-aquatic and lay open-eggs (nonshelled) in water or very moist areas (Cooperider et al., 1986, pp.182).

However, because of the relatively small size of the SISTLES (10 to 80 acres) their value to native wildlife is limited. It has been shown that stands of 28 ha (70 a.) only begin to fill the habitat requirements of some bird species, allowing establishment of a few breeding pairs at best (Cooperider et al. 1986, pp. 175). Considering the species which breed on Santa Rosa and as well as the relative importance of riparian areas, SISTLES of the proposed size might harbor closer to 6-12 breeding pairs of passerines.

Continuity of riparian vegetation along the floodplain is extremely important to small mammals, reptiles, and amphibians. Small, discontinuous block, such as those proposed in this alternative, may not fulfill the needs of many of these species. An important feature of riparian zones is their use as corridors for dispersal and genetic continuity between populations. The maintenance of continuous riparian ecosystems is important to help maintain genetic heterogeneity (Cooperider et al. 1986).

The elimination of deer would significantly reduce browse pressure on the chaparral and other habitats. Under this alternative, elimination or reduction of deer should result in a direct and moderately beneficial impact to wildlife populations.

Shrubs and understory plants that are currently utilized by deer would increase when deer are removed, resulting in an increase in plant species preferred by other wildlife. The amount and type of vegetation that would eventually be reestablished is unknown; however, an increase in shrubs and in the understory would be expected.

The island fox, island spotted skunk and deer mouse would benefit from increased cover. In addition, as the understory slowly recovers, the invertebrate populations should increase, which would thus increase the food base for the fox, skunk, and mice. Birds would benefit from an increase in nesting and roosting potential as well as an increase in the understory and seed plants. Lizards would benefit from an increase in cover as well as from the increase in invertebrate/prey populations. Predators, including the gopher snake and birds of prey, would benefit from the increase in mouse and lizard populations.

The deer removal operations would have no permanent impact on native wildlife. Direct disturbances could be caused by people conducting capture and/or hunting operations. These impacts would be short term in nature.

### **Rare Species and Their Habitats**

Removal of cattle from Old Ranch Pasture would have substantial, beneficial effects on some populations of proposed plant taxa. Six of the ten plant species proposed for listing by USFWS occur presently or have occurred in the past in Old Ranch Pasture. This is the highest concentration of proposed species in any of the pastures. Plants proposed for listing that occur in Old Ranch pasture are *Dudleya blochmaniae* ssp. *insularis*, *Dudleya* sp. nov., *Gilia tenuiflora* ssp. *hoffmannii*, and *Heuchera maxima*. Proposed species that formerly occurred in Old Ranch that are no longer found there are *Berberis pinnata* ssp. *insularis* (no longer found on the island) and *Phacelia insularis* ssp. *insularis* (does occur in Carrington pasture).

Removal of cattle from Old Ranch pasture would likely benefit all the proposed species that occur there. The elimination of grazing and trampling would likely lead to an increase in the vigor and reproductive success of existing plants and facilitate the expansion of all proposed species populations. Removal of cattle would also decrease the need for vehicles to be in the pasture, reducing the possible occurrence of damage from vehicles.



Western snowy plover nesting habitat on Skunk Point is currently protected by a cattle enclosure fence. However, the wetlands of Old Ranch House Canyon Lagoon, Oat Point, and Old Ranch Canyon creek are important forage areas for western snowy plovers, and are currently only partially protected by the cattle enclosure fence. Plovers occasionally breed in the marsh and lagoon areas. The closure of Old Ranch Pasture and removal of cattle from the area would thus have a slight but positive effect on snowy plovers.

Removal of deer from the island is likely to substantially benefit the proposed species that are believed to be affected by deer browsing: *Berberis pinnata* ssp. *insularis*, *Arctostaphylos confertiflora*, *Arabis hoffmanii*, *Helianthemum greenei*, and *Castilleja mollis*. These species would no longer be subject to browsing by deer, and may consequently exhibit successful reproduction and recruitment, and may expand in geographical range.

Under this alternative, as under all alternatives, NPS would request consultation with USFWS regarding possible effects on listed species, and would request conference regarding possible effects on proposed species. NPS will work with USFWS to arrive at appropriate mitigation measures to avoid impacts to listed and proposed species.

## **Cultural Resources**

### **Archeological Resources**

Closure of Old Ranch Pasture to cattle would have substantial beneficial effects on archeological resources in that pasture. The exclusion of cattle would eliminate cattle impact to the archeological sites in this area, which could include the remains of the first island ranch structures.

Construction of fencing for riparian exclosures may potentially damage the numerous archeological sites on the island and disrupt the historic landscape. However, impact can be reduced by carefully controlling and monitoring this process. No new roads will be constructed in order to place exclosures in drainages. Archeological clearance will be obtained, and the actions will be subject to compliance under Section 106 of the National Historical Preservation Act (NHPA). If archeological sites are unearthed during fence construction, work will be stopped, the Park archeologist will be consulted, and his recommendations will be followed.

### **Historical Resources**

This alternative would have no effect upon historical structures or their surrounding historic landscape preservation area, since fencing and water developments would not be constructed near historic structures.

## **Cultural Landscape**

Within Old Ranch Pasture, the removal of cattle would replace the current cultural landscape with a landscape more nearly resembling the prehistoric cultural landscape. Since a cultural landscape study has not been completed, it is unknown what effect this would have on potential cultural landscapes. For the same reason, construction of small riparian exclosures would have unknown effects on the cultural landscape. The remainder of the cultural landscape would be substantially unaffected.

## **Ethnography**

Removal of cattle from the Old Ranch pasture would have slight, beneficial effects on ethnographic resources. Exclusion of cattle from Old Ranch would return a more traditional appearance to a portion of the island. Reduction of erosion should reduce the rate at which burials are exposed. Historic Chumash villages in the Old Ranch pasture would be less impacted by erosion.

## **Socioeconomic Resources**

### **Regional Economic Environment**

Implementation of this alternative would have negligible effects on the regional economic environment. The marginal effect on the permittee's operation would represent an insignificant change to regional agriculture/ranching. The removal of deer hunting, likewise, would have negligible effects on the regional economic environment.

### **Visitor Use**

Under the Minimal Action alternative, there would be slight positive effects on visitor use and the visitor experience. Visitor activities currently stress low-impact, low-volume activities. Due to the Park's mandate for low visitation, this approach would not change under this alternative, nor would visitor use in general on Santa Rosa Island. Recreational opportunities in Old Ranch Canyon could possibly increase under this alternative, if access is less restricted after closure of the pasture to cattle (visitors are currently not allowed access to most of the island unless escorted by a Ranger). In addition, visitors may enjoy their visit more if recovery of the riparian area and uplands in Old Ranch Canyon occurs.

Removal of deer may have both positive and negative effects on the visitor experience. On one hand, removal of the deer will allow eventual recovery of chaparral and coastal sage scrub communities, and visitors may find their island experience more pleasurable because of this. On the other hand, some visitors may find their island experience less pleasing if the deer are not

present. The recovery of native shrub and woodland habitats would outweigh the latter, and the overall effect on the visitor experience is likely to be positive.

Construction of small riparian exclosures is likely to have negligible effects on the visitor experience. Visitors may not come in contact with many of the exclosures, due to the limited visitor access to the island. Those who do view the exclosures may find the fences unattractive, but may enjoy seeing recovered riparian areas.

### **Grazing/hunting Permittee**

This action would slightly alter the current operations of the permittee, resulting in a slight adverse impact. The permittee would no longer be able to stock Old Ranch Pasture with cattle. This represents a 7% reduction in the islandwide stocking rate. Any remaining heifers from Old Ranch Pasture would likely be moved to Pocket Field (the other heifer pasture). The reduction in islandwide stocking rate would lead to a commensurate decline in ranch profits.

The construction of SISTLEs would likely have little if any affect on ranch operations. The exclosures would likely be so small as to not affect the stocking rates within any pasture. Cattle would likely still have easy access to water within streams. During inventory and round-up, vaqueros would likely have to take measures to avoid SISTLEs.

Vail and Vickers would incur a loss of commercial hunt revenue due to removal of the deer, though they would retain the revenue from the elk portion of the hunt. Additionally, Vail and Vickers would incur the expense of removing the deer from the island.

### **NPS Operations**

There would be slight, adverse effects on Park operations from implementation of this alternative. The Park would lose any revenue from the grazing fees for the stock that previously grazed in Old Ranch Pasture. The Park would also bear the costs of any increased monitoring costs (riparian or water quality) and any increase in weed eradication efforts.

### **Wilderness**

Wilderness values will remain unaffected by implementation of this alternative. Santa Rosa Island will remain unsuitable for wilderness designation until sometime after 2011, when grazing has been removed and restoration efforts have been completed.

### **Summary**

Under implementation of the Minimal Action alternative, the closure of Old Ranch Pasture to cattle grazing would have substantial, beneficial effects on resources in that pasture, including soils, water quality and riparian areas, vegetation, wildlife, rare species and their habitats, and



archeological sites. Water quality, riparian areas, and vegetation would improve in Old Ranch Pasture, and grazing threats to rare species in that pasture would be eliminated.

Removal of the deer will have substantial beneficial effects on vegetation and rare species and their habitats. Removal of the deer will eliminate browsing pressure on several rare plant species islandwide, and will encourage recovery of shrub, chaparral and woodland communities.

Construction of small riparian exclosures (SISTLE's) will have substantial, beneficial effects on resources in the exclosures, including soils, water quality and riparian areas, vegetation, and wildlife. The combination of closing Old Ranch Pasture to cattle grazing and construction of SISTLE's in Pocket Field and North Pastures would markedly improve water quality and the condition of riparian areas in those pastures, which comprise 30% of the island. Consequently, six of the island's 16 second-order drainages would improve in water quality and riparian condition/function.

Effects on the permittee would be slightly adverse, due to overall loss of grazing capacity, loss of revenue from deer hunting, and costs of removing the deer. Effects on NPS operations would also be slightly adverse, due to implementation costs (construction of riparian exclosures, weed management, etc.)

Effects in pastures other than Old Ranch Pasture would be similar to the effects identified under the No Action alternative. There would continue to be heavy effects on water quality and riparian areas in South Pasture, and in streams in North and Pocket Field that are not protected by exclosures. In pastures other than Old Ranch, there would continue to be heavy effects on vegetation, rare plants and habitats, and on soils (where livestock congregate and trail). There would be moderate effects on weed management, wildlife, and archeological resources.

Under this alternative, there would be slight, beneficial effects on visitor use. There would be no effect on historical resources, unknown effects on cultural landscapes, negligible effects on the regional economic environment, and no effect on wilderness values.

Impacts to rare species will be avoided by implementation of mitigation measures derived from consultation and conference with U.S. Fish and Wildlife Service.

Identified effects would continue until cattle grazing ceases in 2011.

### **Cumulative Effects**

On other islands in the Park, past sheep and cattle grazing have led to heavy impacts on soils (Brumbaugh 1980, Johnson 1980). These impacts include intense hillside gully development and loss of soil from wind and water erosion, due to direct and indirect effects of sheep and cattle grazing, as well as loss of microphytic crust. These impacts have largely abated now that sheep and cattle are gone from these islands. Heavy, adverse effects have occurred to soils on Santa Rosa Island as a result of past and current ranching operations. Under this alternative, the closure of Old Ranch Pasture and the construction of riparian exclosures will have substantial

beneficial impacts on soils. However, the cumulative impact of this alternative will be offset by adverse impacts to soils in other areas of the island and the Central Coast area.

Other past, present and future actions affecting water quality and riparian areas in the Central Coast region include the ongoing impacts of ranching activities throughout the Central Coast Region (this region includes Santa Cruz, Santa Clara, San Benito, Monterey, San Luis Obispo and Santa Barbara counties). The water quality problems identified for Santa Rosa Island (discharge of bacteria and sediment) are common among other rangelands in the Central Coast Region (Michael Thomas, Central Coast Regional Water Quality Control Board, personal communication, April 26, 1996). Although the CCRWQC Board has been working with the USFS to incorporate BMPs for water quality improvement into allotment management plans on the Los Padres National Forest, BMPs are not yet in place for most of these rangelands. As a result, there are ongoing, adverse impacts to water quality and riparian areas in other areas of the Central Coast region. If BMPs are implemented on these rangelands, these adverse impacts may be reduced.

As stated in this draft EIS, past grazing by the current permittee on Santa Rosa Island has rendered many drainages non-functional as riparian areas (Rosenlieb et al. 1995). The closure of Old Ranch Pasture to cattle and the construction of small riparian exclosures would begin to restore riparian function to Santa Rosa Island drainages, and would be a substantial, beneficial effect on water quality. Therefore, under Minimal Action there would be a slight positive cumulative effect on water quality in the Central Coast Region.

Other past, present and future actions affecting vegetation, which are detailed in the cumulative effects section of the No Action alternative, mainly result from past ranching activities on other northern Channel Islands and ongoing feral pig and sheep damage on Santa Cruz Island. In general, these actions have caused widespread conversion of native shrublands and perennial grasslands to communities dominated by non-native annual grasses and weeds. Though annual grassland will continue to dominate the island under this Minimal Action alternative, the removal of deer would reduce browsing pressure on shrub communities, and chaparral and coastal sage scrub may begin to recover. Additionally, vegetation communities in Old Ranch Pasture would begin to recover. Recovery of chaparral and coastal sage scrub communities on Santa Rosa could add substantially to the extent of those communities on the northern Channel Islands. Chaparral currently occupies about 18,000 acres on Santa Cruz Island, and 2,600 acres on Santa Rosa. Removal of deer would also reduce browsing pressure on Bishop pine woodland, which on the islands, only occurs on Santa Cruz and Santa Rosa Island. Thus, implementation of this alternative would have substantial beneficial cumulative effects on shrub and woodland communities of the northern Channel Islands.

The effects on wildlife of past and future grazing on Santa Rosa Island are unknown because habitat preference and utilization remain unknown for species such as the Channel Island spotted skunk and the Santa Cruz gopher snake. However, grazing has probably diminished habitat for the skunk, which may prefer riparian areas and upland shrub habitats (Crooks 1985). Similar effects on habitat for the Santa Cruz gopher snake include the maintenance of open annual grasslands and reduction of shrub communities; these conditions may increase the risk of predation for snakes and may adversely affect the prey base.



The status of the island spotted skunk and Santa Cruz gopher snake on Santa Cruz Island is unknown. Although habitat is generally better on Santa Cruz due to increased cover and greater areal extent of shrub communities, current feral pig rooting and sheep grazing on Santa Cruz may decrease or limit available habitat for both island spotted skunk and Santa Cruz gopher snake. The effects of this limitation of habitat for both species, when combined with the limitation of habitat on Santa Rosa, are unknown. Since these two taxa are limited in geographic range to Santa Cruz and Santa Rosa Islands, the status of the skunk and the snake would not change under this alternative. Limitation of habitat will continue on both islands until ungulates are removed and shrub and riparian habitats begin to recover and expand. Implementation of this Minimal Action alternative would have slight beneficial effects on these species in Old Ranch Pasture (due to removal of cattle from that pasture) but would have little overall effect on these species.

Heavy, significantly adverse impacts to rare species and their habitats are the result of the combined effects of past and current grazing and browsing by non-native ungulates. These effects are not limited to Santa Rosa Island, but have occurred on all of the northern Channel Islands, and are discussed under the Cumulative Effects section for the No Action alternative. Past and current land use practices on Santa Rosa Island have been identified by U.S. Fish and Wildlife Service as a factor contributing to the rarity and possible extirpation of the 10 Santa Rosa species proposed for listing as endangered. Under the Minimal Action alternative, the closure of Old Ranch Pasture to cattle grazing and the removal of deer from the island would result in significant beneficial effects on rare species, thus beginning to reverse the negative cumulative effects of past land use practices. Of the 10 species proposed for listing as Endangered, four occur only on Santa Rosa, and thus the actions proposed under this alternative would benefit each taxon over the entire range of its distribution. Four other species are extant on Santa Rosa and occur or previously occurred on other islands. These taxa would accrue benefits for a portion of their range or former range. The two remaining species are thought to be extirpated on Santa Rosa Island, but are known to occur on other islands. These taxa would also accrue benefits for a portion of their range or former range. The benefits to Santa Rosa species from implementation of this alternative would comprise a significant beneficial effect on rare species on the northern Channel Islands.

Although significant past and present effects on western snowy plover, California brown pelican and peregrine falcon populations on a regional and national level have led to their designation as threatened or endangered, implementation of this Minimal Action alternative will result in negligible cumulative effects on these listed species. Recovery of populations of the latter two species in the Southern California Bight will occur regardless of the alternative chosen in this plan. There are now about eight successful breeding pairs of peregrines which nest annually on the northern Channel Islands. Although Channel Islands peregrines still exhibit reproductive and survival problems due to accumulation of organochlorines, USFWS has proposed that peregrines be removed from the list of threatened and endangered species due to overall recovery of the species (Federal Register 60 [126]:34406-409). Cumulative effects on western snowy plover will also be negligible. Although plover nesting habitat in Old Ranch Pasture would be protected by closure of Old Ranch Pasture to cattle grazing, nest failure at Skunk Point may



remain high due to high winds and predation, and the site may not add significantly to plover production over the range of the species.

Moderate, significantly adverse effects on cultural resources have occurred due to effects of past trampling by non-native ungulates. Under this Minimal Action alternative, future cattle trampling in all pastures but Old Ranch would exacerbate damage to archeological sites from past and current grazing, and from past rooting by feral pigs. Indirect cumulative effects on archeological sites in all pastures but Old Ranch include further loss of cultural materials from sites due to erosion, which is exacerbated by the effects of ungulates on vegetation.

Under this Minimal Action alternative, cumulative effects on the permittee (ranch operations) would be slightly adverse, due to economic impacts such as loss of overall grazing capacity on the island, and costs incurred from removing the deer.

### **Mitigation Required**

Under implementation of the Minimal Action alternative, mitigation would be required to prevent damage to archeological sites from fencing construction for small riparian exclosures. Construction of fencing for riparian exclosures may potentially damage the numerous archeological sites on the island and disrupt the historic landscape. However, impact can be reduced by carefully controlling and monitoring this process. No new roads will be constructed in order to place exclosures in drainages. Archeological clearance will be obtained, and the actions will be subject to compliance under Section 106 of the National Historical Preservation Act (NHPA). If archeological sites are unearthed during fence construction, work will be stopped, the Park archeologist will be consulted, and his recommendations will be followed.

Visitor use and access would need to be controlled while deer removal is occurring. NPS would also need to oversee removal operations to insure no impacts to other resources from vehicles, etc. Therefore, NPS will require the permittee to submit a detailed removal plan, with timetable, subject to NPS approval. NPS staff will be on hand to oversee removal activities.

To avoid impacts to listed and proposed species, the Park would implement any mitigation measures derived through consultation and conferencing with USFWS.

### **ALTERNATIVE C: TARGETED MANAGEMENT ACTION (THE PROPOSED ACTION)**

Alternative C, Targeted Action, is the implementation of a combination of management actions intended to achieve significant improvement in water quality in two pastures. This would be accomplished by the closure of Old Ranch Pasture to cattle and horses, and the implementation of rotational grazing in North Pasture. The latter would be split by construction of a fence along the Smith Highway, and the riparian areas in the lowland areas (Brockway Pasture) would not be grazed during the hot season. To facilitate summer grazing in the upland portion of North (Black Mountain Pasture), three water developments would be constructed. Grazing and browsing pressure on rare plants would be reduced by the closure of Old Ranch Pasture and the removal of the island's deer herd over a three year period, as well as a slight reduction in the

island's elk herd. Small riparian exclosures would be used as restoration tools and to protect key riparian resources. Minimum Residual Dry Matter (RDM) standards would be raised to protect upland areas. The weed management program would be increased as funding allows, in order to address weed management problems on Santa Rosa Island.

## **Natural Resources**

### **Soils**

Under this alternative, there would be substantial beneficial effects on soils in Old Ranch Pasture. Removal of cattle from that pasture would remove the impacts of grazing cattle on soil resources. In Old Ranch, there would thus be decreased trampling of soils, resulting in increased soil stability, increased water availability for vascular plants, and decreased soil loss; increased nutrient availability to plants; and decreased vegetation loss.

Effects on soils in other pastures would not change under this alternative, except for the following. Increase of Residual Dry Matter (RDM) standards from 400 lb./ac to 1000 lb./ac will protect upland soils from erosion by maintaining more standing biomass (RDM) prior to the onset of fall/winter rains, and will result in moderately beneficial effects on soil resources. However, erosion may be greater on slopes in riparian areas and near the proposed water developments in Black Mountain Pasture, due to increased concentration of livestock in these areas. Increased seasonal stocking density in riparian areas in Brockway and Black Mountain may increase local erosion in these areas. If cattle and/or elk and deer are attracted to the small riparian exclosures, then there may be increased erosion from trampling in these areas. These impacts to soils would not be reduced until grazing ends in 2011. Stabilization and recovery of those soils should subsequently occur.

### **Water Quality and Riparian Areas**

Under implementation of Targeted Management, there would be substantial, beneficial effects on water quality and riparian areas due to three actions. The first would be the closure of Old Ranch Pasture. The second would be the creation of riparian exclosures throughout the island. The third would be the implementation of a rotational grazing system in the split North Pasture. Each action would likely have substantial, beneficial effects on riparian vegetation, stream bank stability, hydrologic functioning, and water quality.

Within all of these areas where cattle are excluded (Old Ranch Pasture and the small riparian exclosures), substantial beneficial effects are the same as described under the previous alternative: recovery of riparian vegetation, stabilization of stream banks, and improvement in water quality. Restoration may be required if native vegetation or seed sources are inadequate for natural recovery.

Riparian areas within the new Brockway Pasture would also likely improve, although the rate of recovery would probably not be as fast as in areas excluded to cattle. Under the proposed action,



Brockway Pasture would be rested throughout the summer drought, when cattle utilization of riparian areas is usually highest. The summer rest would likely allow existing riparian vegetation to recover from the effects of defoliation and trampling. Because riparian vegetation has access to water, the lack of rainfall would not inhibit summer growth. In many cases where there is riparian vegetation nearby or seed sources upstream, new riparian vegetation may become established in current bare areas. As riparian vegetative cover increases, stream banks would likely become more stable. The stabilized banks would be less likely to erode during storm events. Expanding riparian vegetation would likely trap suspended sediments, creating more riparian habitat. Stream channels would likely become more narrow and deep. These are all the same recovery processes which would occur in areas where cattle have been excluded. The rate and extent of recovery would likely be much slower than in those areas totally excluded to cattle grazing.

During the winter months, when Brockway Pasture would be grazed, the riparian areas would likely receive greater grazing pressure than they currently do. This is because there would be twice as many animals grazing in the pasture than currently graze during the winter. Fortunately, cattle are well dispersed through the pasture during the winter rain season when the upland forage is green. It is during the hot, dry summer months that cattle use of riparian areas increases dramatically.

Overall effects on water quality and riparian areas in Brockway Pasture would be substantial and beneficial, due to warm season rest of that pasture.

Water Windmill and Cherry Canyons in Black Mountain Pasture would likely experience the brunt of the increased use of riparian areas during the summer months. Under the proposed action twice as many cattle would graze Black Mountain Pasture during the summer drought. Cattle would most likely spend a disproportionate amount of time in riparian areas.

To mitigate this eventuality, three water developments would be constructed. The water developments would be placed in locations to encourage cattle to leave riparian areas and take advantage of upland forage. Two SISTLEs would also be constructed to protect small stretches of streams within the pasture. Black Mountain Pasture would not be grazed during the cool winter season, and stream reaches within the pasture would likely recover somewhat during the period of rest. Riparian vegetation would likely recover to a certain degree during rest. Water quality would also likely improve during rest. Urine and fecal inputs would cease, leading to less nutrients available for *Cladophora* algae. Fecal coliform levels would also likely drop as well. But the rate of recovery would likely be far less than what would be expected in excluded areas or stream reaches within the Brockway pasture.

Despite the mitigation efforts, many of the stream reaches within Black Mountain Pasture would likely receive more grazing pressure than they currently do, and overall effects on water quality and riparian areas would be slightly adverse, compared to current impacts. This would likely offset many of the gains made by riparian areas during the summer rest, inhibiting recovery. Existing riparian vegetation cover may even be reduced, leading to further destabilization of stream banks. Sediment loads would likely remain high during storm events, indicating continued accelerated levels of erosion within affected watershed. The stream water column



would likely remain unnaturally shallow and wide. Fecal and urine inputs into stream waters would likely increase dramatically during the summer grazing season. Coliform levels would likely exceed standards for the water contact recreation (REC-1) beneficial use.

Stream reaches within the South and Pocket Field pastures would receive minimal additional protection. Several drainages would have SISTLEs constructed within them, but the amount of stream corridor protected would be relatively small. Consequently, the majority of the stream reaches within these drainages would likely suffer from the same effects described for unprotected streams under the No Action alternative.

Overall, though, the gains in riparian area protection and improved water quality under Targeted Management would likely outweigh the deleterious impacts of summer seasonal grazing in Black Mountain Pasture and continuous grazing in Pocket Field and South Pastures. Closing Old Ranch pasture, implementing winter seasonal grazing in Brockway Pasture, and constructing SISTLEs throughout the island would result in substantial beneficial effects on water quality and riparian areas.

## Vegetation

Effects on vegetation from the closure of Old Ranch Pasture to cattle and horses, from establishment of small riparian exclosures (SISTLE's), and from removal of deer are identical to the anticipated effects in Alternative B, with the following exceptions.

The removal of cattle from Old Ranch Pasture will have substantial, beneficial impacts on the vegetation communities in that pasture. Removal of horses will have the following effects. Horse use of Old Ranch Pasture is small in relation to cattle use. Horses are not known to browse coastal sage scrub. Otherwise, removing horses would likely provide small additional benefits of the same nature as removing cattle. Removing both would provide an increased opportunity for natural ecosystem processes to begin to re-establish in Old Ranch Pasture. An additional benefit of removing horses from Old Ranch Pasture is the reduced opportunity for introduction of fennel by horses from other pastures.

Construction of small riparian exclosures will have positive but limited effects on vegetation. Effects will be less than under the Minimal Action alternative, only nine exclosures would be constructed (compared to the 15 that would be constructed under the Minimal Alternative).

## Division of North Pasture and Implementation of Rotational Grazing

The division of North Pasture and the implementation of rotational grazing between Brockway and Black Mountain Pastures, overall, is likely to have negligible effects on vegetation:

Construction of the fence is unlikely to impact any rare plant resources. Impacts to riparian areas will be avoided by careful siting and construction of fence in drainage bottoms.

Summer cattle use of Black Mountain Pasture will increase over pre-1997 levels, due to the cattle previously spending more time near the riparian areas in what will become Brockway

Pasture. Black Mountain Pasture will contain a significant portion of the island's chaparral and woodland communities and their many resident rare species. Intensified cattle use in this area has the potential to negatively impact rare plants in these communities, as well as degrade the communities themselves, due to increased browsing, trailing, and loafing in the shade of these communities. These effects would be mitigated by construction of water developments and an increase in Residual Dry Matter (RDM) standards from 400 to 1000 lb./ac. Construction of water developments will draw cattle away from riparian areas, and shrub and woodland habitats. Implementation of the 1000 lb./ac RDM standard may prevent these negative impacts. Depending on the time of shoot elongation of the woody species, warm season grazing may postpone browsing of these new shoots by cattle. This may result in improved vigor for shrubby species, especially when shoots are able to get beyond browsing's reach.

Relief from grazing and trampling during the growing season may allow riparian species to begin to establish in the Brockway Pasture canyons. The rate of establishment will depend on the amount of reproductive material (seeds and asexual propagules) present as well as the amount of new growth that survives the subsequent six month grazing season. Because the pasture will be grazed in the "cool" season (November 1 - April 30), which is also the season for greatest upland grass growth, it is possible that utilization of the riparian areas will be reduced from current levels. However, without upland water developments in Brockway pasture, it is likely that the riparian areas will continue to be areas of cattle concentration and impact. Additionally, without a period of initial rest (at least 2 years), it is likely that riparian vegetation will never get above the reach of grazing, and so will be unable to aid in improvement of either water quality or status of rare plant and animal species. In dry years, removal of grazing by May 1 may be too late to allow establishment of new riparian growth. Overall, there may be no difference from current effects on vegetation in Brockway Pasture.

Division of North Pasture and implementation of rotational grazing is likely to have little or no effect on weed species.

Construction of water developments in Black Mountain Pasture is likely to have the following effects on vegetation. Cattle and wildlife use in Black Mountain Pasture will likely become concentrated around the water developments. At the Round Top and Army Camp locations, this will likely not cause any discernible changes in vegetation since these are currently grasslands composed of alien annuals.

If deer are removed from the island concurrently with water development, this will prevent increased use of the area by those animals most likely to cause negative impacts. Cattle and elk may still cause measurable impacts, due to trailing, bedding, and some amount of browsing.

It is likely that thistle populations will establish in proximity to water developments.

#### Reduction of Elk Herd

Reducing the elk population will have moderately beneficial effects on vegetation. Elk are primarily grazers and so have many of the same effects on island vegetation as cattle. Additionally, elk have been implicated in predation on juvenile and mature *Pinus remorata*

(Bartolome 1991). Reducing the number of elk on the island would likely reduce grazing, browsing, and trailing impacts on rare species and their habitats.

### Increase in Residual Dry Matter Standards

Adjusting RDM standards (raise from 400 lb./ac to 1000 lb./ac) will have moderately beneficial effects on vegetation. Removal of cattle from a pasture when Residual Dry Matter declines to 1000 lb./ac instead of 400 lb./ac may allow for the expansion of perennial grasses and shrubs (*Baccharis pilularis*) into the annual grasslands. Coastal sage scrub, coastal bluff scrub, and lupine scrub communities may expand as cattle are removed from a pasture prior to their being "forced" to look for alternative forage. Such expansion would likely benefit the 3-dozen-plus Species of Concern that occur in these communities.

Increased residual biomass may reduce establishment of weeds due to lack of bare ground for seedling establishment.

### Forage Production and Availability

In South, Pocket Field, Lobo, Carrington and Wire Field pastures, implementation of Targeted Management would have little impact on forage production and availability, because forage production would not change from current levels. The increase in the minimum RDM would likely not affect forage production for annual species, and may lead to some increases in production for perennial species. Forage utilization through much of the island would remain patchy.

The effects on forage availability in Old Ranch Pasture due to closure of that pasture to cattle and horses would be generally as described under the previous alternative: increase in forage production, but available only to elk.

A major change in forage production and availability would result from the split of North Pasture. Under the proposed action, North Pasture would be split into two new pastures: Brockway and Black Mountain. Brockway Pasture would be grazed during the winter rainy season, whereas Black Mountain Pasture would be grazed during the summer drought. This new grazing system would likely affect production and utilization of forage in several ways.

Within Brockway Pasture, utilization may approximate forage production. There may be periods, particularly during the earliest portion of green-up, when there would be inadequate new forage to support the cattle herd. When grass seedlings first emerge, they are composed of up to 90% water. Cattle grazing upon this new tender forage would have to eat significantly more grass to obtain the equivalent dry weight forage. Cattle frequently lose weight during this time. This is why adequate amounts of residual dry matter will be critical. Leaving a minimum of 1000 lb./ac of RDM would likely ensure enough forage to sustain cattle through the early portion of green up. When the weather warms up, the grasses grow rapidly and the proportion of water within each blade decreases substantially. Grass biomass production would likely exceed utilization during the spring, and implementation of the 1000 lb./ac RDM levels would result in more biomass left at the end of the grazing season (in April) than is currently left. During the



summer drought Brockway Pasture would be rested. Although little forage production would occur in the uplands during the summer, perennial grasses such as alkali rye (*Leymus triticoides*), pacific rye (*L. pacifica*), and saltgrass (*Distichlis spicata*) would likely experience some summer regrowth. Vegetation within the riparian area would likely experience substantial regrowth during the summer rest. Riparian vegetation would have access to water and would likely respond well to the warm summer temperatures. Indeed, one of the goals of the rotational grazing system is to allow for significant summer growth during the summer rest from cattle grazing. Overall effects on forage would be moderate and beneficial.

Black Mountain Pasture would have an almost opposite pattern of production and utilization than that of Brockway Pasture. Under this alternative, Black Mountain Pasture would be rested during the winter rainy season and grazed during the summer drought. Annual grasses would germinate, grow, flower, set seed, and die before cattle would be turned out into the pasture. Perennial grasses would grow, flower, and set seed prior to being grazed. Studies have shown that perennial grasses have better survivorship and recruitment when grazed under a deferred grazing system, than if grazed during the spring. Cattle grazing Black Mountain Pasture would be eating cured forage almost exclusively. Although not as palatable, the cured forage usually maintains the majority of its nutrients. Overall effects on forage in Black Mountain would be moderate and beneficial.

## Wildlife

Effects on wildlife from the closure of Old Ranch Pasture to cattle and horses, from establishment of small riparian exclosures (SISTLE's), and from removal of deer are identical to the anticipated effects under Minimal Action. The closure of Old Ranch Pasture to cattle would have substantial, beneficial effects on wildlife populations. Establishment of small riparian exclosures would have localized, moderate beneficial effects on wildlife. Removal of deer would have moderate, beneficial effects on wildlife.

Under Alternative C, North Pasture will be split into two smaller pastures, Black Mountain and Brockway Pastures, and a seasonal rotational system will be implemented in those two pastures. Additionally, the minimum standards for RDM will be raised from 400 lb./ac to 1000 lb./ac. These changes in grazing management may be slightly beneficial to wildlife. Black Mountain Pasture is predominately an upland/grassland habitat, while Brockway Pasture contains significant reaches of riparian habitat. The amount and type of vegetation change which will occur in these pastures due to the rotational grazing strategy is unknown, so effects on wildlife habitat are largely unknown.

Wildlife utilization in Black Mountain Pasture may increase if habitat quality increases due to changes in grazing management. An increase in minimum RDM from 400 to 1,000 lb./ac may be accompanied by an increase in cover and seed grasses and an increase in invertebrates, which would increase the food base for fox, skunk, and mice. Birds would benefit from an increase in seed plants. Lizards would benefit from an increase in cover as well as from an increase in invertebrate/prey populations. Predators, including the gopher snake and birds of prey, would benefit from the increase in mouse and lizard populations.

However, if an increase in minimum RDM does not result in an increase in seed grasses and/or cover, most of the upland/grassland habitat will not be suitable for native terrestrial vertebrates, and there would be no beneficial effects in wildlife habitat from raising RDM standards. Invertebrate populations may still increase, thus increasing the food base for the fox and skunk. Mice and lizards would be able to utilize the increase in invertebrates along habitat edges, where some type of cover meets the open grassland. These edge habitats are where any benefit to predators would be seen.

The construction of water developments should have no permanent impact on native wildlife. Wildlife may use the water catchments when cattle are not using the area. The native wildlife are adapted to the existing availability of water on the island.

### **Rare Species and Their Habitats**

Effects on threatened and endangered species from the closure of Old Ranch Pasture to cattle and horses, from establishment of small riparian exclosures (SISTLE's), and from removal of deer are identical to the anticipated effects in Alternative B, with the following exceptions.

The closure of Old Ranch Pasture to cattle and horse grazing would have substantial, beneficial effects on rare plant populations in that pasture. Effects of horse grazing on rare plant populations in Old Ranch Pasture are unknown, but are thought to be much less than effects of cattle.

Removal of deer and reduction of elk (from 1100 to 450 animals) would have substantial, beneficial effects on rare plant populations, islandwide. The three year time frame for removal would reduce effects on rare species more quickly than the five year time frame under the previous alternative.

Intensified cattle use in Black Mountain Pasture, and around the proposed water developments may negatively impact rare plants in chaparral and woodland habitat, as well as degrading these communities themselves, due to increased browsing, trailing, and loafing in the shade of these communities. These possible adverse effects would be mitigated by construction of water developments to improve distribution of cattle, and the proposed increase in RDM standards.

Effects on western snowy plover from Alternative C are identical to the effects described for Alternative B.

Under this alternative, as under all alternatives, NPS would request consultation with USFWS regarding possible effects on listed species, and would request conference regarding possible effects on proposed species. NPS will work with USFWS to arrive at appropriate mitigation measures to avoid impacts to listed and proposed species.

## **Cultural Resources**

### **Archeological Resources**

As described under the Minimal Action alternative, closure of Old Ranch Pasture to cattle would have substantial beneficial effects on archeological resources in that pasture. The exclusion of cattle would eliminate cattle impact to the archeological sites in this area, which could include the remains of the first island ranch structures.

Construction of fencing for riparian exclosures may potentially damage the numerous archeological sites on the island and disrupt the historic landscape. However, impact can be reduced by carefully controlling and monitoring this process. No new roads will be constructed in order to place exclosures in drainages. Archeological clearance will be obtained, and the actions will be subject to compliance under Section 106 of the National Historical Preservation Act (NHPA). If archeological sites are unearthed during fence construction, work will be stopped, the Park archeologist will be consulted, and his recommendations will be followed.

A decrease in the elk population would decrease the minimal impact of elk on archeological sites. Vehicular traffic associated with the elk hunt would continue to offer the potential to impact archeological sites. There would effectively be no change from current conditions (No Action)

### **Historical Resources**

This alternative would have no effect upon historical structures or their surrounding historic landscape preservation area, since fencing and water developments would not be constructed near historic structures.

### **Cultural Landscape**

Within Old Ranch Pasture, the removal of cattle would replace the current cultural landscape with a landscape more nearly resembling the prehistoric cultural landscape. Since a cultural landscape study has not been completed, it is unknown what effect this would have on potential cultural landscapes. For the same reason, construction of small riparian exclosures would have unknown effects on the cultural landscape. The remainder of the cultural landscape would be substantially unaffected.

### **Ethnography**

Removal of cattle from the Old Ranch pasture would have slight, beneficial effects on ethnographic resources. Exclusion of cattle from Old Ranch would return a more traditional appearance to a portion of the island. Reduction of erosion should reduce the rate at which



burials are exposed. Historic Chumash villages in the Old Ranch pasture would be less impacted by erosion.

## **Socioeconomic Resources**

### **Regional Economic Environment**

Implementation of this alternative would have negligible effects on the regional economic environment. The slight adverse effect on the permittee's operation would represent an insignificant change to regional agriculture/ranching. The removal of deer hunting, likewise, would have negligible effects on the regional economic environment.

### **Visitor Use**

Under the Targeted Action alternative, there would be slight positive effects on visitor use and the visitor experience. Visitor activities currently stress low-impact, low-volume activities. Due to the Park's mandate for low visitation, this approach would not change under this alternative, nor would visitor use in general on Santa Rosa Island. Recreational opportunities in Old Ranch Canyon could possibly increase under this alternative, if access is less restricted after closure of the pasture to all livestock (visitors are currently not allowed access to most of the island unless escorted by a Ranger). In addition, visitors may enjoy their visit more if recovery of the riparian area and uplands in Old Ranch Canyon occurs.

The splitting of North Pasture into Brockway and Black Mountain Pastures may have both positive and negative effects on the visitor experience. Visitors may find the fence along Smith Highway to be an eyesore. Recovery of riparian areas in Brockway will enhance the visitor experience, but the higher stocking density in Black Mountain during the summer and the construction of water catchments in that pasture may somewhat diminish the visitor experience in this area of the island.

Removal of deer and reduction of elk may have both positive and negative effects on the visitor experience. On one hand, removal of the deer will allow eventual recovery of chaparral and coastal sage scrub communities, and visitors may find their island experience more pleasurable because of this. On the other hand, some visitors may find their island experience less pleasing if the deer are not present.

Construction of small riparian exclosures is likely to have negligible effects on the visitor experience. Visitors may not come in contact with many of the exclosures, due to the limited visitor access to the island. Those who do view the exclosures may find the fences unattractive, but may enjoy seeing recovered riparian areas.

Raising the minimum RDM level from 400 to 1000 pounds per acre may protect upland areas more, and no pastures would appear overgrazed. However, riparian areas in most pastures will still be heavily utilized, negatively affecting the visitor experience.

### **Grazing/hunting Permittee**

Implementation of the Targeted Action alternative would have a moderate, adverse impact to the permittee's operation, which would be slightly altered. The permittee would no longer be able to stock Old Ranch Pasture with cattle or horses. This represents a 7% reduction in the islandwide stocking rate. Any remaining heifers from Old Ranch Pasture would likely be moved to Pocket Field (the other heifer pasture). The 7% reduction in islandwide stocking rate would probably lead to a slight decline in ranch profits, though the actual amount of the decline is unknown.

The implementation of the rotational grazing strategy in the former North Pasture would most likely need a period of fine tuning, where stocking levels and timing are worked out. The timing of movement of cattle between the two new pastures was designed to coincide with existing ranch schedules. Currently the ranch begins roundup in April, and inventory in October. Rotation of cattle between the new Brockway and Black Mountain Pastures would occur at approximately the same time. The ranch may need to shift the schedule of which pastures are dealt with first, depending upon weather factors. For instance if forage on the north side of the island "browns out" (cures) early, then rotation from Brockway Pasture to Black Mountain Pasture may need to occur earlier than if the island receives late spring rains. The intent of the rotational grazing system is to fit into the existing calendar of events of the ranch on the island.

Raising the minimum RDM levels to 1000 lb./ac average per pasture would likely have a substantial impact on ranch operations during years of poor forage production (e.g. drought). In those years, more cattle may need to be taken off the island, or less shipped to the island, in order to meet the RDM standards. Effect on ranch profits is unknown, though would likely be commensurate with the number of cattle that need to be removed. Data from the past three years of forage monitoring (all average or above average precipitation years) indicates that in most pastures the ranch would have few problems maintaining an average of 1000 lb./acre of RDM. The Horse Pasture may be more problematic. The average RDM for this pasture did not meet the 1000 lb./ac average RDM in the fall of 1993 (Sellgren, 1994). All other pastures have met this new criteria over the last three years.

Vail and Vickers would incur a loss of commercial hunt revenue due to removal of the deer. Additionally, Vail and Vickers would incur the expense of removing the deer from the island.

### **NPS Operations**

This alternative would significantly alter Park operations, with moderate adverse impact. The Park would lose revenue from the grazing fees for the stock that previously grazed in Old Ranch Pasture. The Park would also bear the costs of any increased monitoring costs (riparian or water quality) and any increase in weed eradication efforts.

## Wilderness

Wilderness values will remain unaffected by implementation of this alternative. Santa Rosa Island will remain unsuitable for wilderness designation until sometime after 2011, when grazing has been removed and restoration efforts have been completed.

## Summary

Under implementation of the Targeted Action alternative, the closure of Old Ranch Pasture to cattle and horse grazing would have substantial, beneficial effects on resources in that pasture, including soils, water quality and riparian areas, vegetation, wildlife, rare species and their habitats, and archeological sites. Water quality, riparian areas, and vegetation would improve in Old Ranch Pasture, and grazing threats to rare species in that pasture would be eliminated.

The split of North Pasture and the implementation of rotational grazing would have substantial, beneficial effects on water quality and riparian areas in Brockway Pasture, and negligible effects on water quality and riparian areas in Black Mountain Pasture. Rotational grazing would have negligible effects on vegetation in Brockway and Black Mountain Pastures.

Construction of small riparian exclosures (SISTLE's) will have substantial, beneficial effects on resources in the exclosures, including soils, water quality and riparian areas, vegetation, and wildlife. The combination of closing Old Ranch Pasture to cattle grazing, and implementation of cool-season grazing in Brockway Pasture would markedly improve water quality and the condition of riparian areas in those pastures. Construction of SISTLE's in several drainages in Pocket Field, South and Wire Field would slightly or moderately improve water quality in those pastures. Eight of the island's 16 second-order drainages would improve in water quality and riparian condition/function.

Removal of the deer within three years would have substantial beneficial effects on vegetation and rare species and their habitats. Removal of the deer would eliminate browsing pressure on several rare plant species islandwide, and will encourage recovery of shrub, chaparral and woodland communities.

The increase in Residual Dry Matter standards from 400 to 1,000 lb./ac will have moderate, beneficial effects on soils, vegetation, and forage, and slight beneficial effects on wildlife.

Effects on the permittee would be moderately adverse, due to overall loss of grazing capacity, loss of revenue from deer hunting, and costs of removing the deer. Effects on NPS operations would also be moderately adverse.

There would continue to be heavy effects on water quality and riparian areas in some drainages in South and Pocket Field. In pastures other than Old Ranch, there would continue to be heavy effects on soils (in areas where livestock congregate or trail) and on vegetation. There would be



moderate effects on weed management, wildlife, and archeological resources. Implementation of mitigation measures identified in Section 7 consultation with USFWS will prevent impacts to rare species.

Under this alternative, there would be slight, beneficial effects on visitor use. There would be no effect on historical resources, unknown effects on cultural landscapes, negligible effects on the regional economic environment, and no effect on wilderness values.

Identified effects would continue until cattle grazing ceases in 2011.

### **Cumulative Effects**

Due to the extensive landscape changes brought about by past and present land use practices, many of the cumulative effects which would be caused by this action are the same as described for the No Action and Minimal Action alternatives. Future cattle grazing under this alternative includes grazing at present stocking rates until 2011, when grazing ceases on the island, with the exception of the immediate closure of Old Ranch Pasture to cattle grazing and the implementation of rotational grazing in a split North Pasture.

On other islands in the Park, past sheep and cattle grazing have led to heavy impacts on soils (Brumbaugh 1980, Johnson 1980). These impacts include intense hillside gully development and loss of soil from wind and water erosion, due to direct and indirect effects of sheep and cattle grazing, as well as loss of microphytic crust. These impacts have largely abated now that sheep and cattle are gone from these islands. Heavy, adverse effects have occurred to soils on Santa Rosa Island as a result of past and current ranching operations. Implementation of the Targeted Action alternative may result in greater localized erosion of soils around water sources in Black Mountain Pasture, but this will be offset by reduction of cattle trampling islandwide due to closure of Old Ranch Pasture to cattle and horses, the exclusion of cattle from Brockway Pasture during the warm season, and an increase in Residual Dry Matter standards from 400 to 1,000 lb./ac. These represent moderate beneficial cumulative effects to soils on the northern Channel Islands.

Other past, present and future actions affecting water quality and riparian areas in the Central Coast region include the ongoing impacts of ranching activities throughout the Central Coast Region (this region includes Santa Cruz, Santa Clara, San Benito, Monterey, San Luis Obispo and Santa Barbara counties). The water quality problems identified for Santa Rosa Island (discharge of bacteria and sediment) are common among other rangelands in the Central Coast Region (Michael Thomas, Central Coast Regional Water Quality Control Board, personal communication, April 26, 1996). Although the CCRWQC Board has been working with the USFS to incorporate BMPs for water quality improvement into allotment management plans on the Los Padres National Forest, BMPs are not yet in place for most of these rangelands. As a result, there are ongoing, adverse impacts to water quality and riparian areas in other areas of the Central Coast region. If BMPs are implemented on these rangelands, these adverse impacts may be reduced.

As stated in this draft EIS, past grazing by the current permittee on Santa Rosa Island has rendered many drainages non-functional as riparian areas (Rosenlieb et al. 1995). Under this alternative, the closure of Old Ranch Pasture to cattle, implementation of rotational grazing and the construction of small riparian exclosures will begin to restore riparian function to Santa Rosa Island drainages. Under the Targeted Action alternative, water quality on Santa Rosa would improve and there would be a slight positive cumulative effect on water quality in the Central Coast Region.

Other past, present and future actions affecting vegetation, which are detailed in the cumulative effects section of the No Action alternative, mainly result from past ranching activities on other northern Channel Islands and ongoing feral pig and sheep damage on Santa Cruz Island. In general, these actions have caused widespread conversion of native shrublands and perennial grasslands to communities dominated by non-native annual grasses and weeds. Though annual grassland will continue to dominate the island under this Targeted Action alternative, the removal of deer would reduce browsing pressure on shrub communities, and chaparral and coastal sage scrub may begin to recover. Additionally, vegetation communities in Old Ranch Pasture would begin to recover. Recovery of chaparral and coastal sage scrub communities on Santa Rosa could add substantially to the extent of those communities on the northern Channel Islands. Chaparral currently occupies about 18,000 acres on Santa Cruz Island, and 2,600 acres on Santa Rosa. Removal of deer would also reduce browsing pressure on Bishop pine woodland, which on the islands, only occurs on Santa Cruz and Santa Rosa Island. Thus, implementation of this alternative would have substantial beneficial cumulative effects on shrub and woodland communities of the northern Channel Islands.

The status of the island spotted skunk and Santa Cruz gopher snake on Santa Cruz Island is unknown. Although habitat is generally better on Santa Cruz due to increased cover and greater areal extent of shrub communities, current feral pig rooting and sheep grazing on Santa Cruz may decrease or limit available habitat for both island spotted skunk and Santa Cruz gopher snake. The effects of this limitation of habitat for both species, when combined with the limitation of habitat on Santa Rosa, are unknown. Since these two taxa are limited in geographic range to Santa Cruz and Santa Rosa Islands, the status of the skunk and the snake would not change under this alternative. Limitation of habitat will continue on both islands until ungulates are removed and shrub and riparian habitats begin to recover and expand. Implementation of this Targeted Action alternative would have slight beneficial effects on these species in Old Ranch Pasture (due to removal of cattle from that pasture) but would have little overall effect on these species.

Heavy, significantly adverse impacts to rare species and their habitats are the result of the combined effects of past and current grazing and browsing by non-native ungulates. These effects are not limited to Santa Rosa Island, but have occurred on all of the northern Channel Islands, and are discussed under the Cumulative Effects section for the No Action alternative. Past and current land use practices on Santa Rosa Island have been identified by U.S. Fish and Wildlife Service as a factor contributing to the rarity and possible extirpation of the 10 Santa Rosa species proposed for listing as endangered. Under the Targeted Action alternative, the closure of Old Ranch Pasture to cattle grazing and the removal of deer from the island would result in significant beneficial effects on rare species, thus beginning to reverse the negative



cumulative effects of past land use practices. Of the 10 species proposed for listing as Endangered, four occur only on Santa Rosa, and thus the actions proposed under this alternative would benefit each taxon over the entire range of its distribution. Four other species are extant on Santa Rosa and occur or previously occurred on other islands. These taxa would accrue benefits for a portion of their range or former range. The two remaining species are thought to be extirpated on Santa Rosa Island, but are known to occur on other islands. These taxa would also accrue benefits for a portion of their range or former range. The benefits to Santa Rosa species from implementation of this alternative would comprise a significant beneficial effect on rare species on the northern Channel Islands.

Although significant past and present effects on western snowy plover, California brown pelican and peregrine falcon populations on a regional and national level have led to their designation as threatened or endangered, implementation of this Targeted Action alternative will result in negligible cumulative effects on these listed species. Recovery of populations of the latter two species in the Southern California Bight will occur regardless of the alternative chosen in this plan. There are now about eight successful breeding pairs of peregrines which nest annually on the northern Channel Islands. Although Channel Islands peregrines still exhibit reproductive and survival problems due to accumulation of organochlorines, USFWS has proposed that peregrines be removed from the list of threatened and endangered species due to overall recovery of the species (Federal Register 60 [126]:34406-409). Cumulative effects on western snowy plover will also be negligible. Although plover nesting habitat in Old Ranch Pasture would be protected by closure of Old Ranch Pasture to cattle grazing, nest failure at Skunk Point may remain high due to high winds and predation, and the site may not add significantly to plover production over the range of the species.

Moderate, significantly adverse effects on cultural resources have occurred due to effects of past trampling by non-native ungulates. Under this Targeted Action alternative, future cattle trampling in all pastures but Old Ranch would exacerbate damage to archeological sites from past and current grazing, and from past rooting by feral pigs. Indirect cumulative effects on archeological sites in all pastures but Old Ranch include further loss of cultural materials from sites due to erosion, which is exacerbated by the effects of ungulates on vegetation. However, these effects would be ameliorated by the increase in vegetation cover due to raising the RDM standards. This would help reduce erosion damage to archeological sites. This would help reduce erosion damage to archeological sites, and would comprise a significant beneficial cumulative effect on cultural resources on the northern Channel Islands.

Under this Targeted Action alternative, cumulative effects on the permittee (ranch operations) would be moderately adverse, due to economic impacts such as loss of overall grazing capacity on the island, and costs incurred from removing the deer and reducing the elk.

### **Mitigation Required**

Mitigation would be required to prevent damage to archeological sites from fencing construction for small riparian exclosures and the Smith Highway fence, and for construction of water developments in Black Mountain Pasture.



Construction of fencing for riparian exclosures and the Smith Highway fence may potentially damage the numerous archeological sites on the island and disrupt the historic landscape. However, impact can be reduced by carefully controlling and monitoring this process. No new roads will be constructed in order to place exclosures in drainages. Archeological clearance will be obtained, and the actions will be subject to compliance under Section 106 of the National Historical Preservation Act (NHPA). If archeological sites are unearthed during fence construction, work will be stopped, the Park archeologist will be consulted, and his recommendations will be followed.

Under implementation of rotational grazing, Water Windmill and Cherry Canyons in Black Mountain Pasture would likely experience the brunt of the increased use of riparian areas during the summer months. Under the proposed action twice as many cattle would graze Black Mountain Pasture during the summer drought. Cattle would most likely spend a disproportionate amount of time in riparian areas. To mitigate this eventuality, three water developments would be constructed. The water developments would be placed in locations to encourage cattle to leave riparian areas and take advantage of upland forage. Two SISTLEs would also be constructed to protect small stretches of streams within the pasture. To mitigate possible adverse effects of water development construction on archeological resources, the same procedures will be followed as described above for construction of SISTLE's.

Visitor use and access would need to be controlled while deer and elk removal is occurring. NPS would also need to oversee removal operations to insure no impacts to other resources from vehicles, etc. Therefore, NPS will require the permittee to submit a detailed removal plan, with timetable, subject to NPS approval. NPS staff will be on hand to oversee removal activities.

To avoid impacts to listed and proposed species, the Park would implement any mitigation measures derived through consultation and conferencing with USFWS.

## **ALTERNATIVE D: CONSERVATION TEAM RECOMMENDATIONS**

Alternative D, Conservation Team Recommendations, combines some of the elements from the Targeted Action alternative with phased pasture closures and reduction in stock, in order to effect changes at the habitat management level, and to optimally prepare the Park to address issues arising from removal of cattle. Pocket Field would be added to the pasture rotation proposed in the previous alternative. Winter grazing would alternate between Brockway and Pocket Field, allowing each of those pastures an 18 month rest period. Minimum Residual Dry Matter (RDM) standards would be raised to protect upland areas. Grazing and browsing pressure on rare plants would be reduced by pasture closures and the removal of the island's deer herd over a three year period, as well as a significant reduction in the island's elk herd. The weed management program would be increased as funding allows, in order to address weed management problems on Santa Rosa Island.

## Natural Resources

### Soils

Effects on soils would be as described under the previous alternative (Targeted Action), except for the following. As pastures are closed to grazing, impacts to soils will be eliminated, and stabilization and recovery of those soils would subsequently occur.

### Water Quality and Riparian Areas

Under implementation of the Conservation Team Recommendations alternative, protection of riparian areas and improvement in water quality would occur primarily through pasture closure and rotational grazing strategies. Reduction in stocking levels, to be implemented in 2007, would also have some beneficial effects.

Under implementation of this alternative, several pastures are scheduled to close during the phase out in grazing. As in the Minimal Action and Targeted Action alternatives, Old Ranch will be closed to grazing immediately. Under the Conservation Team Recommendations, however, Wire Field and Pocket Field will be closed to grazing in 2003 and 2004, respectively. As each pasture closes, beneficial effects are the same as described for closed pastures under previous alternatives: recovery of riparian vegetation, stabilization of stream banks, and improvement in water quality. Restoration of riparian areas may be required if native vegetation or seed sources are inadequate for natural recovery. Fecal inputs from cattle would cease entirely within closed pastures, but some coliform bacteria would likely drift downstream. Newly established riparian vegetation would filter out much of the nutrient inputs flowing downstream into the closed pasture.

Implementation of a rotational grazing system between the split North Pasture and Pocket Field Pasture would contribute to the improvement of riparian areas in the manner described under the previous alternative, except for the additional effects of adding Pocket Field to the rotation. Under implementation of the Conservation Team Recommendations, both Pocket Field and Brockway are rested during the summer months, and cattle graze alternately in either pasture during the winter months. This is made possible by a 11% reduction in islandwide AUM's (equivalent to the AUM's currently assigned to Pocket Field). When either Brockway or Pocket Field is grazed (during alternate winters), the riparian areas would likely receive greater grazing pressure than they currently do. This is due to higher stocking densities in the grazed pasture than current stocking density. However, since the alternate pasture would continue to be rested through the winter, total rest from grazing equals 18 months for both Pocket Field and Brockway. This 18 month rest period would allow riparian areas to recover to a much greater degree than in the previous alternative.

Effects in Black Mountain Pasture would be the same as described under the previous alternative: higher stocking densities could lead to increased use of riparian areas, though this will be mitigated somewhat by the construction of three water developments to improve the

distribution of cattle. Still, water quality and riparian values in Black Mountain Pasture may decline slightly from current levels.

South Pasture would still be grazed under a continuous grazing system. Towards the end of the grazing phase out, the grazing density would decrease. The majority of stream reaches within South Pasture would not receive any real protection. Consequently the majority of the stream reaches within these drainages would likely suffer from similar effects described for unprotected streams in the No Action alternative: a lack of riparian vegetation, unprotected stream banks, and accelerated rates of erosion. Those streams would likely continue to remain non-functional in their role to dissipate flood energies and trap sediments. Suspended sediment levels would likely continue to dramatically peak during storm events. Water quality standards may continue to be exceeded.

Overall, implementation of the Conservation Team Recommendations alternative would allow for significant reaches of streams to be completely protected from grazing or to receive significant periods of rest (up to 18 months). The phase out of grazing would also allow for the Park to better manage weed populations which may affect riparian areas. These substantial, beneficial effects far outweigh the local negative impacts on streams and riparian areas within Black Mountain and South Pastures.

## Vegetation

With the following exceptions, effects on vegetation from the implementation of this alternative are identical to those described under the previous alternative for the division of North Pasture and implementation of seasonal grazing, the removal of deer and reduction of elk, and the increase in RDM standards. Implementation of the Conservation Team Recommendations will result in substantial, beneficial effects on island vegetation.

Phased removal of cattle from the island will have the following effects on vegetation:

If deer are removed from the island concurrent with construction of water developments in Black Mountain Pasture, this will prevent increased use of the area by those animals that are most likely to cause negative impacts. Cattle and elk may still cause impacts, due to trailing, bedding, and some amount of browsing.

1999 - Reduce AUMs, rotate cattle use between Black, Brockway, and Pocket Field Pastures:

Rotating winter use between Brockway and Pocket Field will establish a "graze 6 months, rest 18 months" schedule of use for these two pastures. This will likely allow for some establishment of riparian vegetation in the canyons of these pastures during the cool rested season and continued protection during the following rested hot season. Upland plant resources in Brockway Pasture and Pocket Field will also receive seasonal protection from cattle trampling and grazing. Rare plant species which may benefit from this are *Castilleja mollis* and *Orobanche parishii* ssp. *brachyloba*.



General ecosystem health will likely be enhanced in these pastures due to periodic accumulation of ungrazed grasses. The additional inputs of litter to the soil will improve seedling establishment through decreased soil surface temperatures, increased moisture holding capacity, and increased nutrient availability. The increased stubble height of ungrazed grasses will also provide increased protection from wind erosion to the shallow, fragile soils of Pocket Field. There will likely be little or no effect on weeds.

#### 2000 - Close Carrington Pasture

Removal of cattle grazing and trampling from Carrington Pasture may provide benefits to rare species that occur in lupine scrub, coastal bluff, and grassland communities. These include *Phacelia insularis* ssp. *insularis*, *Gilia tenuiflora* ssp. *hoffmannii*, *Castilleja mollis*, *Erysimum insulare*, *Lupinus albifrons*, and *Lupinus arboreus*. There will be unknown effects on *Lavatera cretica* (tree mallow), a slowly increasing annual/biennial weed currently restricted primarily to Carrington pasture.

#### 2001 - Reduce Wire Field AUM's by 50%

Reduction of cattle grazing and trampling in Wire Field may provide benefits to rare species that occur in coastal sage scrub, mixed woodland, Torrey pine, chaparral, and grassland communities. The effect on weeds is unknown.

#### 2003 - Close Wire Field

Removal of cattle grazing and trampling in Wire Field may provide additional benefits to rare species that occur in Wire Field. There will little or no effect on weeds unless fennel is present.

#### 2004 - Close Pocket Field, Rotate cattle use between Black and Brockway Pastures

Complete removal of cattle-related impacts from Pocket Field will likely lead to accelerated recovery of riparian vegetation in the canyons, especially Arlington Canyon. Reduction of soil erosion will continue, further enhancing the establishment of native plant species in the uplands.

Closure of Pocket Field will intensify frequency of use in Brockway Pasture. This may reverse any trends toward establishment of riparian vegetation in Brockway. Effects on weeds are unknown.

#### 2007 to 2011 - Reduce AUMs islandwide by 10% per year

The initial reduction of 10% will have little impact on viability of rare plant populations. Subsequent reductions will provide incrementally greater benefits. Effects on weeds are unknown.

Generally, a phased removal of cattle would result in a phased impact on weeds. Any "explosions" would be spread out, so that no simultaneous islandwide infestations occur. At this time, fennel is the only weed species expected to strongly respond to the removal of cattle.

Although elk will be removed by 2011 under all alternatives, the gradual decrease prescribed under this alternative (removal over a 13 year period) may have moderate beneficial effects on vegetation. The lengthy process of reducing the elk population should slowly relieve some grazing pressures throughout the grasslands and riparian areas. The amount and type of vegetation change which will occur due to this reduction is unknown. However, it is expected that there will be an overall increase in biomass and in cover of grass, shrubs, and trees

### **Forage Production and Availability**

Under the Conservation Team Recommendations alternative there would be moderate changes in forage production and availability. These changes can be classified into two categories: pasture closure and rotational grazing strategy.

This alternative calls for a series of pasture closures. Effects on forage production and availability due to the immediate closure of Old Ranch Pasture and in other closed pastures would be as described under previous alternatives, characterized by an increase in forage, but obviously available only to elk. Effects due to implementation of rotational grazing among Brockway, Pocket Field and Black Mountain Pastures would be similar to those described under Targeted Action. Except that the alternating 18-month rest of Pocket Field and Brockway under this alternative would allow forage production to outpace utilization. This would be a substantial, beneficial effect on forage. Warm season grazing in Black Mountain will have the same moderate beneficial effects as described under Targeted Action. Cattle will primarily eat cured grasses in that pasture. Deferring grazing until late spring/summer will increase survivorship and recruitment of perennial grasses in Black Mountain Pasture.

### **Wildlife**

Effects on wildlife under implementation of the Conservation Team Recommendations will have, overall, moderately beneficial effects on wildlife.

Effects on wildlife from the closure of Old Ranch Pasture and the removal of deer are identical to the effects described for Alternative C.

Under Alternative D, pasture rotation will begin among Black Mountain, Brockway and Pocket Fields in 1999. The impacts to wildlife will be similar to the effects described in Alternative C for the split of North Pasture into Black Mountain and Brockway Pastures and the implementation of rotational grazing. The only difference is that Pocket Field will be added to the grazing rotation, and benefits will extend to that pasture. Pocket Field contains habitat similar to both Brockway and Black Mountain Pastures (upland/grasslands and riparian areas).

Carrington Pasture will be closed by the year 2000, Wire Field by 2003, and Pocket Field by 2004. The closing of these pastures will have direct and positive effects on wildlife. The small mammals which utilize these pastures would benefit from an increase in cover, seeds and other plant materials as the vegetation slowly recovers. The invertebrate populations within the pastures and riparian areas should increase, which would then increase the food base for the fox,

skunk, mice, and lizards. Lizards would also benefit from an increase in cover. Passerine birds would benefit from an increase in nesting and roosting habitat as well as an increase in the understory and seed plants. Predators, including the gopher snake and raptors, would benefit from the increase in mice, lizards and passerine bird populations.

The increase in RDM standards would have slight indirect benefits for wildlife, as described under Targeted Action, through habitat improvement. An increase in minimum RDM from 400 to 1,000 lb./ac may be accompanied by an increase in cover and seed grasses and an increase in invertebrates, which would increase the food base for fox, skunk, and mice. Birds would benefit from an increase in seed plants. Lizards would benefit from an increase in cover as well as from an increase in invertebrate/prey populations. Predators, including the gopher snake and birds of prey, would benefit from the increase in mouse and lizard populations.

### **Rare Species and Their Habitats**

Effects on rare plant species are described under effects of this alternative on vegetation, above.

Effects on western snowy plover from Alternative D are identical to the effects described for Alternatives B and C.

Under this alternative, as under all alternatives, NPS would request consultation with USFWS regarding possible effects on listed species, and would request conference regarding possible effects on proposed species. NPS will work with USFWS to arrive at appropriate mitigation measures to avoid impacts to listed and proposed species.

## **Cultural Resources**

### **Archeological Resources**

As described under the Targeted Action alternative, closure of Old Ranch Pasture to cattle would have substantial beneficial effects on archeological resources in that pasture. The exclusion of cattle would eliminate cattle impact to the archeological sites in this area, which could include the remains of the first island ranch structures.

Construction of fencing for riparian exclosures may potentially damage the numerous archeological sites on the island and disrupt the historic landscape. However, impact can be reduced by carefully controlling and monitoring this process. No new roads will be constructed in order to place exclosures in drainages. Archeological clearance will be obtained, and the actions will be subject to compliance under Section 106 of the National Historical Preservation Act (NHPA). If archeological sites are unearthed during fence construction, work will be stopped, the Park archeologist will be consulted, and his recommendations will be followed.



A decrease in the elk population would decrease the minimal impact of elk on archeological sites. Vehicular traffic associated with the elk hunt would continue to offer the potential to impact archeological sites, but this would lessen as elk were gradually removed from the island.

### **Historical Resources**

This alternative would have no effect upon historical structures or their surrounding historic landscape preservation area, since fencing and water developments would not be constructed near historic structures.

### **Cultural Landscape**

Within Old Ranch Pasture, the removal of cattle would replace the current cultural landscape with a landscape more nearly resembling the prehistoric cultural landscape. Since a cultural landscape study has not been completed, it is unknown what effect this would have on potential cultural landscapes. For the same reason, construction of small riparian exclosures would have unknown effects on the cultural landscape. The remainder of the cultural landscape would be substantially unaffected.

### **Ethnography**

Removal of cattle from the Old Ranch pasture would have slight, beneficial effects on ethnographic resources. Exclusion of cattle from Old Ranch would return a more traditional appearance to a portion of the island. Reduction of erosion should reduce the rate at which burials are exposed. Historic Chumash villages in the Old Ranch pasture would be less impacted by erosion.

## **Socioeconomic Resources**

### **Regional Economic Environment**

Under this alternative, the current cattle grazing operation would be reduced by 18% of its current level in two years, 21% in three years, and 35% in seven years, after which there would be a 10% reduction each year until 2011. The effects of this on the regional economic environment are unknown, but are likely to be negligible.

### **Visitor Use**

Under implementation of the Conservation Team Recommendations alternative, there would be slight positive effects on visitor use and the visitor experience. Visitor activities currently stress low-impact, low-volume activities. Visitors are currently not allowed access to most of the island unless escorted by a Ranger. Under this alternative, however, recreational opportunities in Old Ranch Canyon and other closed pastures would increase if access is less restricted after closure. In addition, visitors may enjoy their visit more if recovery of the riparian area and uplands occurs in closed pastures.

The splitting of North Pasture into Brockway and Black Mountain Pastures may have both positive and negative effects on the visitor experience. Visitors may find the fence along Smith Highway to be an eyesore. Recovery of riparian areas in Brockway will enhance the visitor experience, but the higher stocking density in Black Mountain during the summer and the construction of water catchments in that pasture may somewhat diminish the visitor experience in this area of the island.

Removal of deer and reduction of elk may have both positive and negative effects on the visitor experience. On one hand, removal of the deer will allow eventual recovery of chaparral and coastal sage scrub communities, and visitors may find their island experience more pleasurable because of this. On the other hand, some visitors may find their island experience less pleasing if the deer are not present.

Raising the minimum RDM level from 400 to 1000 pounds per acre may protect upland areas more, and no pastures would appear overgrazed. However, riparian areas in most pastures will still be heavily utilized, comprising an aesthetic negative.

### **Grazing/hunting Permittee**

Implementation of this alternative would have heavy, adverse effects on the permittee. The current operations of the permittee would be markedly affected. The impacts would increase throughout the phase out of grazing. Each reduction in AUM's would result in commensurate reduction of ranch profits.

As in Alternatives B and C, initially the ranch would lose access to Old Ranch Pasture and islandwide AUM's would be reduced by 7%. This would likely have a minimal impact on ranch operations. Old Ranch is a heifer pasture. Any remaining heifers would likely be moved to Pocket Field.

Implementation of the rotational grazing system, beginning in 1999, would be somewhat problematic due to potential mixing of heifers and steers. Requiring the ranch to rotate cattle between the split North Pasture (a steer pasture) and the Pocket Field Pasture (a heifer pasture) would require the ranch to either combine steers and heifers or to choose which gender of bovine will graze. In general, mixing of steers and heifers is not commonly practiced, as steers are known to chase and harass heifers. Since the cattle stay on Santa Rosa Island for about 18 months, the ranch would likely have to choose which kind of animal to graze under the three

pasture rotation. The three pasture rotational system would lead to an additional 11% reduction in AUM's, with commensurate decrease in profits. Some ranch staff may have to be let go.

The closure of Carrington Pasture in the year 2000 would further limit the ranch's options. Currently Carrington Pasture is used for long term management of weak or sick animals. Acute care currently occurs in the Hospital Field near the ranch. Loss of Carrington Pasture would likely force the ranch to either set aside other areas on the island for long term management of weakened animals or to ship these animals off the island at a loss.

Closure of Wire Field Pasture would reduce the number of holding pastures to one. All animals would have to be herded to the Lobo Pasture. This would likely lead to delays in the round up process. For instance it may take two days to move cattle from the south side of the island to Lobo Pasture, whereas it currently takes only one day.

Closure of Pocket Field in 2004 would likely not have any additional effects, as there would have already been a commensurate reduction in AUM's with the implementation of the three pasture rotation.

The implementation of the annual reductions of AUM's beginning in 2007 would have commensurate effects on ranch profits.

Although each part of the phaseout of grazing has differing impacts on ranch operations, it is the cumulative effects of the phase out that shows the greatest impact on ranch operations. Within three years of the beginning of the phaseout of grazing, the ranch would lose 18% of their current AUM's. By the year 2000 the loss in AUMs would grow to 21%. By 2003 the reduction would be 24%. At some point in this process that ranch would likely lose economic viability. When the ranch would meet that point is not known. But it may be likely that the ranch would not be able to maintain a viable cattle operation through 2011 under this alternative. Since the permittee is not obligated to continue its ranching operation, it may be that the ranch would cease cattle operation prior to 2011.

Vail and Vickers would also incur a loss of commercial hunt revenue due to removal of the deer. Additionally, Vail and Vickers would incur the expense of removing the deer from the island. Reduction of the elk herd would also cause a loss of revenue to the permittee, the amount of lost revenue being dependent upon the size of the reduction.

## **NPS Operations**

Implementation of the Conservation Team Recommendations alternative would have moderate adverse impacts on NPS operations. There would be a phased loss of revenue to the Park from the grazing fees for the stock that previously grazed in pastures that are closed. The Park would also bear the costs of any increased monitoring costs (riparian or water quality) and any increase in weed eradication efforts.



## Wilderness

Wilderness values be slightly improved by implementation of the Conservation Team Recommendations, in that wilderness suitability will be improved in closed pastures, as recovery occurs. However, since most of South Pasture will remain grazed until 2011, Santa Rosa Island as a whole will remain unsuitable for wilderness designation until sometime after 2011, when all grazing has been removed and restoration efforts have been completed.

## Summary

Under implementation of the Conservation Team Recommendations alternative, the sequential closure of pastures to livestock grazing would have substantial, beneficial effects on resources in that pasture, including soils, water quality and riparian areas, vegetation, wildlife, rare species and their habitats, and archeological sites. Water quality, riparian areas, and vegetation would improve in closed pastures, and grazing threats to rare species would be eliminated.

The split of North Pasture and the implementation of rotational grazing would have substantial, beneficial effects on water quality and riparian areas in Brockway and Pocket Field Pastures, and negligible effects on water quality and riparian areas in Black Mountain Pasture. The three pasture rotational grazing system would have substantial beneficial effects on vegetation in Brockway and Pocket Field Pastures, and negligible effects on vegetation in Black Mountain Pasture.

Removal of the deer within three years will have substantial beneficial effects on vegetation and rare species and their habitats. Removal of the deer will eliminate browsing pressure on several rare plant species islandwide, and will encourage recovery of shrub, chaparral and woodland communities.

Phased removal of the elk will have moderate, beneficial effects on vegetation.

The increase in Residual Dry Matter standards from 400 to 1,000 lb./ac will have moderate, beneficial effects on soils, vegetation, and forage, and slight beneficial effects on wildlife.

Effects on the permittee would be heavy and adverse, due to overall loss of grazing capacity, loss of revenue from elk and deer hunting, and costs of removing the deer and elk. Effects on NPS operations would also be moderately adverse.

There would continue to be heavy effects on water quality and riparian areas in some drainages in South Pasture, at least until stocking levels are reduced in 2011. Until pastures are closed, there would continue to be heavy effects impacts on soils (where livestock congregate and trail), and on vegetation. There would be moderately adverse impacts to weed management, wildlife, and archeological resources. Implementation of mitigation measures identified in Section 7 consultation with USFWS will prevent impacts to rare species.

Under this alternative, there would be slight, beneficial effects on visitor use. There would be no effect on historical resources, unknown effects on cultural landscapes, negligible effects on the regional economic environment, and no effect on wilderness values.

### **Cumulative Effects**

Due to the extensive landscape changes brought about by past and present land use practices, many of the cumulative effects which would be caused by this action are the same as described for the No Action, Minimal Action and Targeted Action alternatives. Future cattle grazing under this alternative includes phased removal of grazing according to the prescribed schedule.

On other islands in the Park, past sheep and cattle grazing have led to heavy impacts on soils (Brumbaugh 1980, Johnson 1980). These impacts include intense hillside gully development and loss of soil from wind and water erosion, due to direct and indirect effects of sheep and cattle grazing, as well as loss of microphytic crust. These impacts have largely abated now that sheep and cattle are gone from these islands. Heavy, adverse effects have occurred to soils on Santa Rosa Island as a result of past and current ranching operations. Implementation of the Conservation Team Recommendations alternative may result in greater localized erosion of soils around water sources in Black Mountain Pasture, but this will be offset by reduction of cattle trampling islandwide due to phased closure of pastures, the alternating 18-month rest of Brockway and Pocket Field Pastures, and an increase in Residual Dry Matter standards from 400 to 1,000 lb./ac. These represent substantial beneficial cumulative effects to soils on the northern Channel Islands.

Other past, present and future actions affecting water quality and riparian areas in the Central Coast region include the ongoing impacts of ranching activities throughout the Central Coast Region (this region includes Santa Cruz, Santa Clara, San Benito, Monterey, San Luis Obispo and Santa Barbara counties). The water quality problems identified for Santa Rosa Island (discharge of bacteria and sediment) are common among other rangelands in the Central Coast Region (Michael Thomas, Central Coast Regional Water Quality Control Board, personal communication, April 26, 1996). Although the CCRWQC Board has been working with the USFS to incorporate BMPs for water quality improvement into allotment management plans on the Los Padres National Forest, BMPs are not yet in place for most of these rangelands. As a result, there are ongoing, adverse impacts to water quality and riparian areas in other areas of the Central Coast region. If BMPs are implemented on these rangelands, these adverse impacts may be reduced.

As stated in this draft EIS, past grazing by the current permittee on Santa Rosa Island has rendered many drainages non-functional as riparian areas (Rosenlieb et al. 1995). Under this alternative, the phased closure of pastures and reduction in stock as well as the implementation of rotational grazing would begin to restore riparian function to Santa Rosa Island drainages. Under the Targeted Action alternative, water quality on Santa Rosa would improve and there would be a slight positive cumulative effect on water quality in the Central Coast Region.

Other past, present and future actions affecting vegetation, which are detailed in the cumulative effects section of the No Action alternative, mainly result from past ranching activities on other



northern Channel Islands and ongoing feral pig and sheep damage on Santa Cruz Island. In general, these actions have caused widespread conversion of native shrublands and perennial grasslands to communities dominated by non-native annual grasses and weeds. Though annual grassland will continue to dominate the island under this alternative, the removal of deer would reduce browsing pressure on shrub communities, and chaparral and coastal sage scrub may begin to recover. Additionally, vegetation communities in Old Ranch Pasture would begin to recover. Recovery of chaparral and coastal sage scrub communities on Santa Rosa could add substantially to the extent of those communities on the northern Channel Islands. Chaparral currently occupies about 18,000 acres on Santa Cruz Island, and 2,600 acres on Santa Rosa. Removal of deer would also reduce browsing pressure on Bishop pine woodland, which on the islands, only occurs on Santa Cruz and Santa Rosa Island. Thus, implementation of this alternative would have substantial beneficial cumulative effects on shrub and woodland communities of the northern Channel Islands.

The status of the island spotted skunk and Santa Cruz gopher snake on Santa Cruz Island is unknown. Although habitat is generally better on Santa Cruz due to increased cover and greater areal extent of shrub communities, current feral pig rooting and sheep grazing on Santa Cruz may decrease or limit available habitat for both island spotted skunk and Santa Cruz gopher snake. The effects of this limitation of habitat for both species, are unknown. These two taxa are limited in geographic range to Santa Cruz and Santa Rosa Islands. The status of both the skunk and the snake may improve under this alternative if shrub and riparian habitats begin to recover and expand. Implementation of this alternative would have moderate beneficial effects on these species on Santa Rosa Island and moderate overall beneficial effects on these species.

Heavy, significantly adverse impacts to rare species and their habitats are the result of the combined effects of past and current grazing and browsing by non-native ungulates. These effects are not limited to Santa Rosa Island, but have occurred on all of the northern Channel Islands, and are discussed under the Cumulative Effects section for the No Action alternative. Past and current land use practices on Santa Rosa Island have been identified by U.S. Fish and Wildlife Service as a factor contributing to the rarity and possible extirpation of the 10 Santa Rosa species proposed for listing as endangered. Under the Conservation Team Recommendations alternative, the phased pastures closures and reduction of stock, the removal of deer from the island, and the reduction of elk would result in significant beneficial effects on rare species, thus beginning to reverse the negative cumulative effects of past land use practices. Of the 10 species proposed for listing as Endangered, four occur only on Santa Rosa, and thus the actions proposed under this alternative would benefit each taxon over the entire range of its distribution. Four other species are extant on Santa Rosa and occur or previously occurred on other islands. These taxa would accrue benefits for a portion of their range or former range. The two remaining species are thought to be extirpated on Santa Rosa Island, but are known to occur on other islands. These taxa would also accrue benefits for a portion of their range or former range. The benefits to Santa Rosa species from implementation of this alternative would comprise a significant beneficial effect on rare species on the northern Channel Islands.

Although significant past and present effects on western snowy plover, California brown pelican and peregrine falcon populations on a regional and national level have led to their designation as threatened or endangered, implementation of this alternative would result in negligible



cumulative effects on these listed species. Recovery of populations of the latter two species in the Southern California Bight will occur regardless of the alternative chosen in this plan. There are now about eight successful breeding pairs of peregrines which nest annually on the northern Channel Islands. Although Channel Islands peregrines still exhibit reproductive and survival problems due to accumulation of organochlorines, USFWS has proposed that peregrines be removed from the list of threatened and endangered species due to overall recovery of the species (Federal Register 60 [126]:34406-409). Cumulative effects on western snowy plover will also be negligible. Although plover nesting habitat in Old Ranch Pasture would be protected by closure of Old Ranch Pasture to cattle grazing, nest failure at Skunk Point may remain high due to high winds and predation, and the site may not add significantly to plover production over the range of the species.

Moderate, significantly adverse effects on cultural resources have occurred due to the effects of past trampling by non-native ungulates. Under this alternative, future cattle trampling will be reduced by phased closure of pastures and phased removal of grazing, and by the increase in vegetation cover due to raising the RDM standards. This would help reduce erosion damage to archeological sites, and would comprise a significant beneficial cumulative effect on cultural resources on the northern Channel Islands.

Under this Targeted Action alternative, cumulative effects on the permittee (ranch operations) would be heavy and adverse, due to economic impacts such as loss of overall grazing capacity on the island, and costs incurred from removing the deer and reducing the elk.

### **Mitigation Required**

Mitigation would be required to prevent damage to archeological sites from fencing construction for the Smith Highway fence, for possible adverse effects of summer grazing in Black Mountain Pasture, and for construction of water developments in Black Mountain Pasture.

Construction of fencing for the Smith Highway fence may potentially damage the numerous archeological sites on the island and disrupt the historic landscape. However, impact can be reduced by carefully controlling and monitoring this process. No new roads will be constructed. Archeological clearance will be obtained, and the actions will be subject to compliance under Section 106 of the National Historical Preservation Act (NHPA). If archeological sites are unearthed during fence construction, work will be stopped, the Park archeologist will be consulted, and his recommendations will be followed.

Under implementation of rotational grazing, Water Windmill and Cherry Canyons in Black Mountain Pasture would likely experience the brunt of the increased use of riparian areas during the summer months. Under the proposed action twice as many cattle would graze Black Mountain Pasture during the summer drought. Cattle would most likely spend a disproportionate amount of time in riparian areas. To mitigate this eventuality, three water developments would be constructed. The water developments would be placed in locations to encourage cattle to leave riparian areas and take advantage of upland forage. To mitigate possible adverse effects of

water development construction on archeological resources, the same procedures will be followed as described above for construction of the Smith Highway fence.

Visitor use and access would need to be controlled while deer and elk removal is occurring. NPS would also need to oversee removal operations to insure no impacts to other resources from vehicles, etc. Therefore, NPS will require the permittee to submit a detailed removal plan, with timetable, subject to NPS approval. NPS staff will be on hand to oversee removal activities.

To avoid impacts to listed and proposed species, the Park would implement any mitigation measures derived through consultation and conferencing with USFWS.

## **ALTERNATIVE E: IMMEDIATE REMOVAL OF UNGULATES**

Alternative E, Immediate Removal of Ungulates, would require the permittee to remove all livestock, including cattle, horses, deer, and elk, from Santa Rosa Island within three years. The weed management program would be increased as funding allows.

### **Natural Resources**

#### **Soils**

Implementation of Immediate Removal of Ungulates will have substantial, beneficial effects on soil resources. After all ungulates are removed from the island (within three years of implementation), impacts to soils will be eliminated, and stabilization and recovery of those soils should subsequently occur. There will thus be decreased trampling of soils islandwide, resulting in increased soil stability, increased water availability for vascular plants, and decreased soil loss; increased nutrient availability to plants; and decreased vegetation loss.

#### **Water Quality and Riparian Areas**

Complete and immediate removal of all non-native ungulates within three years would have substantial, beneficial impacts to the streams, riparian areas, and water quality of the island. Riparian vegetation would likely grow rapidly if appropriate vegetation and/or seed sources are available. However, most riparian areas on the island are devoid of native riparian plants. In these areas, restoration efforts would likely be required. Whether recovery occurs naturally or with the assistance of restoration, vegetative cover along stream banks would likely increase. This in turn would facilitate stabilization of stream banks. As riparian cover increases, sediments would likely be trapped by the vegetation, forming new stream banks and point bars. This in turn would likely provide new riparian habitat. As the process continues, stream width would likely decrease, while stream column depth would increase. The result would be narrower and deeper streams.

The improvements in riparian habitat and channel morphology would lead to improvements in water quality. With a narrower and deeper stream column, water temperatures would decrease.

Establishment of shrubby and woody riparian vegetation would contribute to this process by providing shade for the stream waters. Suspended sediment levels during storm events would not rise as high within excluded areas. Fecal and urine inputs from cattle would cease entirely, once cattle were completely removed. Amounts of *Cladophora* algae would likely diminish within a few years. Water quality would improve and riparian areas would recover at faster rates and over a wider area than under the other alternatives.

## Vegetation

Implementation of this alternative would result in substantial, beneficial effects to vegetation. The direct effects of this alternative would be to remove all grazing, browsing, and trampling impacts from all vegetation. Plants would no longer be harmed or destroyed by being wholly or partially eaten, nor would they be broken or uprooted by being walked on, lain upon, or rubbed against. Reproductive cycles would no longer be interrupted by consumption or breakage of flowering/fruitlet structures.

In response to removal of these direct effects, the majority of the vegetation will show an increase in plant size, plant density, and population area.

Annual plants may show rapid recovery. This includes the proposed species *Gilia tenuiflora hoffmannii* and *Phacelia insularis insularis*. Recovery will be directly related to the size of the seedbank and the amount of precipitation received after removal of the animals.

Perennial succulent and herbaceous species will likely show a rapid two-phased recovery. First will be an increase in size and vigor of existing plants. This will begin immediately upon removal of herbivory and trampling. Reproductive success will also be increased which will be followed by an increase in the number of seedlings. Seedling survival will be enhanced by the lack of herbivory and trampling. Enhanced seedling survival leads to the second phase of recovery, which is increased population density and extent. The long term effect of increased population density and extent is a reduction in vulnerability to extinction through stochastic (random) events. Proposed species that are herbaceous or succulent perennials are *Dudleya blochmaniae insularis*, *Dudleya* sp. nov., *Heuchera maxima*, and *Arabis hoffmannii*. It is possible that *Arabis hoffmannii*, which is currently presumed extirpated from the island, could be re-established. New populations of this species were discovered on Santa Cruz Island after the removal of livestock.

Shrubs and subshrubs will likely show rapid increase in size due to removal of browsing by deer and elk. Reproduction will likely be improved as more flowers and fruits remain on the plants. More seedlings will survive because they are not eaten or trampled. Populations will likely increase in extent, expanding into the annual grasslands. Shrub and subshrub species that are proposed for listing are *Arctostaphylos confertiflora*, *Berberis pinnata insularis*, *Castilleja mollis*, and *Helianthemum greenii*. *Castilleja mollis*, which is partially parasitic on *Isocoma venetus* would likely experience a double benefit as ungulate pressure is removed from both species. *Orobancha parishii*, a Park Species of Concern is also presumed to be parasitic on *Isocoma*, and so would likely benefit from any improvement in that plant's status.



Shrub and tree dominated plant communities (such as chaparral, coastal sage scrub, and mixed woodland) will respond to removal of browsing and trampling impacts. They will likely begin to develop greater species richness in their understories. As reproduction of woody species is enhanced, shrublands and woodlands will begin developing greater age and size class diversity. Seral stage diversity will also likely increase as these communities expand into their former ranges, replacing exotic annual grasslands. Fragmentation of native communities will decrease as a result of this expansion.

Even with complete and immediate removal of non-native herbivores, the reversion of annual grasslands to perennial grasslands is likely to proceed slowly. Annual grass seedlings emerge earlier in the season than perennial seedlings, and so claim a greater portion of moisture, sunlight, and space. Active restoration may be necessary to re-establish the former extent of native perennial grasslands. With the removal of grazing, prescribed fire becomes a viable tool for perennial grassland restoration. Tender young perennials that seed and sprout following fire will no longer be vulnerable to herbivory. Moreover, the temporary loss of forage from a fire will not impact a commercial livestock operation.

Complete removal of deer and elk will allow fuel loadings in shrub and woodland communities to increase. This increase will permit the use of prescribed fire in managing the woodland stands. Chaparral and Bishop pine stands will likely show marked rejuvenation after implementation of an appropriate burn program.

Complete removal of all ungulates will eliminate trampling. This will allow the re-establishment of the soil's microphytic crust. This crust will lead to a reduction in soil erosion and enhance moisture and nutrient availability to plants. Ground nesting pollinators will also benefit from removal of trampling, which may lead to improved reproductive success for native plant species.

All fennel plants on the island would be released from control by grazing. This would likely result in a large increase in seed production, which could lead to significantly increased numbers of plants on the island. Black mustard and wild radish may undergo similar increases. Thistles are likely to continue to expand, but not aggressively. The current weed management program would likely be inadequate to control the spread of these species. Depending upon the extent of the weed invasion, the appearance of the landscape may change substantially, where seasonal fluxes of black mustard or sweet fennel may mask the annual grasses underneath. Eventually (>20 years) native shrub communities would likely invade into former grasslands, further changing the character of the island's landscape.

Effects on forage availability and utilization are irrelevant, under this alternative. Forage availability would increase during the period when cattle are removed, since there would be fewer cattle grazing. Obviously, this is not an issue, since all grazing animals will have been removed from the island.

## **Wildlife**

Implementation of this alternative would have substantial, beneficial effects on wildlife. Under this alternative, the removal of all non-native ungulates would halt deterioration of the island's habitats, with short and long-term benefits for wildlife.

The island fox, island spotted skunk, and deer mouse would benefit from an increase in cover, seeds, grasses, and other plant material as the vegetation slowly recovers; in addition, as the understory slowly recovers, the invertebrate populations should increase which would thus increase the food base for the fox, skunk, and mice. Passerine birds would benefit from an increase in nesting and resting potential as well as an increase in the understory and seed plants. Lizards would benefit from an increase in cover as well as from the increase in invertebrate/prey populations. Predators, including the gopher snake and birds of prey, would benefit from the increase in mouse and lizard populations.

The removal of ungulates from riparian areas would halt the current damage to these areas from trampling and trailing. These water sources would return to natural conditions and become more available to wildlife after the non-native ungulates are removed.

## **Rare Species and Their Habitats**

Effects of immediate removal of ungulates on rare plant species are given in the section on vegetation, above.

Effects on western snowy plover would be identical to those described for the closure of Old Ranch Pasture under Alternative B.

Under this alternative, as under all alternatives, NPS would request consultation with USFWS regarding possible effects on listed species, and would request conference regarding possible effects on proposed species. NPS will work with USFWS to arrive at appropriate mitigation measures to avoid impacts to listed and proposed species.

## **Cultural Resources**

### **Archeological Resources**

Removal of all ungulates within three years would have substantial, beneficial effects on archeological resources, islandwide. Removal of ungulates would halt all current trampling damage to archeological sites. Additionally, cessation of hunting activities after three years would remove the potential for damage to archeological sites from vehicles associated with the hunt.

## **Historical Resources**

This alternative would have no effect upon historical structures or their surrounding historic landscape preservation area. Since no proposed activities would occur at or near historic structures.

## **Cultural Landscape**

Removal of all ungulates within three years would cause the current cultural landscape to be replaced with a landscape more nearly resembling the prehistoric cultural landscape. Since a cultural landscape study has not been completed, it is unknown what effect this would have on potential cultural landscapes.

## **Ethnography**

Removal of ungulates from the island would have slight, beneficial effects on ethnographic resources. Removal of ungulates would return a more traditional appearance to the island. Reduction of erosion should reduce the rate at which burials are exposed. Historic Chumash villages would be less impacted by erosion.

## **Socioeconomic Resources**

### **Regional Economic Environment**

Under this alternative, the ranching and hunting operations on Santa Rosa Island would terminate within three years from the date of implementation of this plan. The effects of this on the regional economic environment are unknown, but likely to be negligible. If the termination of grazing allowed greater visitor access and recreational opportunities on Santa Rosa, then overall effects on the regional recreation industry would be slightly positive.

### **Visitor Use**

Removal of ungulates within three years would have moderate, beneficial effects on visitor use. Visitor activities currently stress low-impact, low-volume activities. Due to the Park's mandate for low visitation, this approach would not change under this alternative. If this alternative is implemented, visitor use during the first three years will continue to be restricted, in order to reduce interference with the closure activities by the permittee. After these first three years, the island would be more accessible to visitors, the demonstration ranch will provide an additional visitor attraction, and recreational activity on and near Santa Rosa Island should increase.



### **Grazing/hunting Permittee**

Implementation of this alternative would result in heavy, significantly adverse effects on the permittee. Removal of all ungulates within three years would drastically alter the current operations of the permittee. Under this alternative, the present SUP would be terminated or amended requiring the permittee to terminate commercial operations and remove all cattle, deer, elk and horses from the island within three years. Vail and Vickers would still retain the right of non-commercial use and occupancy for the 8 acre ranch complex. During the removal process, the permittee would still earn the revenue generated from the sale of each head of cattle presently on the island. However, they would incur costs to remove the cattle, deer, elk and horses within the three year time frame. The permittee will also lose the future expected revenue that would have been generated by the ranching and hunting operation until the year 2011. In addition, the employees of the permittee's ranching and hunting operations will also lose their jobs and associated income.

### **NPS Operations**

This alternative would, overall, have both positive and negative effects on Park operations. The Park would lose the income from the annual SUP fees, which have averaged around \$43,913.55 annually over the last five years. Substantial financial investment in weed eradication and revegetation would be needed to prevent immediate and rapid explosion of non-native weedy plant species. However, NPS would not incur costs for range monitoring.

### **Wilderness**

Implementation of this alternative would have moderate, beneficial effects on wilderness values, which would be improved. Wilderness suitability of the island will improve after all grazing is removed, and all restoration is completed. Under this alternative, restoration efforts may be completed 10-12 years earlier than in all other alternatives.

### **Summary**

Complete and immediate removal of ungulates from Santa Rosa Island, would allow for rapid recovery of riparian areas and improvement in water quality in all drainages, and would remove all grazing and browsing pressure from rare plant species and their habitats. Several species of weeds which are currently being controlled by grazing would probably spread in extent. The permittee's operation would be terminated by implementation of this alternative.

Immediate removal of ungulates would have substantial, beneficial effects on soils, water quality and riparian areas, vegetation, wildlife, rare species and their habitats, and archeological resources. Implementation of this alternative would have no effect on historical resources, unknown effects on cultural landscapes, and slightly beneficial effects on ethnographic resources. There would be unknown effects on the regional economic environment, moderate,

beneficial effects on visitor use, heavy, significantly adverse effects on the permittee, and both positive and negative effects on NPS operations. Implementation of mitigation measures identified in Section 7 consultation with USFWS will prevent impacts to rare species during the three year removal period.

### **Cumulative Effects**

Due to the extensive landscape changes brought about by past and present land use practices, many of the cumulative effects which would be caused by this action are the same as described under previous alternatives. Future cattle grazing under this alternative includes that which would occur until all ungulates are removed from the island (within three years of plan implementation).

On other islands in the Park, past sheep and cattle grazing have led to heavy impacts on soils (Brumbaugh 1980, Johnson 1980). These impacts include intense hillside gully development and loss of soil from wind and water erosion, due to direct and indirect effects of sheep and cattle grazing, as well as loss of microphytic crust. These impacts have largely abated now that sheep and cattle are gone from these islands. Heavy, adverse effects have occurred to soils on Santa Rosa Island as a result of past and current ranching operations. Implementation of the Immediate Removal alternative. Implementation of the Immediate Removal of Ungulates alternative would begin abatement of all these effects within three years. Thus, there would be substantial beneficial cumulative effects on soils on Santa Rosa, and for soil resources on the northern Channel Islands.

Other past, present and future actions affecting water quality and riparian areas in the Central Coast region include the ongoing impacts of ranching activities throughout the Central Coast Region (this region includes Santa Cruz, Santa Clara, San Benito, Monterey, San Luis Obispo and Santa Barbara counties). The water quality problems identified for Santa Rosa Island (discharge of bacteria and sediment) are common among other rangelands in the Central Coast Region (Michael Thomas, Central Coast Regional Water Quality Control Board, personal communication, April 26, 1996). Although the CCRWQC Board has been working with the USFS to incorporate BMPs for water quality improvement into allotment management plans on the Los Padres National Forest, BMPs are not yet in place for most of these rangelands. As a result, there are ongoing, adverse impacts to water quality and riparian areas in other areas of the Central Coast region. If BMPs are implemented on these rangelands, these adverse impacts may be reduced.

As stated in this draft EIS, past grazing by the current permittee on Santa Rosa Island has rendered many drainages non-functional as riparian areas (Rosenlieb et al. 1995). Under this alternative, the phased closure of pastures and reduction in stock as well as the implementation of rotational grazing would begin to restore riparian function to Santa Rosa Island drainages. Under the Immediate Removal alternative, water quality on Santa Rosa would improve and there would be a slight positive cumulative effect on water quality in the Central Coast Region.

Other past, present and future actions affecting vegetation, which are detailed in the cumulative effects section of the No Action alternative, mainly result from past ranching activities on other northern Channel Islands and ongoing feral pig and sheep damage on Santa Cruz Island. In general, these actions have caused widespread conversion of native shrublands and perennial grasslands to communities dominated by non-native annual grasses and weeds. The removal of all ungulates under this alternative would reduce grazing and browsing pressure on shrub communities, and chaparral and coastal sage scrub would begin to recover. Recovery of chaparral and coastal sage scrub communities on Santa Rosa could add substantially to the extent of those communities on the northern Channel Islands. Chaparral currently occupies about 18,000 acres on Santa Cruz Island, and 2,600 acres on Santa Rosa. Removal of deer would also reduce browsing pressure on Bishop pine woodland, which on the islands, only occurs on Santa Cruz and Santa Rosa Island. Thus, implementation of this alternative would have substantial beneficial cumulative effects on shrub and woodland communities of the northern Channel Islands.

The status of the island spotted skunk and Santa Cruz gopher snake on Santa Cruz Island is unknown. Although habitat is generally better on Santa Cruz due to increased cover and greater areal extent of shrub communities, current feral pig rooting and sheep grazing on Santa Cruz may decrease or limit available habitat for both island spotted skunk and Santa Cruz gopher snake. The effects of this limitation of habitat for both species, are unknown. These two taxa are limited in geographic range to Santa Cruz and Santa Rosa Islands. The status of both the skunk and the snake may improve under this alternative when shrub and riparian habitats begin to recover and expand. Implementation of this alternative would thus have substantial beneficial effects on these species on Santa Rosa Island and substantial overall beneficial effects on these species.

Heavy, significantly adverse impacts to rare species and their habitats are the result of the combined effects of past and current grazing and browsing by non-native ungulates. These effects are not limited to Santa Rosa Island, but have occurred on all of the northern Channel Islands, and are discussed under the Cumulative Effects section for the No Action alternative. Past and current land use practices on Santa Rosa Island have been identified by U.S. Fish and Wildlife Service as a factor contributing to the rarity and possible extirpation of the 10 Santa Rosa species proposed for listing as endangered. Under the Immediate Removal alternative, the complete removal of all ungulates within three years would result in significant beneficial effects on rare species, thus beginning to reverse the negative cumulative effects of past land use practices. Of the 10 species proposed for listing as Endangered, four occur only on Santa Rosa, and thus the actions proposed under this alternative would benefit each taxon over the entire range of its distribution. Four other species are extant on Santa Rosa and occur or previously occurred on other islands. These taxa would accrue benefits for a portion of their range or former range. The two remaining species are thought to be extirpated on Santa Rosa Island, but are known to occur on other islands. These taxa would also accrue benefits for a portion of their range or former range. The benefits to Santa Rosa species from implementation of this alternative would comprise a significant beneficial effect on rare species on the northern Channel Islands.



Although significant past and present effects on western snowy plover, California brown pelican and peregrine falcon populations on a regional and national level have led to their designation as threatened or endangered, implementation of this alternative would result in negligible cumulative effects on these listed species. Recovery of populations of the latter two species in the Southern California Bight will occur regardless of the alternative chosen in this plan. There are now about eight successful breeding pairs of peregrines which nest annually on the northern Channel Islands. Although Channel Islands peregrines still exhibit reproductive and survival problems due to accumulation of organochlorines, USFWS has proposed that peregrines be removed from the list of threatened and endangered species due to overall recovery of the species (Federal Register 60 [126]:34406-409). Cumulative effects on western snowy plover will also be negligible. Although plover nesting habitat in Old Ranch Pasture would be protected by removal of cattle, nest failure at Skunk Point may remain high due to high winds and predation, and the site may not add significantly to plover production over the range of the species.

Moderate, significantly adverse effects on cultural resources have occurred due to the combined direct effects of past trampling by non-native ungulates. These effects would be abated by removal of ungulates under this alternative. This would comprise a significant beneficial cumulative effect on cultural resources on the northern Channel Islands.

Under this Targeted Action alternative, cumulative effects on the permittee (ranch operations) would be heavy and adverse, due to economic impacts such as loss of overall grazing capacity on the island, loss of revenue from the hunt, and costs incurred from removing the deer and reducing the elk.

### **Mitigation Required**

The Park would need to control visitor use and access while ungulate removal is occurring. NPS would also need to oversee removal activities to insure no impacts to other resources from vehicle damage, etc. Therefore, NPS will require the permittee to submit a detailed removal plan, with timetable, subject to NPS approval. NPS staff will be on hand to oversee removal activities.

To avoid impacts to listed and proposed species, the Park would implement any mitigation measures derived through consultation and conferencing with USFWS.

## UNAVOIDABLE ADVERSE IMPACTS

The impacts identified below for each alternative are those for which there are no mitigating measures or which could not be mitigated to a level of insignificance.

### **Alternative A                      No Action**

The No Action alternative, by definition, contains no measures to mitigate impacts to resources. Thus, continued cattle grazing and game ranching on Santa Rosa Island under this alternative will result in unmitigated, significant, adverse impacts to soils, water quality and riparian areas, vegetation, rare species and their habitats, and archeological sites.

### **Alternative B                      Minimal Action**

In streams or pastures not targeted for management actions (South , Wire Field, Carrington and Lobo), there would be continuation of current adverse effects of continuous grazing on riparian areas, water quality, populations of rare species and their habitats, archeological sites, and soil.

### **Alternative C                      Targeted Action (The Proposed Action)**

In pastures not targeted for management actions (South, Pocket Field, Lobos, Carrington, Wire Field) as well as in some areas of targeted pastures (North), there would be continuation of current adverse effects of continuous grazing on riparian areas, water quality, populations of rare species and their habitats, archeological sites, and soil.

### **Alternative D                      Conservation Team Recommendations**

In South Pasture, there would be continuation of current adverse effects of continuous grazing on riparian areas, water quality, archeological sites, and soil, until stocking rate is decreased in 2007.

### **Alternative E                      Immediate Removal of Ungulates**

There would be continuation of current adverse effects of continuous grazing on riparian areas, water quality, and archeological sites, for the three year removal period, or until stocking rate decreased substantially.

## **RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY**

### **Alternative A                      No Action**

Under the No Action alternative, some short-term uses of the environment on Santa Rosa Island will continue until 2011. These include all aspects of the cattle ranch and commercial hunt operations. During that 15 year time period, the permittee will annually use the available forage on the island to feed cattle for the stocker operation, and to support the existing herds of deer and elk for the commercial hunt operation. Under the No Action alternative, there will be no new existing short-term uses that will affect long-term productivity.

### **Alternative B                      Minimal Action**

Under the Minimal Action alternative, some short-term uses of the environment on Santa Rosa Island will continue until 2011. These include cattle ranching at current levels, except for the closure of Old Ranch Pasture, and commercial hunting of elk. During that 15 year time period, the permittee will annually use the available forage on the island to feed cattle for the stocker operation, and to support the existing herd of elk for the commercial hunt operation. Under the Minimal Action alternative, there will be no new existing short-term uses that will affect long-term productivity.

### **Alternative C                      Targeted Action (The Proposed Action)**

Under the Targeted Action alternative, some short-term uses of the environment on Santa Rosa Island will continue until 2011. These include cattle ranching at current levels, except for the closure of Old Ranch Pasture and implementation of rotational grazing in North Pasture. Additionally, the permittee will continue the commercial hunt operation for elk. During that 15 year time period, the permittee will annually use the available forage on the island to feed cattle for the stocker operation, and to support the existing herd of elk for the commercial hunt operation. Under the Targeted Action alternative, there will be no new existing short-term uses that will affect long-term productivity.

### **Alternative D                      Conservation Team Recommendations**

Under the Targeted Action alternative, some short-term uses of the environment on Santa Rosa Island will continue until 2011. These include cattle ranching until pastures are phased out from grazing, or until islandwide stocking rate decreases. Additionally, the permittee will continue the commercial hunt operation for elk, though that will be phased out also. During that 15 year time period, the permittee will annually use the available forage on the island to feed cattle for the stocker operation, and to support the existing herd of elk for the commercial hunt operation,



though incrementally less each year. Under the Conservation Team Recommendations alternative, there will be no new existing short-term uses that will affect long-term productivity.

### **Alternative E                      Immediate Removal of Ungulates**

Under the Targeted Action alternative, some short-term uses of the environment on Santa Rosa Island will continue until the end of the three year period for ungulate removal. These uses include cattle ranching and commercial hunt operations for deer and elk. It is unlikely that these short-term uses would have effects on long-term productivity by causing long-term impacts to natural and cultural resources on Santa Rosa Island. Under the Immediate Removal alternative, there will be no new existing short-term uses that will affect long-term productivity.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

*Irreversible* commitments are those which cannot be reversed, except perhaps in the extreme long term. For example, extinction of a species is an irreversible loss. *Irretrievable* commitments are those that are lost for a period of time. For example, restriction of visitor use while an area is temporarily closed would be an ongoing irretrievable loss. The following section identifies irreversible and irretrievable commitments of resources resulting from affirmative actions identified in the various alternatives.

### **Alternative A                      No Action**

Under the No Action alternative, there would be no irreversible or irretrievable loss of resources, because NPS is taking no action, and therefore is not committing resources one way or another. Under the No Action alternative, water quality and conservation of rare species would not improve, but this is due to the existing situation, and not to actions by NPS.

### **Alternative B                      Minimal Action**

Under the Minimal Action alternative, there would be no irreversible or irretrievable loss of resources due to identified actions.

### **Alternative C                      Targeted Action (The Proposed Action)**

Under the Targeted Action alternative, there would be no irreversible or irretrievable loss of resources due to identified actions.

### **Alternative D                      Conservation Team Recommendations**

Under the Conservation Team Recommendations alternative, there would be no irreversible or irretrievable loss of resources due to identified actions.

## **Alternative E**

## **Immediate Removal of Ungulates**

Under the Immediate Removal of Ungulates alternative, there would be no irreversible or irretrievable loss of resources due to identified actions.

## CONSULTATION AND COORDINATION

### THE EIS PROCESS AND PUBLIC REVIEW

All federal actions are subject to review under the National Environmental Policy Act of 1969, which requires federal agencies to assess the environmental consequences of proposed and alternative actions. Because the proposed actions of this resources management plan comprise a major federal action with sufficient controversy, an *environmental impact statement* (EIS) is being prepared to assess the impacts of this action on the natural and cultural environment.

The EIS process is implemented to provide managers with a process for decision-making, and to insure that proposed federal actions have adequate review by the public and other agencies. Though not required by law, public input and review is an integral part of the EIS process, and occurs at all stages. The process begins with *scoping*, in which the federal agency presents the problem to the public and solicits comments both on the *issues* to be considered and the *range of alternatives* which the government should consider when developing solutions to the problem. Using this input, the agency then develops its preferred alternative, which is presented in a *draft environmental impact statement* for a mandatory public review period of 60 days. Public comments are then incorporated into the *final environmental impact statement*, which is released for a 30-day review period before implementation.

The scoping process for this resources management plan began when NPS published a notice of intent to prepare an EIS in the Federal Register on September 15, 1995. The Park then held a series of public meetings and workshops to solicit public opinion on the issues and range of alternatives to be considered.

In November, the Park convened an interagency team, or “core team”, to assist in developing the range of alternatives to be considered. The core team, which comprised federal agency personnel with expertise in management of water quality, grazing, rare plants, and endangered species (see List of Preparers) met periodically through February 1996 to develop the alternatives presented in this plan.

The 60-day review period for this document commences with the release of this draft plan and EIS on May 6, 1996. Comments on this plan will be accepted until July 5, 1996, and the final plan and EIS is scheduled for release on July 30.

### SCOPING AND THE USE OF PUBLIC COMMENTS

In order to solicit public participation in developing the issues and range of alternatives to be considered in this plan, the Park conducted a comprehensive public scoping process. The process included soliciting public comment through public scoping meetings, written comment cards and availability of periodic planning updates.



The Park held three public scoping meetings on October 18, 1995, October 24, 1995 and November 7, 1995. These meetings were publicized through press release and invitations were mailed to over 100 individuals that had previously expressed interest in the issue. Over 40 people attended each meeting.

The Park also provided opportunity for written comment to those that were not able to attend the meeting or did not want to speak publicly. Comment cards were designed and used for this purpose. The Park has received over 35 forms of written comment to date.

Lastly, the Park created one-page planning updates to inform the public of the Park's progress throughout this process. Three different planning updates have been mailed to over 100 interested parties.

The public comments substantially influenced the draft EIS, in regard to the issues to be analyzed and the range of alternatives to be considered.

## ISSUES NOT ADDRESSED

Most of the issues raised during the scoping process have been incorporated in alternatives or addressed as impacts in the EIS. But, several issues were not addressed because they are beyond the scope of the document or did not meet the basic purposes of the resources management plan.

The following are examples of issues which were raised during public scoping but are not addressed in the EIS:

- Establishment of marine refugia areas
- Incorporating Santa Rosa Island into a camping network
- Increased interpretative efforts on Santa Rosa Island, including trails/displays/media
- Increased transportation accessibility for visitors
- A letter writing campaign to increase the funding base for Channel Islands National Park

## AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONTACTED DURING SCOPING

Name	Affiliation
Duncan and Meredith Abbott	
Kerry Blankenship Allen	Santa Cruz Island Foundation
Louis Audalora	
Carolyn Barr	Land Trust for S.B. Co.
Jane Baxter	RangeWatch
Dr. Michael R. Benedict	
Mr. Bob Blecker	Los Padres National Forest
Dr. Robert Breunig	Santa Barbara Museum of Natural History
Roger Briggs	California Regional Water Quality Control Board, Central Coast Region

Name	Affiliation
Melinda Burns	
Bill Bushing	University of California, Santa Barbara
Harry Carter	National Biological Survey
Willy Chamberlain	
Ronilee Clark	California Department of Parks and Recreation
W. James Clawson	
John Cloud	University of California, Santa Barbara
Paul Collins	Santa Barbara Museum of Natural History
W. R. Cowell	
Nancy Crawford	
Mr. Jack Crawford	
A. V. Crawford	
Marla Daley	Santa Cruz Island Foundation
Diane Devine	The Nature Conservancy
Lauren Dody	
Mr. David Dominguez	Tribal Chair, Santa Ynez Indian Reservation
Ron Dow	US Navy, Naval Air Weapons Station
Paul C. Doose	
Charles Drost	National Biological Service
Henry V. Eggers	
Ann Eggers-Jones	
Bill Ehorn	
Fred Emerson	
Laurie Eusey	
Bill Everett	
Gary Fellers	National Biological Service
Cal and Louise French	
H. Paul Friesema	Northwestern University
The Honorable Elton Gallegly	Member, U.S. House of Representatives
Dave Garcelon	Institute for Wildlife Studies
Mel George	University of California, Davis
John Gherini	
Felice Ginsberg	Friends of Channel Islands National Park
David Gold	
George Gough	California Cattlemen's Association
Dr. David M. Graber	National Biological Service
Bill Halvorson	National Biological Service
Greg Helms	Environmental Defense Center
Don Henderson	Resource Concepts
Joan Holtz	
Elden Hughes	Sierra Club
James H. Hurley	
Brian Huse	National Parks and Conservation Association
Larry Iwerks	
Wayne Jensen	

Name	Affiliation
D. Cris and Ann Jones	
Steve Junak	Santa Barbara Botanic Garden
Thomas Keeney	US Navy, Naval Air Weapons Station
Laurie Kelty	Santa Cruz Island Foundation
Marcelin E. Kevin	
Rob Klinger	The Nature Conservancy
Howard Kolb	California Regional Water Quality Control Board, Central Coast Region
Dr. Lyndal Laughrin	University of California
David C. Lederer	
Howard R. Level	
Neil Levine	Environmental Defense Center
Roy W. Lockwood	
Wayne Long	Multiple Use Managers
Lola Lynch	
David Magney	California Native Plant Society
Art Marshall	Ventura Audubon Society
Gail Marshall	
Stephen McCabe	California Native Plant Society
Mary Meyer	California Department of Fish and Game
Orlando Mistretta	Rancho Santa Ana Botanic Garden
Lee Moldaver	Santa Barbara Audubon Society
Roy E. Naftzger	Vickers Co. Ltd.
Diane Noda	U.S. Fish & Wildlife Service
Dr. Jim Nofziger	
Joe and Alice Olla	
Joshua Opelc	
Dr. Elizabeth Painter	
Ralph Philbrick	
Oren Pollak	The Nature Conservancy
Jeff Reiner	USDA/Forest Service
Kathy Rindlaub	
Dr. Emily Roberson	California Native Plant Society
Gary Roemer	Institute for Wildlife Studies
Anne Rosenberry	
Connie Rutherford	U.S. Fish & Wildlife Service
David Salah	
Carson E. Scheller	Santa Barbara Co. Cattlemen's Assoc.
Dr. Edward Schneider	Santa Barbara Botanic Garden
Steve Schwartz	US Navy, Naval Air Weapons Station
Jan Scow	California Native Plant Society
The Honorable Andrea Seastrand	Member, U.S. House of Representatives
John Sharkey	Bonnie Sharpe
Rick Skillin	Sierra Club
Mark Skinner	California Native Plant Society



Name	Affiliation
Grace Smith	US Navy, Naval Air Weapons Station
John Steckman	
Pat Sullivan	
Jan Timbrook	
Brian G. Trautwein	Santa Barbara Urban Creeks Council
Doug Schwartz and Joanne Turner	
Al and Russ Vail	
Mary Vail	
Nita Vail	Vail & Vickers, Inc.
Chuck Warner	
Bill Weinerth	
Adrian Wenner	
Ken Weiss	Vail & Vickers, Inc
Harwood White	
Wayne White	
Ms. Cherilyn Widell	
Dieter Wilken	Vail & Vickers, Inc
John Woolley	
Keith Zandona	
	The Nature Conservancy
	U.S. Fish and Wildlife Service
	Santa Barbara Botanic Garden

## PREPARERS AND CONSULTANTS

### INTERDISCIPLINARY TEAM (DEVELOPMENT OF ALTERNATIVES)

Tim Coonan	Branch Chief for Terrestrial Monitoring and Restoration	National Park Service Channel Islands National Park
Gary Rosenlieb	Hydrologist	National Park Service Water Resources Division
John Bechtold	District Conservationist	Natural Resources Conservation Service
Gary Montgomery	Range Conservationist	U.S. Forest Service Los Padres National Forest
Cece Sellgren	Range Conservationist	National Park Service Channel Islands National Park
Connie Rutherford	Botanist	U.S. Fish and Wildlife Service Ventura Field Office
Karen Danielsen	Botanist	U.S. Forest Service Los Padres National Forest
Laurie Johnson	Botanist	National Park Service Channel Islands National Park

### PLANNING TEAM (IMPACT ANALYSIS AND WRITING)

Tim Coonan	Branch Chief for Terrestrial Monitoring and Restoration	National Park Service Channel Islands National Park
Cece Sellgren	Range Conservationist	National Park Service Channel Islands National Park
Laurie Johnson	Botanist	National Park Service Channel Islands National Park
Greg Austin	Wildlife Biologist	National Park Service Channel Islands National Park
Don Morris	Cultural Resources Specialist	National Park Service Channel Islands National Park
Lee Anne Naue	Environmental Specialist	Environmental Protection Agency





## APPENDICES

### APPENDIX A WEED MANAGEMENT PROGRAM

Although NPS has an firm commitment to extirpate non-native plant species on the Channel Islands (NPS 1980, 1985), the extent of future weed problems on Santa Rosa Island is unknown, as is the availability of funding for such efforts. Thus, two possible programs for weed management are presented below.

**CURRENT PROGRAM:** This represents the level of weed eradication program currently being implemented on Santa Rosa Island. This includes spot spraying of herbicide on non-native plants at growth season. This program allows the eradication of 64 acres of plants in a tour (32 days at 2 acres a day). However, a baseline program such as this can not treat the vast majority of weeds on the island. As a result, many populations of non-native plants are untreated and may spread in extent.

The current program consists of one GS-9 Restoration Biologist implementing the following:

- 3 - 4 island work tours (7 days/tour)
- 1 person at a time
- 80 hours per tour

The cost of this program includes:

- Salary: \$17 per hour
- Transportation: \$800 per season (assuming take the boat most times, but one round-trip Skymaster)
- Materials: \$300 per tour
- 3.5 tours x 80 hours per tour = 280 hours total
- 280 hours x \$17 hour = \$4,760 in salary
- \$300 in materials per tour x 3.5 tours = \$1,050 in materials

Cost of Baseline Program Alone: \$4,760 + \$800 trans + \$1,050 mat = \$6,610 total

Total Acres of Baseline Alone: 64 acres

Cost per Acre: \$103.28

**POTENTIAL MODERATE PROGRAM:** This level of program funding allows for weed control over twice the area treated in the baseline program, or an additional 640 acres (320 days x 2 acres per day).

This program level would comprise:

- 10 tours
- 4 persons per tour
- 80 hours per tour per person

This level of effort would cost:

- Salary: \$20/hr per person
- Transportation: \$1,000 per tour
- Materials: \$600 per tour
  
- 10 tours x 4 person = 40 person/tours
- 8 days per tour x 10 hours per day = 80 hours per tour per person
- 80 hours per tour per person x \$20 per hour per person = \$1,600 per person per tour
- \$1,600 per person per tour x 40 person tours = \$64,000 in salary for 4 people at 10 tours
  
- Transportation = \$1,000 x 10 tours = \$10,000
- Materials = \$600 per tour x 10 tours = \$6,000

Cost of moderate program alone = \$80,000

Total Acres for Moderate alone = 640 acres

Cumulative Cost Total = \$80,000+ baseline (\$6,610) = \$86,610

Cumulative Acres Total = 672 acres

Cost per Acre: \$128.88

## **APPENDIX B            MONITORING PROGRAM**

### **Range Management**

The Park will continue to use Residual Dry Matter methods (Frost et al. 1990) to monitor range conditions on Santa Rosa Island. Upland areas (those areas greater than 1/4 mile from permanent water sources) will be monitored using the rank yield protocol. Residual Dry Matter will be measured biannually (spring and late summer/fall) at each established site. The amount of biomass at each site is visually assessed and then ranked on a scale of one to five. Representative examples of each rank are clipped, oven dried, and weighed. An additional twenty five quadrats (along a transect line) are ranked. The average rank is computed. The five standards and their corresponding weights are used to create a linear regression relationship. The average rank is inserted into the regression equation to determine the average amount of biomass (residual dry matter) at the site.

Presently there are 34 monitoring sites in eight pastures. The sites are designed to represent larger areas of the pasture. The sites are located on flat to moderate slopes, at least 1/4 mile from permanent water sources. The current sites do not address conditions on steep slopes on the island. To remedy this situation, an additional four sites, two each in the North and South pastures, will be added on steep slopes (>25%).

### **Rare Plant Monitoring**

Rare plant monitoring protocols are currently being developed by the National Biological Service's ecologist stationed at Channel Islands National Park.

### **Water Quality and Riparian Areas**

Riparian areas and streams will also be monitored to evaluate effectiveness of prescribed measures to improve water quality and riparian values. Both treated and untreated streams will be monitored. Stream waters will be monitored by measuring water quality parameters. Currently the park monitors nine sites in three streams on a monthly basis for discharge, water temperature, pH, conductivity, salinity, dissolved Oxygen and turbidity, which are tested for *in situ*. Additionally, water samples are taken from one site in each of the three streams and laboratory analysis is performed for total Nitrogen, total Phosphorus, total dissolved solids, total suspended sediments, total coliform, and fecal coliform.

Under implementation of this plan, water quality sampling frequency will be changed from monthly to annually, in order to track bacteria levels, which are highest during the warm season. The following sampling sites will be established (actual sites to be determined in the field):



<b>Drainage</b>	<b>Pasture</b>	<b>Treatment</b>
Old Ranch Canyon	Old Ranch	Pasture Closure
Windmill Canyon	North (Black Mountain)	Rotational Grazing (Summer)
Water Canyon	North (Black Mountain)	Rotational Grazing (Summer) plus SISTLE <sup>1</sup>
Lobos Canyon	North (Brockway)	Large Exclosure
Verde Canyon	North (Brockway)	Rotational Grazing (Winter)
Soledad Canyon	North (Brockway)	Rotational Grazing (Winter) plus SISTLE
Arlington Canyon	Pocket Field	SISTLE
Acapulco Canyon	South	SISTLE
Wreck Canyon	South	None

<sup>1</sup>Strategically Identified Stream, Tactically Located Exclosure

The same water quality parameters will be measured at each site as are currently measured.

Riparian vegetation will also be monitored annually at each of the above water quality sites via the line point vegetation sampling method. The line point method is currently used by the Park to monitor vegetation Parkwide (Halvorson et al. 1988). There are a number of transects located within riparian areas on Santa Rosa Island. Presently the riparian transects cross the stream channel at an angle. The protocol will be adjusted slightly. At each water quality monitoring site, one vegetation monitoring transect will be established. The transect will run perpendicular to the direction of stream flow. The vegetation transect, 30 meters in length, will be surveyed in relation to a permanent marker. At each transect 100 points of data will be collected (at every 30 cm). At each point the substrate, and species composition (from shortest to tallest) will be recorded. From the data collected, percent cover of different vegetation classes (native vs. introduced, upland vs. wetland, shrubs vs. herbaceous, perennial vs. annual) can be calculated. These will be used to monitor changes in the amount of bare ground, native herbaceous vegetation, and non-native vegetation found within the riparian corridor.

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