UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

DRAFT SUPPLEMENT TO THE RESOURCES MANAGEMENT PLAN AND FINAL 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

In August, 1995, the National Park Service began developing a resources management plan for Santa Rosa Island, in order to address impacts from the present commercial ranching and hunt operations on water quality, riparian values, and rare plant species[1] and their habitats. After an initial public scoping period, NPS prepared and distributed for public review a draft resources management plan and environmental impact statement (Draft RMP/EIS) in May 1996. During a public review period of 125 days, NPS received over 240 comments on the draft plan. The NPS subsequently revised the draft RMP/EIS and addressed all substantive comments in a Final RMP/EIS, released in April, 1997. In a Record of Decision (ROD) signed in July, 1997, NPS stated that it would implement the actions described in the Proposed Action, Alternative D, Revised Conservation Strategy, of the Final RMP/EIS.

This supplement to the Final RMP/EIS introduces a new alternative being considered by NPS for management of Santa Rosa Island. This new alternative, Alternative F, Negotiated Settlement, results from recent negotiations among the National Park Service, Vail & Vickers, and the National Parks and Conservation Association (NPCA). These negotiations were convened to resolve two lawsuits that were filed against NPS during the RMP/EIS process. The first lawsuit (NPCA v. Kennedy) was filed by NPCA against the NPS. This suit alleged that the NPS' management of the Vail & Vickers cattle, deer and elk operation did not protect Park resources adequately. Vail & Vickers ultimately intervened in this suit. Vail & Vickers also filed a separate lawsuit (Vail et al. v. Galvin) after the NPS issued the July, 1997 ROD. This suit alleged that the NPS' decision to implement Alternative D violated an agreement between the NPS and Vail & Vickers under which Vail & Vickers argued they could continue their operation until 2011. NPCA intervened in this suit.

The three parties to these lawsuits began meeting in July, 1997 to explore settlement options. After months of negotiations, the parties agreed to a new management plan for cattle, horses, deer and elk, subject to the NPS' compliance with the National Environmental Policy Act (NEPA) process. The management plan agreed upon by the parties is embodied in Alternative F.

---

[1] "Rare species" includes species which have been **listed** as threatened or endangered under the Endangered Species Act and those which have been identified as **species of concern** by the National Park Service.

Whereas many elements of Alternative F are similar to Alternative D, there are some differences. The NPS has therefore decided to invite public comment on Alternative F as well as the other alternatives by circulating this Draft Supplement to the Final RMP/EIS. Accordingly, NPS is distributing this Draft Supplement to the Final RMP/EIS for review by affected public agencies, interest groups, businesses and individuals for a 60-day public comment period. After considering comments received, the NPS will issue a Final Supplement to the Final RMP/EIS and a new ROD.

This Draft Supplement to the Final RMP/EIS 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 of plants and animals on Santa Rosa, as well as the habitats upon which they depend.

Description of the Action: Under Alternative F, Negotiated Settlement (the Proposed Action), water quality and riparian values would be improved and rare plants and their habitats would be conserved by a rapid removal of cattle and a phased removal of deer and elk from Santa Rosa Island. With the exception of 12 head in Lobo Pasture, all cattle would be removed from the island by the end of 1998. Deer and elk would be removed by the end of 2011, although they could be removed earlier if necessary to achieve recovery goals for selected listed species and their habitats. After an initial reduction in deer and elk, an adaptive management program for deer and elk would be implemented. Under adaptive management, deer and elk would be managed at levels which would allow rare species and their habitats to recover. Provided recovery goals are met, Vail & Vickers will be allowed to conduct commercial hunting of deer and elk. After the adaptive management period, deer and elk populations would be eliminated during a final phaseout period. If, for some reason, an acceptable adaptive management program cannot be developed, deer and elk populations will be reduced at a pre-determined rate. As under Alternative D, the Park would implement road management actions to reduce impacts to island streams, and would develop a comprehensive alien plant management plan to address problems caused by alien species. The Park would develop monitoring programs for rare species, water quality and riparian recovery. Visitor access to Santa Rosa Island would be increased beyond current levels.

Summary of Environmental Impacts: Rapid removal of cattle would allow for rapid recovery of riparian areas and improvement in water quality in all drainages, and would remove some grazing pressure from rare plant species and their habitats. The permittee's cattle operation would be voluntarily terminated by implementation of this alternative. Adaptive management of deer and elk would augment recovery of indicator species and their habitats, because allowable deer and elk levels would be tied to attainment of recovery standards. Implementation of Alternative F 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, negligible effects on cultural landscapes, and slightly beneficial effects on ethnographic resources. Under this alternative, Vail & Vickers would have reduced revenues. This alternative would have both benefits and impacts to NPS operations. The Park would no longer bear the cost of overseeing cattle management actions after 1998, but would incur some additional costs under the adaptive management program for deer and elk, as well as possible deer and elk removal costs.

Alternatives Considered: A) No Action; B) Minimal Action; C) Targeted Management Action; D) Revised Conservation Strategy; E) Immediate Removal of Ungulates, and F) Negotiated Settlement (the Proposed Action). Information on the other alternatives may be found in the Final RMP/EIS. A summary of the different elements in each alternative, including Alternative F, may be found in Table 1. Similarly, a summary of the environmental consequences of each alternative, including Alternative F, may be found in Table 2. These tables replace Tables 1 and 2 from the Final RMP/EIS.

Inquiries on the Draft Supplement to the Final RMP/EIS and requests for copies of the Draft or Final RMP/EIS should be directed to Channel Islands National Park, 1901 Spinnaker Drive, Ventura, CA 93001, or by telephone at (805) 658-5776.

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

ELEMENT	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
Pastures Targeted for Management Actions	none	Old Ranch North Pocket Field	Old Ranch North	Old Ranch North South Pocket Field Carrington Wire Field	All	All
Pasture Closures	none	Old Ranch closed to cattle	Old Ranch closed to cattle and horses	Old Ranch (1997) Carrington (1998) Pocket Field (2000) North (2008)	All	Old Ranch closed to cattle immediately; all but 12 cattle removed from SRI by December 31, 1998
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	Jolla Vieja (South Pasture) Box Canyon (Wire Field)	none	none

ELEMENT	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
Management of Deer	none	Removal within 5 years	Removal within 3 years	Removal by 2000	Removal within 3 years	Adaptive management at herd levels which will allow rare plants and their habitats to recover, or, if standards for recovery cannot be developed, reduction of deer to 0 by 2003
Management of Elk Herd	none	none	Reduced to 450 within 3 years	Phased out over 14 years	Removal within 3 years	Adaptive management at herd levels which will allow rare plants and their habitats to recover, or, if standards for recovery cannot be developed, gradual reduction to 0 by 2011
Rotational Grazing	no	no	Seasonal grazing rotation implemented within North Pasture. Riparian areas protected from summer grazing.	no	No	No

ELEMENT	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
Changes in Grazing Management	none	none	Minimum Residual Dry Matter (RDM) raised from 400 to 1000 lb./ac	Pasture stocking set by phaseout schedule and monitored by monthly reporting of head-days Minimum RDM raised from 400 to 1000 lb./ac, but used only to adjust stocking rates in drought years	Not applicable	Not applicable
Weed Management	Expanded program	Expanded program	Expanded program	Expanded program focused on pastures with reduced stocking levels	Expanded program	Expanded program
Management Action in 2011	Rapid removal of all ungulates islandwide	Rapid removal of all ungulates islandwide; initiate island restoration	Rapid removal of all ungulates from 95% of the island; initiate island restoration	Remove last 60 elk and last cattle	Continue island restoration programs	Final removal of all deer and elk by December 31
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	Water quality monitoring changed to track recovery of water quality values and riparian function. Add rare plant monitoring.	No range monitoring. Quarterly water quality monitoring in targeted and untargeted pastures. Annual monitoring of riparian areas.	No range monitoring. Under adaptive management for deer and elk, annual monitoring of deer herd, elk herd, and rare plants and their habitats.

ELEMENT	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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 riparian exclosure construction on archeological sites. Oversight required for deer and elk removal program. Park will comply with terms and conditions of recommended by RWQCB for water quality certification for road stream crossing maintenance. 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.	Deer and elk reductions under adaptive management program, to protect and recover rare plant species and their habitats. Oversight required for removal program. The Park will prohibit off-road driving in identified resource-sensitive areas. Horses will be prevented from impacting riparian resources in Old Ranch Pasture by placement of salt or molasses blocks, and/or construction of exclosure fencing. BMP's for deer/elk management and road management will be applied if WQ monitoring reveals impacts. Other mitigation measures may be required by USFWS.

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

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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.	Impacts to soils will be gradually 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.	Rapid removal of cattle would remove much of the current soil impacts. Deer and elk may continue to impact soils in steep terrain and in areas where they concentrate. Otherwise, stabilization and recovery of soils should subsequently occur.

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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 closed pastures will improve significantly, and progressively, as grazing is phased out on a greater proportion of the island. Water quality and riparian areas in Pocket Field will improve significantly when the pasture is closed to grazing in 2000. Reduction of stocking levels in North Pasture to 25% of current level will improve water quality and riparian function. Jolla Vieja and Box Springs will be protected by exclosures.	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.	Rapid removal of cattle would remove the majority of ungulate impacts to riparian areas and water quality. 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.

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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.	Rapid reduction of deer and the gradual phaseout of elk and cattle will remove gazing and browsing pressure on vegetation. 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.	Effects will be the same as described under Revised Conservation Strategy, but recovery of native plants and vegetation communities would be more rapid.	Rapid removal of cattle would remove a major source of grazing and trampling impacts. Adaptive management of deer and elk will allow recovery of woody communities such as chaparral and coastal sage scrub.

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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.	Gradual reduction of cattle will remove a source of disturbance and weed dispersal. Weed populations may initially increase in closed pastures. 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 at first. These species will be controlled and eradicated by an aggressive weed control program.	Same as described under Revised Conservation Strategy.	Rapid removal of cattle will remove the major source of soil disturbance that weeds such as thistles require for establishment. Thistle populations will thus decrease following removal of cattle grazing and associated disturbance. Fennel, mustard and radish will be released from grazing pressure, and will grow to normal height. These species will be controlled and eradicated by an aggressive weed control program.

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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.	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.	The rapid removal of cattle and adaptive management of deer and elk will significantly improve habitat values for wildlife. Recovery of vegetation following implementation will increase cover and forage resources for wildlife.

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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, and in pastures where stocking levels have been reduced. 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 gradual reduction of elk will greatly reduce browsing and grazing pressure on rare plant species. Closure of pastures to grazing will allow NPS to use prescribed fire to restore habitat for rare species.	All grazing and browsing pressure on rare plants, and their habitats, will cease. This will facilitate recovery of all rare plant populations.	Grazing pressure on rare plants will be greatly reduced by the rapid removal of cattle. Adaptive management of deer and elk will greatly reduce browsing and grazing pressure on rare plant species and will allow rare species and their habitats to recover.

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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	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.	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.	Rapid removal of cattle and adaptive management of deer and elk will have essentially the same effects as under Alternative E.

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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.	There would be no effect on historic structures or the surrounding historic landscape preservation area.
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.	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 except the historic landscape preservation area centered upon the Beecher's Bay Ranch.

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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. During the elk and deer reduction, some areas may be temporarily closed to visitor access for reasons of public safety.	Progressive recovery of riparian areas and upland habitats in closed pastures and as grazing is phased out may enhance the visitor experience. There will be expanded visitor access to the island. The requirement for Ranger escort will be eliminated for most visitor travel.	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.	There would be increased visitor opportunities for recreation on the island under this alternative. Visitor access to parts of the island may increase. Recovery of riparian areas and vegetation communities may enhance the visitor experience. For safety reasons, there would be restrictions on visitor use of the island during deer and elk hunts.

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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. The permittee would bear the costs of construction of small riparian exclosures.	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. The permittee would bear the costs of construction of small riparian exclosures. Raising the minimum RDM level could impact ranch operations during drought years, when forage production is lower.	Ranch would lose revenue from deer portion of annual hunt. The permittee would bear the costs of elk reduction, and would lose profits due to a reduced elk hunt later in the phaseout period. Each pasture closure and subsequent reduction in islandwide grazing capacity would have commensurate effects on ranch profits. Grazing capacity would be reduced 50% four years after implementation of this plan. The permittee would bear the costs of construction of small riparian exclosures.	Complete removal of ungulates would have substantial effects on the permittee. Anticipated revenue from grazing and hunting operations would be lost.	Under this alternative, the permittee's cattle ranching operation would cease by the end of 1998. The permittee would continue the deer and elk hunting operations possibly until 2011, though a final phaseout of ungulates would begin in 2008. Deer and elk herds may be reduced or eliminated prior to 2008. The permittee would share the costs of the adaptive panel, and may incur all the costs of managing deer and elk.

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
NPS	No effects on Park operations, beyond costs of an expanded weed management program. NPS will bear costs of restoration and weed management. Overall costs of weed management and restoration would be highest under A, since cattle would continue to disturb soil and riparian areas, and vector weeds.	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.	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. Restoration costs may be less overall, due to earlier mitigation of grazing impacts.	The Park would lose revenue from grazing fees, once livestock is removed. Park would incur costs of weed management program required to control weeds released by removal of grazing earlier than under A-D, but overall costs would be less due to earlier mitigation of grazing impacts on weeds. Restoration costs may be less overall, due to earlier mitigation of grazing impacts.	The Park would no longer incur the costs of cattle management. The Park would share the costs of the adaptive management panel, and may assist the permittee with deer and elk removal. Restoration and weed management costs may be less overall, due to earlier mitigation of grazing impacts. Park would incur costs of weed management program required to control weeds released by removal of grazing sooner than under A-E.

IMPACT TOPIC	ALT. A NO ACTION	ALT. B MINIMAL ACTION	ALT. C TARGETED MANAGEMENT ACTION	ALT. D REVISED CONSERV. STRATEGY	ALT. E IMMEDIATE REMOVAL	ALT. F NEGOTIATED SETTLEMENT
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. 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.	Wilderness values may be improved. Wilderness suitability of island will improve after all grazing is removed, and all restoration is completed.

CONTENTS

INTRODUCTION 1
ALTERNATIVES 3
Alternative F. Negotiated Settlement (The Proposed Action) 3
Summary 3
Differences Between Alternative F and Alternative D, Revised Conservation Strategy 4
Removal of Cattle 5
Management of Ranch Horses 6
Adaptive Management of Deer and Elk 7
Restoration 15
Monitoring 16
Expanded Alien Plant Management Program 16
Road Management Actions 18
Increased Visitor Opportunities 19
ENVIRONMENTAL CONSEQUENCES 21
Alternative F: Negotiated Settlement 21
Natural Resources 21
Cultural Resources 31
Socioeconomic Resources 32
Summary 33
Cumulative Effects 34
Mitigation Measures 36
Unavoidable Adverse Impacts 36
Relationship Between Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity 37
Irreversible and Irretrievable Commitments of Resources 37
BIBLIOGRAPHY 40

ILLUSTRATIONS

Figure 1. Removal schedule for cattle, deer and elk under Alternative F. Actual numbers of deer and elk during the Adaptive Management Period would vary. 5
Figure 2. Off-road vehicle driving restrictions on Santa Rosa Island. Off-road vehicle driving is permitted in all pastures except for Old Ranch and Carrington (shaded), where driving is restricted to existing roads. 20

TABLES

Table 1. Summary of alternatives for Resources Management Plan, Santa Rosa Island. iv
Table 2. Summary of impacts associated with alternatives for Resources Management Plan, Santa Rosa Island..... viii
Table 3. Cattle management actions, Santa Rosa Island, under Alternative F. 6
Table 4. Horse management actions, Santa Rosa Island, under Alternative F. 6
Table 5. Management actions for deer under Alternative F. 10
Table 6. Management actions for elk under Alternative F. 12
Table 7. Herbicide use on Santa Rosa Island, 1995-1996. 18
Table 8. Status of former proposed plant species, after publication of final rule for northern Channel Islands listing package (Federal Register, Vol. 62, No. 147, pp. 40954 - 40974). 24

INTRODUCTION

In August, 1995, the National Park Service began developing a resources management plan for Santa Rosa Island, in order to address impacts from the present commercial ranching and hunt operations on water quality, riparian values, and rare plant species and their habitats. After an initial public scoping period, NPS prepared and distributed for public review a draft resources management plan and environmental impact statement (Draft RMP/EIS) in May 1996. The proposed action in the Draft RMP/EIS was Alternative C, Targeted Management Action. The proposed action included immediate closure of Old Ranch Pasture, development of seasonal rotational grazing in North Pasture, construction of off-line water developments, construction of small riparian exclosures, removal of deer within three years, reduction of elk, an increase in minimal residual dry matter standards, and an expanded alien plant management program.

During a public review period of 125 days, NPS received over 240 comments on the draft plan. Many comments, including those from scientists and environmental groups, urged the Park to rapidly phase out or immediately end ranching and hunting on the island. The Permittee and local and regional ranching interests urged the Park to take minimal actions, or to take no action.

The NPS subsequently revised the draft RMP/EIS and incorporated all substantive comments into a Final RMP/EIS, released in April, 1997. The proposed action in the Final RMP/EIS was Alternative D, Revised Conservation Strategy. The proposed action included a gradual phaseout of cattle, horses and elk, a rapid phaseout of deer, an expanded alien plant management program, road management actions, and increased visitor access.

In a Record of Decision (ROD) released in July, 1997, NPS stated that it would implement the actions described in the Proposed Action, Alternative D, Revised Conservation Strategy, of the Final RMP/EIS.

During the development of this resources management plan, the NPS was sued by both an environmental group, National Parks and Conservation Association (NPCA), and Vail & Vickers, which operates a cattle, deer and elk operation on the island. The NPCA filed suit against NPS in October, 1996, alleging that the 1993 Special Use Permit issued to Vail & Vickers by NPS violated various statutes, including the Clean Water Act, the National Historic Preservation Act, the Coastal Zone Management Act, the NPS Organic Act, the Park's enabling legislation, and various NPS regulations. The suit also alleged that NPS violated the Endangered Species Act (ESA) by allowing cattle to harm snowy plovers, a species federally listed as threatened under the ESA.

In June, 1997, Vail & Vickers sued NPS, alleging that implementation of the proposed action in the Final RMP/EIS would cause economic harm to the Vail & Vickers operation and thereby violate an alleged agreement between NPS and Vail & Vickers regarding the sale of the island to the United States and the continuance of the Vail & Vickers' operation.

Because all parties in these two cases wished to resolve their differences and avoid further litigation, NPS, NPCA and Vail & Vickers began negotiations in July, 1997 regarding a new management alternative for Santa Rosa Island which would achieve the objectives of the RMP/EIS, comply with all applicable federal laws and regulations, and protect the core interests of each party. This Draft Supplement to the Final RMP/EIS introduces a newproposed action, , Alternative F, Negotiated Settlement, which resulted from those negotiations. This new alternative is now the proposed action for this Draft Supplement to the Final RMP/EIS. Accordingly, NPS is distributing this Draft Supplement to the Final RMP/EIS for review by affected public agencies, interest groups, businesses and individuals during a 60-day public comment period. The NPS is soliciting comments on all the alternatives, including Alternative F. After the end of the comment period, NPS will review the comments and issue a Final Supplement to the Final RMP/EIS and a new ROD.

The reader should refer to the original Final RMP/EIS for information not contained in this Supplement, such as descriptions of other alternatives and their environmental consequences, and a description of the affected environment.

ALTERNATIVES

Alternative F. Negotiated Settlement (The Proposed Action)

Removal of Cattle, Retention of a Limited Horse Herd, Adaptive Management of Deer and Elk, Expanded Alien Plant Management Program, Road Management Actions, Increased Visitor Access

Targeted Pastures: All

Summary

Under this alternative, water quality and riparian values would be improved and rare plants and their habitats would be conserved by a rapid removal of cattle and a phased removal of deer and elk from Santa Rosa Island (Fig. 1). With the exception of 12 head in Lobo Pasture, all cattle would be removed from the island by the end of 1998. Deer and elk would be managed under an adaptive management program and could remain on the island as long as 2011, provided that recovery goals for selected listed plant species and their habitats were achieved. After an initial reduction in numbers, deer and elk would be maintained at a steady state or reduced, if necessary, to levels which would allow selected listed species and their habitats to recover. Provided that recovery goals are met, Vail & Vickers would be able to continue to conduct commercial hunting of deer and elk. After the adaptive management period, deer and elk populations would be brought down to zero during a final phaseout period. If an acceptable adaptive management program cannot be developed, deer and elk populations will be reduced at a pre-determined rate.

As under Alternative D, the Park would implement road management actions to reduce impacts to island streams, and would develop a comprehensive alien plant management plan to address problems caused by alien species. Off-road vehicle use will be restricted. The Park would develop monitoring programs for rare species, water quality and riparian recovery. Recreational opportunities for visitors to Santa Rosa Island would be increased beyond current levels.

The management actions described here would be incorporated into a new Special Use Permit for Vail & Vickers which would replace the existing Special Use Permit. Similar to previous SUP's for the Vail & Vickers operation, the new SUP would be valid for a period of up to five years. Subsequent SUP's would be issued to Vail & Vickers provided that the activities authorized by the SUP continue to comply with all applicable laws and policies.

The actions contained in this alternative pertain only to the commercial ranching and hunting operation currently operating on Santa Rosa Island, and to the Park's road maintenance program. These proposed actions do not affect the Park's long range plan to develop and maintain a demonstration ranch on approximately 800 acres at Beecher's Bay (General Management Plan, 1985). The purpose of the demonstration ranch would be to interpret the ranching history of the island.

Differences Between Alternative F and Alternative D, Revised Conservation Strategy

At the time that negotiations started among NPS, NPCA and Vail & Vickers, the proposed action in the Final RMP/EIS was Alternative D, Revised Conservation Strategy. The NPS entered into negotiations with the perspective that any new alternative would have to fully comply with all applicable laws and regulations, as Alternative D did, and that NPS would not accept an alternative with greater impacts than under Alternative D. The latter was thus used as a benchmark in negotiations. The final product of the negotiations, Alternative F, is similar to Alternative D in some respects, but different enough in others to warrant its inclusion as a separate alternative, rather than as another revision of Alternative D.

The major differences between alternatives D and F concern management of cattle, horses, deer and elk. Under Alternative D, cattle grazing on Santa Rosa Island would be gradually phased out. Grazing levels would be reduced to approximately half of current use by 2001, and would remain at this reduced level until final phaseout of cattle occurs from 2008 to 2011. Old Ranch Pasture would be closed immediately, Carrington Pasture in one year, and Pocket Field Pasture in three years. North Pasture would be closed within eight years of plan implementation, and South Pasture and several smaller pastures would remain open to grazing until the end of 2011.

In contrast, under Alternative F, all cattle except for 12 head would be removed from the island by the end of 1998. Old Ranch Pasture would be closed immediately to cattle grazing. The 12 head remaining on the island after 1998 would be allowed to graze only in Lobo Pasture, and would have to be removed by the end of 2011.

Under Alternative D, horses would be treated the same as cattle, and subject to the same pasture closures and AUM reductions. Under Alternative F, horses would be treated separately. Vail & Vickers would be allowed keep a maximum of 150 horses (including foals) on Santa Rosa Island until the end of 1999. After that date, not more than 50 horses (including foals) would be allowed to remain on Santa Rosa Island. All horses would be removed from Santa Rosa Island by the end of 2011. Beginning in 1998, Vail & Vickers would be allowed to keep up to 12 horses and up to eight foals in Old Ranch Pasture. All horses will be removed from Old Ranch Pasture at the time they are weaned or by March 31, 1999, whichever comes first. Thereafter, Vail & Vickers may keep up to 12 horses (including foals) in Old Ranch Pasture until December 31, 2011. Beginning in 1999, no horses would be allowed in Carrington Pasture.

Under Alternative D, deer would be phased out rapidly, and elk would be phased out gradually over the next 14 years. Under Alternative D, deer would be removed from the island by 2000, whereas under Alternative F, both deer and elk would be managed under an adaptive management program which would tie annual allowable deer and elk levels to achievement of recovery standards for indicator species of selected listed plants and their habitats. A panel of three scientists would develop recovery standards and a monitoring protocol for indicator species of rare plants, and their habitats. After an initial reduction period, deer and elk would be managed at annual levels which allowed rare species and their

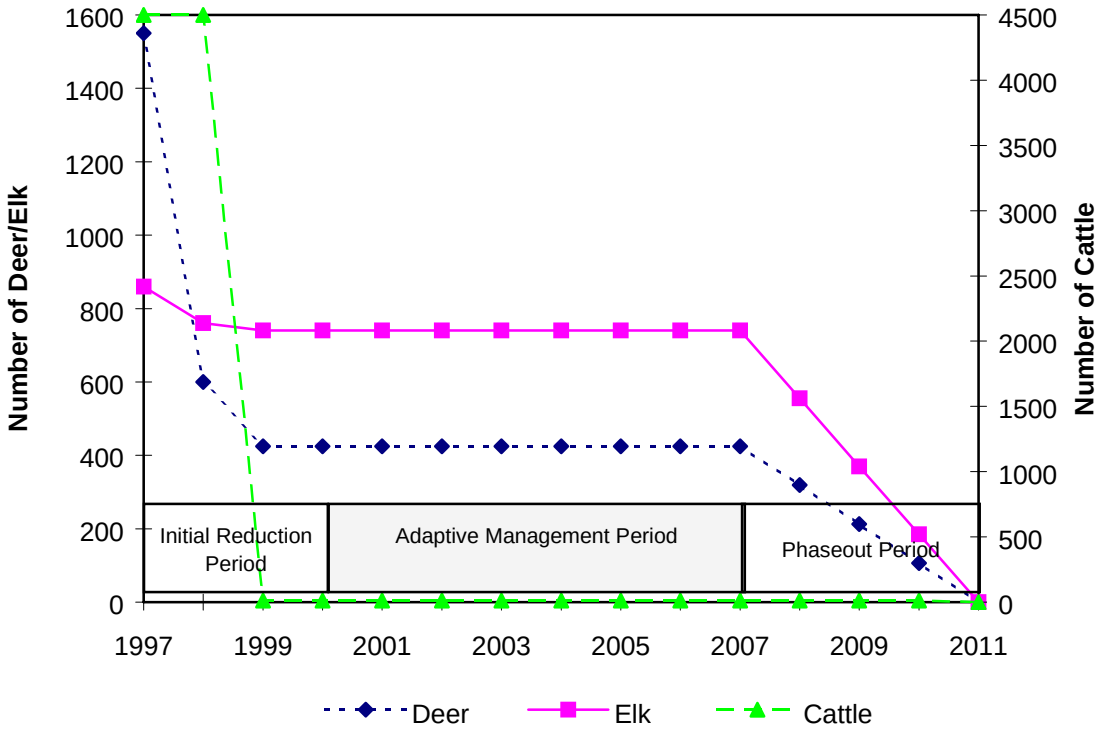

Figure 1. Removal schedule for cattle, deer and elk under Alternative F. Actual numbers of deer and elk during the Adaptive Management Period would vary.

habitats to recover, as indicated by annual monitoring of those species. If annual recovery standards for rare species and their habitats are not met, then further reductions of deer and/or elk would be required, potentially resulting in removal of all animals, until recovery standards are met. If recovery standards are met, the adaptive management program would end in 2007, and a final phaseout of deer and elk would occur from 2008 to 2011. If an acceptable adaptive management program cannot be developed, deer and elk populations will be reduced at a pre-determined rate.

The following elements are the same under Alternative F as under Alternative D: expanded alien plant management program, road management actions, and increased visitor access.

Removal of Cattle

Under Alternative F, Vail & Vickers would remove all cattle from Santa Rosa Island by December 31, 1998, with the exception of 12 head in Lobo Pasture. The following would occur :

1. Old Ranch Pasture would be immediately closed to cattle.
2. Carrington Point Pasture would remain open for cattle grazing until December 31, 1998. NPS would monitor the threatened and endangered species in this pasture in the spring and institute passive means to mitigate adverse effects to these species as needed.
3. Distribution among pastures of cattle Animal Unit Months ("AUM's") may not exceed the AUM allotment as given in Bartolome and Clawson (1992).

4. At the end of each quarter, Vail & Vickers would report to the National Park Service the average monthly distribution of cattle by pasture.
5. After December 31, 1998 and until December 31, 2011, Vail & Vickers may keep no more than 12 head of cattle on Santa Rosa Island in Lobo Pasture.

Table 3. Cattle management actions, Santa Rosa Island, under Alternative F.

Date	Action
Immediately	Old Ranch Pasture closed to cattle
12/31/1998	All cattle removed from Santa Rosa Island, except for 12 head in Lobo Pasture
12/31/2011	All cattle removed from Santa Rosa Island

Management of Ranch Horses

Under Alternative F, Vail & Vickers would be allowed keep a maximum of 150 horses (including foals) on Santa Rosa Island until the end of 1999. After that date, not more than 50 horses (including foals) would be allowed to remain on Santa Rosa Island. All horses would be removed from Santa Rosa Island by the end of 2011. Beginning in 1998, Vail & Vickers would be allowed to keep up to 12 horses and up to eight foals in Old Ranch Pasture. All horse will be removed from Old Ranch Pasture at the time they are weaned or by March 31, 1999, whichever comes first. Thereafter, Vail & Vickers may keep up to 12 horses (including foals) in Old Ranch Pasture until December 31, 2011.Beginning in 1999, no horses would be allowed in Carrington Pasture.

In order to keep horses away from sensitive resource areas in Old Ranch Pasture, Vail & Vickers would place salt and molasses blocks in areas designated by NPS. If the NPS determines that passive means of keeping the horses away from sensitive resources are ineffective, Vail & Vickers would be responsible for 50% of the cost of constructing fencing as specified by NPS to prevent horses from accessing sensitive resource areas. NPS would be responsible for the other 50% of the cost.

Table 4. Horse management actions, Santa Rosa Island, under Alternative F.

Date	Action
12/31/1997	No more than 150 horses allowed, islandwide. No more than 12 horses and eight foals allowed in Old Ranch Pasture..
12/31/1999	No more than 50 horses allowed, island wide. No horses allowed in Carrington Pasture. No more than 12 horses (including foals) allowed in Old Ranch Pasture
12/31/2011	All horses removed from Santa Rosa Island

Adaptive Management of Deer and Elk

Under this alternative there would be an initial reduction of deer and elk in 1998 and 1999. Beginning in 2000, an adaptive management program would be implemented for deer and elk. Under adaptive management, allowable annual levels of deer and elk would be tied to meeting specific recovery standards for indicator species of rare plants and their habitats. If recovery standards are not met, deer and elk would be reduced, or, if need be, eliminated in order to meet recovery standards. If recovery standards are met, Vail & Vickers would be able to continue their commercial hunt operation throughout the adaptive management period (2000 to 2007). A final phaseout period will occur from 2008 to 2011, during which commercial hunting may also continue, but during which deer and elk herds will be brought down to zero.

Setting Adaptive Management Levels for Deer and Elk:

Castilleja mollis and *Arctostaphylos confertiflora* and their habitats have been selected as indicator species for the purposes of managing deer and elk populations. *Castilleja mollis* was chosen as an indicator species because it has been shown to be impacted by both deer and elk (McEachern et al. 1997) and occurs in discrete populations that can be monitored. *Arctostaphylos confertiflora* was chosen as an indicator species because it occurs in, and is representative of, island chaparral, one of Santa Rosa's more impacted vegetation communities. Because *Arctostaphylos confertiflora* has been impacted heavily by deer (McEachern et al. 1997); changes in its status and trend would mirror changes in the chaparral community.

Ecological standards for selected indicator species of rare plants would be developed by a Scientific Panel of three scientists, with one scientist to be designated by Vail & Vickers, one scientist to be designated by NPS, and the third scientist selected by the first two. Vail & Vickers has designated John Menke of UC Davis, and NPS has chosen Ed Schreiner of USGS Biological Resources Division. Michael Barbour of UC Davis has been selected as the third scientist.

The Panel would perform three functions:

1. Recommend standards that would effect biologically meaningful and beneficial changes in the status and trend of the indicator species *Castilleja mollis* and *Arctostaphylos confertiflora* and their habitats during the Adaptive Management period.
2. Recommend a monitoring protocol; and
3. Make annual individual recommendations to NPS regarding the reduction of deer and elk or other management techniques, if any, that are required to meet its standards.

The Panel would convene or otherwise confer as necessary. The cost of the Panel would be shared equally by NPS and Vail & Vickers, except that NPS and Vail & Vickers would each bear the entire cost for its own appointed scientist.

Development of Standards and Monitoring Protocol

For deer, the Panel would establish standards to effect biologically meaningful and beneficial changes in the status and trend for *Castilleja mollis* (Carrington Pasture), *Arctostaphylos confertiflora* (island-wide) and their habitats during the Adaptive Management Period. For elk, the Panel would establish standards so as to effect biologically meaningful and beneficial changes in the status and trend for *Castilleja mollis* in Pocket Field and its habitat during the Adaptive Management Period. Each of the standards established must be met during the Adaptive Management Period.

The NPS will consider the recommended standards from the panel members and then submit proposed standards to U.S. Fish and Wildlife Service for determination of conformance with Section 7(a)(2) of the Endangered Species Act ("ESA").

By December 31, 1998, the Panel would prepare a report regarding the status quo of the Indicator Species. By the same date, the Panel would also prepare a report setting forth the recommended standards and monitoring protocol to be used during the Adaptive Management period. By December 31, 1999, the Panel would prepare a report detailing any changes in the status quo of the Indicator Species from the previous year. Reductions to acceptable deer and elk levels for the first year of adaptive management would have to be met by the end of the year 2000.

If the Panel is unable to agree by majority vote on a system of standards and monitoring in time for implementation in January 2000, the reduction of deer and elk would follow Option 1 from Tables 5 and 6 for both deer and elk. Under Option 1, deer would be phased out by 2003. Elk would be reduced by 100 per year until 2002 and 50 per year thereafter, and would be phased out by 2011.

Initial Reduction Period (1998-1999)

By December 31 of each year of the Initial Reduction Period, Vail & Vickers must reduce the number of deer and elk to the numbers specified in Tables 5 and 6, Option 2 for deer and elk respectively. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.

Adaptive Management Period (2000-2007)

During the Adaptive Management Period, acceptable deer and elk levels would be tied to ecological standards for the selected indicator species. Standards would be developed that insure negligible impact to rare plants and their habitats by deer and elk, and which result in improved status and trend for those species and habitats. If annual standards are not met, deer and elk would be reduced or eliminated, if need be, in order to meet recovery standards. During the Adaptive Management Period, the NPS would perform annual monitoring of indicator species and their habitats according to the monitoring protocol developed by the Panel. One or more of the Panel members may oversee this monitoring. Within 30 days of receipt of the monitoring results, the Panel will confer and use the results of the monitoring program to prepare a report regarding the status quo of the indicator species, and whether the recovery standards were met. In addition, each Panel member will prepare an individual

recommendation to the Park Superintendent and the Regional Director ("RD") for the Pacific West Region regarding a reduction, if any, of the number of elk or deer on Santa Rosa Island.

Within 30 days of receipt of the Panel's report and the individual recommendations, the Superintendent and the RD would make a decision regarding the reduction, if any, of deer and elk allowed on Santa Rosa Island during the Adaptive Management Period based upon the information contained in the Panel's report, the recommendations of the individual panel members, available scientific information, and upon any other applicable laws, regulations or policies. The decision would be made in writing, and include the reasons for any material deviation from the individual recommendations.

If Vail & Vickers disagrees with the NPS' decision, they may request mediation within 30 days after issuance of the decision. The mediation must begin within 60 days, and the cost of mediation would be equally shared by NPS and Vail & Vickers.

By December 31 of each year specified during the Adaptive Management Period, Vail & Vickers must reduce or maintain the number of deer and elk to the number set by the NPS. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration. The number can be no higher than 425 deer and 740 elk. The maximum number of deer and elk allowed per year under adaptive management is specified in Tables 5 and 6, Option 2. After January 1, 2005, the number of deer cannot be increased to an amount exceeding the maximum number of deer allowed in the previous year.

If, for some reason, the Panel is unable to develop a system of standards and monitoring in time for implementation by January 2000, reduction of deer and elk would occur according to the schedule in Tables 5 and 6, Option 1. Under this scenario, deer would be phased out by 2003, and elk would be gradually reduced to zero by 2011.

Phaseout Period (2008-2011)

If deer and/or elk remain on the island as of the end of 2007, a Phaseout period would begin in 2008. From 2008 to 2011, straight percentage reductions of deer and elk would be implemented, with no deer or elk remaining by the end of 2011.

By December 31 of each year specified during the Phaseout Period, Vail & Vickers must reduce the number of deer and elk by the specified percentage of animals in Tables 5 and 6, Option 2.

Vail & Vickers may reduce the number of animals sooner than specified in Tables 5 and 6. In the last year that Vail & Vickers would have elk or deer on Santa Rosa Island, Vail & Vickers would remove the remaining deer and elk to the greatest extent feasible. Provided that Vail & Vickers meets all deer and elk reduction requirements prior to 2011, and provided that the remaining deer and elk in 2011 become extraordinarily difficult to remove despite the diligent efforts of removal by Vail & Vickers, NPS would equally share the "unusual costs" of the removal of those deer and elk. "Unusual costs" are defined as the cost of trained professionals and helicopters.

Annual Deer and Elk Counts

Before the end of 1997 and annually thereafter, an annual count of the elk and deer populations would be conducted jointly by NPS and Vail & Vickers. NPS would annually prepare a report concerning the numbers, distribution and composition of animals. Vail & Vickers and NPS would share the costs of the count equally.

Cooperation Between the Park and Vail & Vickers in Deer and Elk Reduction

The NPS has retained the discretion to assist Vail & Vickers in deer and elk reduction in order to maintain the ability to deal with resource problems, should they arise. Therefore, NPS may elect to assist Vail & Vickers with deer and elk reduction during either the Initial Reduction, Adaptive Management or Phaseout periods, if such action is necessary to protect Park resources from impacts by deer and/or elk. The NPS may choose to assist Vail & Vickers during some or all of these years. Such cooperation by NPS is entirely discretionary; that is, NPS is not required to assist Vail & Vickers with deer and elk removal. Moreover, any such cooperation does not relieve the permittee of their responsibility to remove deer and/or elk.

Such cooperation by NPS may comprise funding or implementing immuno-contraception of deer or elk, or direct reduction of deer or elk. Direct reduction methods would include shooting from the ground or from a helicopter. These methods may be implemented by trained and certified Park personnel, by agency personnel, or by contractors.

Table 5. Management actions for deer under Alternative F.

Date	Action	Responsible Party (ies)
Option 1 - Straight Reduction of Deer		
12/31/98	No more than 550 deer permitted on SRI	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/99	No more than 350	V&V responsible for animal reductions.
12/31/00	No more than 250	V&V responsible for animal reductions.
12/31/01	No more than 150	V&V responsible for animal reductions.
12/31/02	No more than 100	V&V responsible for animal reductions.
12/31/03	0	V&V responsible for animal reductions.
Option 2 - Adaptive Management of Deer		
5/31/98	700	V&V responsible for animal reductions.

Date	Action	Responsible Party (ies)
		Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/98	600	Scientific Panel to complete standards and monitoring protocol. V&V responsible for animal reductions.
12/31/99	425	Monitoring program implemented by NPS. V&V responsible for animal reductions.
12/31/00	Adaptive Management begins 1/1/2000. If standards for *Arctostaphylos confertiflora* (island-wide) and *Castilleja mollis* (Carrington Pasture) and their habitats are met, no more than 425 deer would be permitted. If standards are not met, deer would be further reduced.	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/01	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/02/02	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/03	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/04	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/05	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.

Date	Action	Responsible Party (ies)
12/31/06	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/07	" " Adaptive Management ends.	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/08	Deer numbers would be reduced to 75% of the ceiling number allowed in 2007.	V&V responsible for animal reductions.
12/31/09	Deer numbers would be reduced to 50% of the ceiling number allowed in 2007.	V&V responsible for animal reductions.
12/31/10	Deer numbers would be reduced to 25% of the ceiling number allowed in 2007.	V&V responsible for animal reductions.
12/31/11	All deer would be removed from SRI	V&V responsible for animal reductions. NPS will assist with extraordinary costs provided that V&V meet deer and elk reduction requirements prior to 2011, and that the animals are extraordinarily difficult to remove .

Table 6. Management actions for elk under Alternative F.

Date	Action	Responsible Party (ies)
Option 1 - Straight Reduction of Elk		
12/31/98	No more than 800	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/99	No more than 700	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/00	No more than 600	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park

Date	Action	Responsible Party (ies)
		administration.
12/31/01	No more than 500	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/02	No more than 400	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/03	No more than 350 (provided *Castilleja mollis* standards are attained, per Alternative D)	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/04	No more than 300	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/05	No more than 250	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/06	No more than 200	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/07	No more than 170	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/08	No more than 140	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/09	No more than 110	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/10	No more than 60	V&V responsible for animal reductions. Removal

Date	Action	Responsible Party (ies)
		activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/11	0	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
Option 2 - Adaptive Management of Elk		
12/31/98	No more than 760	Scientific Panel to complete standards and monitoring protocol
12/31/99	No more than 760	Monitoring program implemented by NPS
12/31/00	Adaptive Management begins on 1/1/2000. If standards for *Castilleja mollis* (Pocket Field) and its habitat are met, no more than 740 elk would be permitted. . If standards are not met, elk would be further reduced.	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/01	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/02	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/03	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/04	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/05	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.

Date	Action	Responsible Party (ies)
12/31/06	" "	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/07	" " Adaptive Management ends.	V&V responsible for animal reductions. Monitoring program implemented by NPS. NPS will determine number of ungulates permitted on the island as of the end of the year.
12/31/08	Elk numbers would be reduced to 75% of the ceiling number allowed in 2007.	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/09	Elk numbers would be reduced to 50% of the ceiling number allowed in 2007.	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/10	Elk numbers would be reduced to 25% of the ceiling number allowed in 2007.	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.
12/31/11	All elk would be removed from SRI	V&V responsible for animal reductions. Removal activities must be coordinated with NPS to avoid impacts to rare species, visitors, or park administration.

Restoration

Under Alternative F, the Park would implement the same restoration actions as under Alternative D, Revised Conservation Strategy. The NPS would undertake a number of actions to restore native plant communities and rare species on Santa Rosa Island. Actions to be undertaken are:

- Seed banking of federally listed and NPS 'sensitive' plant species
- Control of invasive alien plants in sensitive habitats
- Testing of fire as a tool for restoration of native plant communities
- Restoration plantings of *A. hoffmannii, A. confertiflora, Dudleya gnoma, Dudleya candelabrum, Ceanothus* spp., *Quercus tomentella,* and other rare species in the upland areas, and *Populus trichocarpa* ssp. *balsamifera, Sambucus mexicana, Salix lasiolepis,* and *Baccharis salicifolia,* and a variery of herbaceous species, in riparian areas.

- Erosion control in sensitive habitats

Assuming continuation of existing funding levels, NPS would have adequate funds to undertake the above actions. Implementation of additional desirable actions, such as large-scale erosion control, growing and transplanting of rare species, and more extensive control of alien plants, would be contingent on receiving additional funds or other assistance.

Monitoring

Under Alternative F, the Park would implement essentially the same monitoring programs as under Alternative D, Revised Conservation Strategy.

Rare Plant Monitoring

Rare plant monitoring protocols are currently being developed by Kathryn McEachern, Research Ecologist, U.S.G.S Biological Resources Division, Channel Islands Field Station (McEachern 1996, McEachern et al. 1997). Current methods focus on surveys for populations of rare species, and demographic monitoring (population density, size-class sampling) for selected species. The terrestrial monitoring program at Channel Islands National Park would assume responsibility for monitoring rare plant species on Santa Rosa Island. Appropriate monitoring would be conducted for all listed species, depending on such factors as known distribution, immediacy of threats, etc.

Water Quality and Riparian Areas

The Park is currently working with the NPS Water Resources Division and the Regional Water Quality Control Board to shift its Santa Rosa Island water quality monitoring from a limited program tracking compliance with water quality standards to a comprehensive program focused on documenting recovery of water quality values and riparian function. The Regional Water Quality Control Board has indicated its approval of the concept of such a shift in monitoring. Riparian monitoring would be designed to measure changes in the resource attributes that would document over time the progress in achieving the overall goal of improving streambank cover and stability to decrease bank and channel erosion. Water quality values would continue to be monitored by synoptic sampling of fecal-indicator bacteria and nutrients. The Park would work with the RWQCB to ensure that the monitoring program meets applicable State standards.

Expanded Alien Plant Management Program

As under Alternative D, Revised Conservation Strategy, the Park's alien plant management program would be expanded with the following actions: 1) implementation of a three year program to survey current alien plant infestations, research life-history characteristics of alien plants, and prioritize alien plants for control efforts, and test and evaluate control methods and 2) development of a comprehensive alien plant management plan for the Park.

Alien Plant Surveys and Prioritization

Channel Islands National Park began receiving three-year project funding beginning in fiscal year 1997 to survey current occurrence and distribution of invasive alien plants, predict their future expansions in numbers and ranges, research life-history characteristics of at least 140

individual taxa, and prioritize alien plants for control efforts. A ranking system (Hiebert and Stubbendieck 1993) has been developed for resource managers to classify alien plants within a park according to the species' level of impact and its innate ability to become a pest. This information can then be weighed against the feasibility or ease of control. The ranking system is designed to first separate the "innocuous" species from the "disruptive" species. The separation allows researchers to then concentrate further efforts on species in the disruptive category.

The system is also designed to identify those species that are not presently a serious threat but that have the potential to become a threat and which thus should be monitored closely. Finally, the system incorporates the ecological costs of delaying any action.

In order to use this system, and to apply the results toward effective vegetation management, the Park needs to acquire background life history information on alien plants in the Park, map and describe their occurrences, and compile data on their impacts on ecosystem processes and on control methods.

The Park would acquire background information on alien species through literature reviews and consultations with alien plant control specialists and other land managers with alien plant control experience. All of these species also occur over much of California and the West, so this information is widely applicable. The "Alien Species Ranking System" would be applied to alien plants in the Park, the results evaluated, and control programs would be tested on a suite of the highest priority species. Results of these experiments would be assessed, and recommendations for further implementation would be made.

Alien Plant Management Plan

Based on the results of the alien plant prioritization project, the Park would develop a comprehensive alien plant management plan to guide alien plant management actions in the future.

Herbicide Use

Annual herbicide use is expected to increase in the near future, as the Park expands its alien plant management program on Santa Rosa Island. The amount of herbicide required will depend upon the scope of the alien plant problem and the rate of eradication. However, it is anticipated that an expanded alien plant management program would use 2-3 times the amount of herbicide currently used on an annual basis.

In 1995 and 1996, the Park used a total of 8.7 gal of Roundup® Herbicide (Monsanto Co., St. Louis) and 8.5 gal of Garlon 3A® Herbicide (DowElanco Co., Indianapolis) on approximately 3000 acres on Santa Rosa Island in control efforts for thistles, fennel, tumbleweed, horehound and mustard/radish (Table 7). The application method is spot treatment, in which foliage of individual plants is sprayed with dilute herbicide, via backpack sprayer, using a low-pressure, low-volume method. To avoid spray drift, application is not attempted during periods of moderate to high winds, and spray shields are also used to more effectively direct the herbicide, and to protect desirable adjoining vegetation. Application is supervised by certified pesticide applicators, and is done in accordance with the directions for

use and precautions provided by the herbicide manufacturer, on both the herbicide label and material safety data sheet. The Park obtains annual NPS approval for specific pesticide use in the Park, and daily and annual pesticide use logs are maintained. Annual pesticide use is reported.

Proposed herbicide use does not include any Class I or Class II controlled substances regulated under the Clean Air Act as ozone-depleting substances.

Table 7. Herbicide use on Santa Rosa Island, 1995-1996.

Herbicide	1995			1996		
	Amount	Acres	Target	Amount	Acres	Target
Roundup	--	--	--	8.7 gal	2000	thistles
Garlon 3A	4.0 gal	440	horehound fennel tumbleweed thistles	4.5 gal		*Brassica* fennel tumbleweed thistles

Alien plant eradication efforts would be focused initially on the several high-priority target species occurring in Old Ranch Pasture, which was closed to cattle in 1997, and selectively on the very-highest-priority species where they occur elsewhere on the island.

Road Management Actions

The Park would implement the same road management practices as under Alternative D, Revised Conservation Strategy:

1) The Park has developed and has implemented a protocol for road use during bad weather - specifically, no road use would occur. Every operator of a vehicle on the island must be drive-tested and approved by the resident island Ranger or maintenance person regardless of past driving experience. Operators of heavy equipment must be licensed and approved through the Park's Chief of Maintenance following extensive on-island training and evaluation. These actions would help minimize the need for road maintenance.

2) A road inventory is being developed using the Park's geographic information system (GIS). This includes digitizing the island road system. The stream crossing data previously developed for the Clean Water Act Section 404 permitting process would be entered into the GIS. The location of the 28 miles of regraded/repaired roads would be entered into the GIS along with priorities for repair for remaining ungraded road sections.

3) In 1993 the Park purchased a $125,000 road grader. Prior to that the Park had only a small bulldozer to repair roads, which was inadequate to properly grade roads. A WG-11 Equipment Operator was hired, and to date he has resloped and regraded approximately 28 miles of the island's 54 miles of roads. Road grading would only occur during the spring of each year when soil moisture conditions are acceptable, so the annual time available to work on the roads is limited.

4) All roads are being outsloped whenever possible, according to 1992 recommendations from a hydrologist. Park staff try to avoid inboard ditches and culverts whenever possible because of the higher degree of maintenance required.

5) The Park has surveyed a proposed route for a by-pass for the most severely eroded and unrepairable section of the island road system, the beginning of the Smith Highway. A future environmental assessment would evaluate the benefits and impacts of such a road.

6) The Park has applied for and received from the U.S. Army Corps of Engineers an individual permit for the routine maintenance of 63 road stream crossings on Santa Rosa Island. The State Water Resources Control Board issued water quality certification for the project, subject to conditions recommended by the Central Coast Regional Water Quality Control Board. The Park would comply with all permit conditions.

The Park has also identified sensitive resource areas where off-road driving would be prohibited, under this alternative (Fig. 2).

Increased Visitor Opportunities

As under Alternative D, Revised Conservation Strategy, visitor opportunities on Santa Rosa Island would be increased beyond present levels. Until recently, unescorted visitors were restricted to the Water Canyon drainage, the beach at Beecher's Bay, and the road up to and including the Torrey Pines Grove. All other travel was prohibited unless escorted by a Park Ranger. These restrictions were lifted in 1997, and visitors are now allowed to travel unescorted to all parts of the island, with the following exceptions:

1) Skunk Point beaches are closed to public access March 1 to September 15 to protect nesting western snowy plovers, as per USFWS biological opinion.
2) Camping on beaches is seasonally restricted for protection of seabirds, pinnipeds and plovers, as per Park beach camping plan.
3) The reserved area of the main ranch at Beecher's Bay (approximately 8 acres), as specified in the deed of sale, is only open to visitation under Ranger escort. The remaining barn structures are accessible with Ranger permission.
4) During periods of the elk and deer hunt, visitation to certain portions of the island may be temporarily restricted for reasons of public safety.
5) Sandy Point is closed year round for protection of pinnipeds and seabirds.

Other temporary closures may be required to protect natural or cultural resources, or to ensure visitor safety.

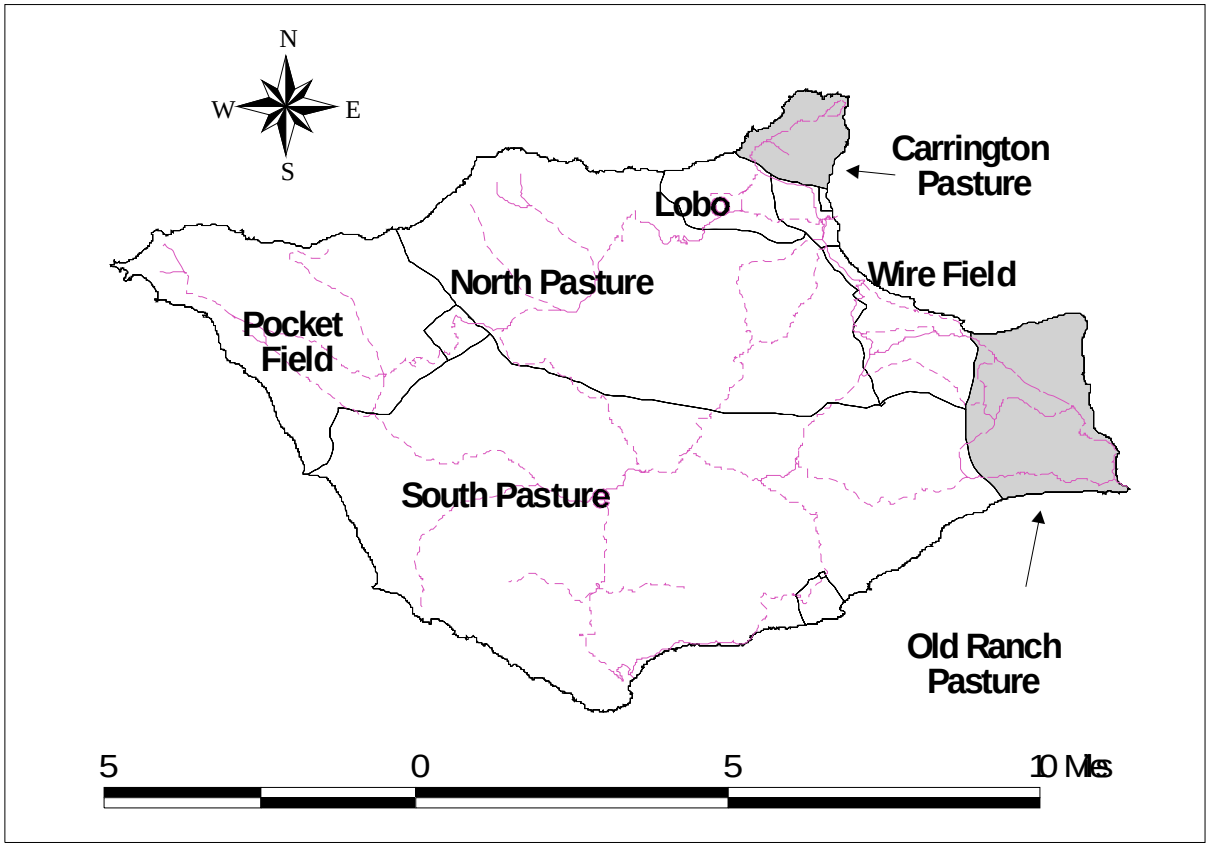

Figure 2. Off-road vehicle driving restrictions on Santa Rosa Island. Off-road vehicle driving is permitted in all pastures except for Old Ranch and Carrington (shaded), where driving is restricted to existing roads (as depicted on map).

ENVIRONMENTAL CONSEQUENCES

Alternative F: Negotiated Settlement

Natural Resources

Soils

Implementation of Alternative F would have substantial, beneficial effects on soil resources. Removal of virtually all cattle from the island by December 31, 1998 would remove the majority of present impacts to island soils. Stabilization and recovery of soils should subsequently occur. There would 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.

There may be minor, localized impacts to soils from remaining deer and elk populations on the island. In particular, recovery of the eroded and trampled areas in chaparral habitat may be delayed, if significant deer numbers remain on the island. Under this alternative, as many as 425 deer may remain on Santa Rosa Island until 2008, at which time the final phaseout of deer and elk may occur. Most of the remaining deer use will be around the chaparral habitat near Black Mountain.

As under the No Action alternative, there would still be off-road vehicle travel by ranch vehicles during elk and deer hunts, and by NPS vehicles or contractors during cooperative deer and/or elk reduction efforts. This may result in localized compaction of soils and increased susceptibility to erosion due to loss of vegetation. To mitigate these impacts, the Park has identified sensitive resource areas where off-road driving will be prohibited (Fig. 2). These effects would diminish and eventually halt as deer and elk populations declined, and ungulate reduction/commercial hunting decreased.

As under Alternative D, Revised Conservation Strategy, there would be no effects to soils from herbicide use proposed under this alternative. Herbicide use would probably remain at or slightly above existing levels (Table 7). The Park uses Garlon 3A (active ingredient triclopyr) and Roundup (active ingredient glyphosate). In soil and in aquatic environments, triclopyr, a selective, systemic herbicide, rapidly converts to an acid, which in turn is neutralized to a salt (EXTOXNET 1993). Triclopyr is rapidly degraded by soil microorganisms. The half-life in soils is from 30 to 90 days, with an average of about 46 days. Triclopyr is readily translocated throughout a plant after being taken up by either roots or the foliage. The estimated half-life in aboveground drying foliage is two to three months. Breakdown by sunlight is the major means of triclopyr degradation in water; the half-life is 10 hours at 25° C.

Glyphosate, a broad-spectrum, non-selective systemic herbicide, is so highly adsorbed on most soils that little is expected to leach from the application area (EXTOXNET 1994). Microbes are responsible for breakdown of the product, and the half-life in soil ranges from 1-174 days.

Photodecomposition plays only a minor role in environmental breakdown. Glyphosate may be extensively metabolized by some plants while remaining intact in others. Once in the plant tissue, the chemical is translocated throughout the plant, including to the roots.

The spot treatment method of application minimizes the amount of herbicide that contacts soil.

Water Quality and Riparian Areas

Implementation of Alternative F would have substantial, beneficial impacts to the streams, riparian areas, and water quality of the island. Removal of virtually all cattle by the end of 1998 would remove the primary impactor of water quality and riparian systems. After removal of cattle, riparian vegetation would likely grow rapidly if appropriate vegetation and/or seed sources are available (Skovlin 1984). Some riparian areas on the island lack a source of native riparian plants. In these areas, restoration efforts may be required to restore riparian vegetation. For example, the Park has recently begun restoration of riparian areas in Old Ranch Pasture. Whether recovery occurs naturally or with the assistance of restoration, vegetative cover along stream banks would likely increase under this alternative. 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 be decreased. Fecal and urine inputs from cattle would cease by the end of 1998, once cattle were 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.

The 12 cattle remaining in Lobo Pasture until 2011 will have negligible effects on water quality in that pasture, due to the small number of cattle (relative to the large number of cattle in pastures and riparian areas prior to implementation of this plan). And the few water sources in that pasture.

The retention of a small herd of horses in Old Ranch Pasture has the potential to retard recovery of riparian vegetation. Horses may congregate in areas of rehabilitation or natural recovery, and may graze on recovering riparian vegetation. In order to prevent this, Vail & Vickers would place salt and molasses blocks in areas designated by NPS. If the NPS determines that passive means of keeping the horses away from sensitive resources are ineffective, Vail & Vickers and NPS will split the cost of fence construction for fencing required to prevent horses from accessing sensitive resource areas. These measures will largely eliminate the potential for any adverse impacts to sensitive resources in Old Ranch Pasture.

Deer and elk populations remaining on the island until 2011 would have negligible effects on water quality and riparian areas, though deer and elk browsing and grazing may retard recovery of woody riparian vegetation. The ecological response of deer and elk to removal of cattle is

unknown; that is, deer and/or elk may or may not spend more time in riparian areas once cattle are removed. With improved forage for both deer and elk islandwide as a result of cattle removal and adaptive management, it is unlikely that deer or elk use of riparian areas will result in impacts to water quality.

If the Park's water quality monitoring program reveals problems due to deer or elk, Vail & Vickers will implement best management practices (BMP's) in order to meet water quality standards. Likewise, if the monitoring program reveals water quality problems due to road management practices, NPS will implement BMP's for road management as mitigation measures.

There would be no effects on water quality from herbicide application under this alternative. Herbicide would not be applied near water, and therefore would have little chance of leaching into groundwater or surface waters. Glyphosate binds tightly to soil particles and would decompose *in situ* within 1-6 months following treatment. Although triclopyr is much more mobile in the soil (it does not adsorb to soil particles), it breaks down more rapidly in soil (approximately 45 days) and very rapidly in water (10 hours). It is practically non-toxic to fish and aquatic invertebrates.

Vegetation

On July 25, 1995, U.S. Fish and Wildlife Service (USFWS) proposed endangered status for 16 plant taxa from the northern Channel Islands. Included in this proposal were 11 plant species which currently occur or historically occurred on Santa Rosa Island. In their listing proposal, USFWS 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.

In July, 1997, USFWS issued a final ruling on the status of the Santa Rosa Island plants proposed for listing as endangered. Three of the proposed plants were removed from the listing package (e.g., were not listed as endangered or threatened): *Dudleya blochmaniae* ssp. *insularis, Dudleya gnoma,* and *Heuchera maxima*. *Helianthemum greenei* was listed as threatened, rather than endangered. *Arabis hoffmanii, Arctostaphylos confertiflora, Castilleja mollis, Gilia tenuiflora* ssp. *hoffmanii, Malacothrix indecora,* and *Phacelia insularis* ssp. *insularis* were listed as endangered. Thus, there are eight listed plants that currently occur or historically occurred on Santa Rosa Island. *Berberis pinnata* ssp. *insularis* and *Helianthemum greenei,* historically occurred on Santa Rosa Island, but have not been relocated in recent surveys.

Table 8. Status of former proposed plant species, after publication of final rule for northern Channel Islands listing package (Federal Register, Vol. 62, No. 147, pp. 40954 - 40974).

Scientific Name	Common Name	Status
Arabis hoffmannii	Hoffmann's rock-cress	FE
Arctostaphylos confertiflora	Santa Rosa Island manzanita	FE
Berberis pinnata ssp. *insularis* *	Island barberry	FE
Castilleja mollis	Soft-leaved paintbrush	FE
Dudleya blochmaniae ssp. *insularis*	Santa Rosa Island dudleya	SSC
Dudleya gnoma	Munchkin dudleya	SSC
Gilia tenuiflora ssp. *hoffmannii*	Hoffmann's slender-flowered gilia	FE
Helianthemum greenei *	Island rush-rose	FT
Heuchera maxima	Island alumroot	SSC
Malacothrix indecora	Santa Cruz Island malacothrix	FE
Phacelia insularis ssp. *insularis*	Island phacelia	FE

*Presumed extirpated from Santa Rosa Island
FE = Federally listed as Endangered
FT = Federally listed as Threatened
SSC = Park Species of Special Concern (removed from listing package in final rule)

The ruling became effective on Sept. 2, 1997 (U.S. Fish and Wildlife Service 1997). Those species that were removed from the package are still considered to be Park Species of Concern. Table 8 summarizes the revised status of the proposed species, following the final rule.

Implementation of this alternative would result in substantial, beneficial effects to vegetation. Implementation of this alternative would remove all cattle 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 by cattle. Reproductive cycles would no longer be interrupted by consumption or breakage of flowering/fruiting structures. Several of the rare plant species, or their habitats, have been impacted substantially by cattle grazing and trampling. These include *Castilleja mollis*, *Dudleya blochmaniae* ssp. *insularis*, *Dudleya gnoma*, *Gilia tenuiflora* ssp. *hoffmannii*, *Malacothrix indecora*, and *Phacelia insularis* ssp. *insularis*. These species and their habitats will benefit from removal of cattle.

Implementation of adaptive management of deer and elk would ensure recovery of rare plants and their habitats. Allowable levels of deer and elk would be tied directly to attainment of established standards for two rare species (*Arctostaphylos* and *Castilleja*) and their habitats that will serve as indicator species, as evident in annual monitoring. If recovery does not occur on schedule (if standards are not attained), NPS can require the permittee to reduce deer and/or elk. The inherent flexibility of adaptive management would allow an appropriate management response to ensure recovery of island vegetation. Adaptive management thus acts as a safeguard. Additionally, NPS would consult with FWS regarding impacts of these proposed actions on listed species.

Under adaptive management, vegetation would still be subject to grazing, browsing, and trampling by deer and elk, but these impacts would decrease over time as the numbers of these animals are decreased. In response to removal or reduction of these direct effects, the majority of the vegetation would show an increase in plant size, plant density, and population area. Those rare plant species which have been substantially impacted by deer and elk will benefit from reduction and adaptive management of deer and elk. Those rare species include *Arabis hoffmannii* , *Arctostaphylos confertiflora*, and *Castilleja mollis*.

Under adaptive management of deer and elk and removal of cattle, annual plants would show rapid recovery. This includes the federally listed endangered species *Gilia tenuiflora* ssp. *hoffmannii*, *Malacothrix indecora*, and *Phacelia insularis* var. *insularis*. Recovery would 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 would likely show a rapid two-phased recovery following implementation of cattle removal and adaptive management of deer and elk. The first response would be an increase in size and vigor of existing plants. This would begin immediately upon reduction of herbivory and trampling. Reproductive success would also be increased, which should be followed by an increase in the number of seedlings. Seedling survival would be enhanced by the lack of herbivory and trampling. Enhanced seedling survival will lead to the second phase of recovery, which is increased population density and extent. The long term effect of increased population density and extent would be a reduction in vulnerability to extinction through stochastic (random) events. Among the herbaceous species likely to exhibit this type of response is *Arabis hoffmanii*, a federally listed endangered species.

Under implementation of Alternative F, shrubs and subshrubs may show an increase in size due to a decrease in browsing by deer and elk. Reproduction would likely be improved as more flowers and fruits remain on the plants. More seedlings may survive because they are not eaten or trampled. Populations may increase in density, which would provide improved soil protection. Populations may also increase in extent, expanding into the annual grasslands. Shrub and subshrub species that are federally listed as endangered are *Arctostaphylos confertiflora*, *Berberis pinnata* ssp. *insularis*, *Castilleja mollis*, and *Helianthemum greenei* (listed as threatened*). Castilleja mollis*, which is partially parasitic on *Isocoma venetus* would likely experience a double benefit as ungulate pressure is removed from both species. *Orobanche 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) would respond positively to a decrease in browsing and trampling impacts. They would likely begin to develop greater species richness in their understories. As reproduction of woody species is enhanced, shrublands and woodlands would begin developing greater age and size class diversity. Seral stage diversity would also likely increase as these communities expand into their former ranges, replacing alien annual grasslands. Fragmentation of native communities would decrease as a result of this expansion.

Even with complete removal of cattle, the reversion of annual grasslands to perennial grasslands and shrublands 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 techniques, such as prescribed fire, may be necessary to re-establish the former extent of native perennial grasslands.

Riparian vegetation is likely to respond favorably to the removal of cattle and reduction of deer and elk. The past and current level of grazing and browsing on herbaceous and woody species has reduced or eliminated their reproductive success, which has led to decadent, depauperate plant communities. Trampling of streambanks by ungulates has caused vegetation mortality and streambank instability, which increases the likelihood of further vegetation loss during flood events. By reducing grazing, browsing, and trampling, reproduction will be improved and channel morphology allowed to stabilize, increasing the number of sites available for seedling establishment and decreasing the number of vegetated sites obliterated by flood events. Grazing on riparian herbaceous species will likely be nearly eliminated. This will likely cause an increase in plant cover on streambanks, which will further improve stability; plant cover and stream stability are part of a positive feedback loop that also includes water quality and habitat for aquatic invertebrates. Herbaceous riparian communities will benefit more than woody riparian communities, as deer and elk are likely to browse any new shrubs or trees.

With the removal of cattle grazing, prescribed fire may become a viable tool for restoration of shrublands and perennial grasslands. Tender young perennials that seed and sprout following fire would no longer be vulnerable to cattle. They would still attract deer and elk. Partial removal of deer and elk may allow fuel loading in shrub and woodland communities to increase. This increase may permit the use of prescribed fire in managing the woodland stands, though remaining deer and elk herbivory would decrease the efficacy of such burns. Chaparral and Bishop pine stands would likely show marked rejuvenation after burning. However, seedlings or resprouts would probably be eaten by deer. Thus, the Park will not be able to use fire as a management tool in chaparral and Bishop pine until deer have been substantially reduced in number.

Complete removal of cattle will decrease soil trampling. This will encourage the re-establishment of the soil's microphytic crust. This crust reduces soil erosion and enhances moisture and nutrient availability to plants. Ground nesting pollinators would also benefit from removal of trampling, which may lead to improved reproductive success for native plant species.

Retention of 15 horses in Old Ranch Pasture will have negligible effects on vegetation, except that horses may be attracted to and may graze or browse upon recovering riparian vegetation. In order to keep horses away from sensitive resource areas in Old Ranch Pasture, Vail & Vickers would place salt and molasses blocks in areas designated by NPS. If the NPS determines that passive means of keeping the horses away from sensitive resources are ineffective, Vail & Vickers would be responsible for 50% of the cost of constructing fencing as specified by NPS to prevent horses from accessing sensitive resource areas. NPS would be responsible for the other 50% of the cost.

Retention of 12 head of cattle in Lobo Pasture until 2011 will have negligible effects on vegetation, relative to past and current levels of grazing in that pasture.

Off-road driving conducted for the commercial hunting or cooperative ungulate reduction programs would have localized impacts on vegetation. Some grasses, forbs and subshrubs would be killed by off-road vehicle driving.

Weeds

The removal of cattle under Alternative F will benefit Park efforts to control and/or eradicate alien plant species, because cattle have been the primary cause of soil disturbance and a major vector of weeds.

Benefits for weed management will be evident particularly for those species such as thistles which depend on disturbed sites for establishment and expansion. "Thistle" is a non-botanical term which, conveniently for their management, groups several plants in the same tribe of the same plant family, whose life histories and ecological effects are very similar. Since they are by and large annual plants (living only one year, and reproducing only by seed), they are primarily dependent on continuing vegetation removal and soil disturbance for seedling recruitment, since soil unoccupied by other plants, and exposure to strong sunlight, are the necessary factors for germination and establishment of their seedlings. These plants are able to maintain existing populations, and expand into new areas, only when and where these factors occur. Maintenance of dense and tall vegetation, and protection of the soil surface from disturbance by hooves, plowing, etc. has been proven to be the best control method for these invasive plants. Therefore, NPS anticipates that the cessation of cattle grazing on SRI will result in an initial increase in plant density in the established "thistle" patches, with little or no expansion into previously un-infested areas, and that within a few years a trend toward a gradual decrease in both patch density and patch numbers, again with few or no new patches established, will develop. Exceptions will be areas that are subject to natural disturbances such as floods and landslides. NPS plans to implement control of seed production (by use of mowing and/or selective herbicide) in as many established patches as is feasible, to encourage the growth of desirable vegetation within and around these patches, and to monitor areas of natural disturbance for thistle outbreaks, and control these actively.

Other species, such as fennel, wild radish, and black mustard, will not expand in distribution, but individual plants will grow to full stature and reproductive state in the absence of herbivory from cattle. This will allow these populations to be treated with herbicides and subsequently controlled or eliminated.

Fennel has been present on Santa Rosa since at least 1915, when it was collected in the ranch area. It is still very limited both in distribution and numbers. Total numbers of individual fennel plants on the island were estimated at fewer than 4000 in 1994, and all but about 100 of these were in the immediate ranch area. The non-ranch-areas plants were localized in three other limited areas. After three years of eradication effort (using spot-treatment with herbicide), no mature plants, and fewer than 100 new seedlings, could be found in the ranch area. All plants detected in the outlying areas were destroyed; surveys continue for additional mature plants (to date, no more have been located), and known locations are patrolled yearly for seedlings. Fennel plants remaining will, with relief from grazing, grow to their normal height, and proceed with their normal flowering/seeding life cycle. Rather than comprising a threat to island resources, this will allow Park personnel to locate and eradicate additional individual mature plants and to monitor those locations in the future for seedlings.

Perennial mustard and wild radish may undergo similar apparent increases, but the Park will apply appropriate measures to control their spread and reduce both their distribution and

numbers, with eradication the long-term goal. Like fennel, by far most of these plants are located in the immediate environs of the ranch, particularly in the seasonally-used holding pens. Perennial mustard also has established (as early as 1975) a satellite population at the point of intersection of the main island road and the cross-island fence, from whence it is dispersing, via cattle and elk, down the slopes to the south and north, and along the road itself, via vehicles, cattle, and road-grading operations. Perennial mustard has also become established in Green (Verde) Canyon, beginning in the cattle corral area and being dispersed from there by animals.

Black mustard (an annual species) is patchily distributed on the island, with the bulk of the distribution in the immediate ranch area. A few small isolated patches have been observed elsewhere, in areas favored by cattle for resting. Control measures directed at prevention of seed production, which can extend throughout the entire vegetation growing season, will be implemented as patches are discovered. Spot application of a selective herbicide will probably be the method of choice.

All three of these plants were collected on the island, from the ranch and from the interior location mentioned for perennial mustard, as early as 1975.

In summary, rapid removal of cattle will remove the major source of soil disturbance that weeds such as thistles require for establishment. Thistle populations will thus decrease following removal of cattle grazing and associated disturbance. Fennel, mustard and radish will be released from grazing pressure, and will grow to normal height. These species will be controlled and eradicated by an aggressive weed control program.

Wildlife

Implementation of Alternative F would have substantial, beneficial effects on wildlife. Under this alternative, the removal of cattle and the phased removal of deer and elk would slow and eventually halt deterioration of the island's habitats, with short and long-term benefits for wildlife.

The removal of cattle and phased reduction of deer and elk 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.

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.

There would be no effects to wildlife from herbicide use proposed under this alternative. Method of application (spot treatment of individual plants) minimizes the amount of herbicide used and

that wildlife might contact or ingest. Triclopyr has low chronic toxicity to mammals and is not expected to concentrate to any significant degree in animal tissue (EXTOXNET 1993). Triclopyr is slightly toxic to water fowl and practically non-toxic to fish and aquatic invertebrates. Glyphosate is only slightly toxic to wild birds, and is practically nontoxic to fish (EXTOXNET 1994). There is very low potential for the chemical to accumulate in the tissues of aquatic invertebrates or other aquatic organisms. In mammals, glyphosate is poorly absorbed from the digestive tract and is largely excreted unchanged; it has no significant potential to accumulate in animal tissue.

Non-native Ungulates

Under implementation of Alternative F, cooperation provided by NPS to Vail & Vickers in deer and elk removal, during the initial reduction, adaptive management, or final phaseout periods, will have both direct and indirect effects on deer and elk. Methods used would include direct reduction (shooting) or remotely administering contraceptives. Live-capture and removal of deer has been rejected as an alternative, because of the difficulty in capturing deer, the high probability of injury to animals during the capture process, and the lack of suitable sites for transplanting. Vail &Vickers has recently conducted live-capture and transport of elk from the island to a buyer in Michigan. It is unlikely NPS would conduct a live-capture program for elk, because of the expense, and because the NPS could not sell elk to commercial buyers.

If direct reduction methods are employed, deer and/or elk will be killed during some or all of the years of the initial reduction, adaptive management, or final phaseout periods. The number of animals killed by NPS during any given year would depend upon existing herd levels, the targeted management level (see Tables 5 and 6), and the extent of assistance provided by NPS. A rough estimate of the number of animals killed in any year by NPS sharpshooters or contracted sharpshooters could thus range from zero to approximately 200. Besides the direct mortality of deer and/or elk, other effects on deer and elk include the possibility of nonlethal shooting injuries, injuries sustained from pursuit by helicopter or vehicle, and separation of family groups. Sharpshooting may change the behavior of deer and/or elk over time. Animals may become more wary of humans.

Reproductive intervention, or the delivery of reproduction-inhibiting drugs, is currently not feasible for managing populations of free-ranging deer or elk. However, methods are being developed for deer (DeNicola et al. 1997, Muller et al. 1997) and may become available in the near future. If such methods are developed, then NPS may consider using them to control deer populations on SRI. Methods of immunocontraception use an animal's own immune response to disrupt reproductive function, and can thus affect health and behavior of individual animals, and can have broader ecological effects (Muller et al. 1997). First, since the success of immunocontraceptive techniques depends on eliciting a strong immune response from individual animals, immunocontraception can artificially select for individuals with poor immune responses and thus more vulnerability to disease. Therefore, an indirect effect of immunocontraception may be the predominance of deer with poor immune responses, and more susceptibility to disease. Second, estrous (or breeding) cycles may be extended by immunocontraceptive methods, and bucks may thus continue attempting to breed infertile females beyond the normal breeding season. Finally, because breeding is energetically taxing, bucks may be in relatively poorer body

condition after an extended breeding season, and greater mortality may occur during the following winter.

Proposed population control methods for deer and elk management will have both lethal and sublethal effects on individual animals, and will reduce population levels and affect age and sex structure of the deer and elk populations. Under different circumstances these may be considered undesirable negative effects on these species, but on Santa Rosa island, deer and elk are non-native species which are owned by the permittee and managed as livestock. Moreover, deer and elk on Santa Rosa Island have significantly impacted native vegetation and wildlife, causing or maintaining unnatural vegetation communities, and U.S. Fish and Wildlife Service has identified deer and elk impacts as contributing factors in their decision to list several Santa Rosa Island plant species as endangered or threatened. Therefore, deer and elk on Santa Rosa Island are managed not as native wildlife in a National Park Service unit, but rather as exotic species. National Park Service Management Policies (NPS 1988, p. 4:12) state that:

> Management of populations of exotic plant and animal species, up to and including eradication, will be undertaken whenever such species threaten park resources or public health and when control is prudent and feasible. Examples of threatening situations include…interfering with natural processes and the perpetuation of natural features or native species (especially those that are endangered, threatened, or otherwise unique).

Thus, effects on deer and elk individuals and populations from proposed management actions are an acceptable, even necessary tradeoff, for the recovery of endangered species, native plant communities, and wildlife that will occur following initial reduction, adaptive management and final removal of deer and elk (see environmental consequences sections for vegetation and wildlife).

Rare Species and Their Habitats

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

Herbicide use proposed under this alternative would have no negative effects on listed or sensitive species. Individual plants would not be affected; the spot method of herbicide application minimizes effects on non-target species. Herbicides would not be applied near populations or individuals of proposed or listed species. An indirect positive effect on rare species is that the eradication of alien species eliminates potential competitors for rare and other native plant species.

Effects on western snowy plover would be similar to those described for the closure of Old Ranch Pasture under Alternative B. In recent years, western snowy plover nesting habitat on Skunk Point has been protected by a cattle exclosure 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 were only partially protected by the cattle exclosure 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.

Effects of the remaining horses on western snowy plovers in Old Ranch Pasture is expected to be negligible, since the horses are not known to utilize plover breeding habitat.

Direct reduction of deer and/or elk by NPS sharpshooters would result in the presence of a number of deer and/or elk carcasses on Santa Rosa Island. This, in turn, could have indirect effects on the island ecosystem. The carcasses may be scavenged by island foxes, or by birds such as common ravens (*Corvus corax*). This may prove a significant supplement to food presently available to foxes or ravens. Populations of scavengers may temporarily increase because of increased food availability. When carcasses are no longer available, scavengers will return to preying upon primary prey, or alternative prey. There may thus be greater predation upon western snowy plovers by common ravens following periods of significant reduction of deer and/or elk, if carcasses are left in the field. If NPS monitoring indicates increases in raven populations following direct reduction, carcasses will be removed from the field to the extent possible during the next period of direct reduction.

Helicopter use by NPS or contractors for deer and elk reduction is unlikely to disturb or otherwise impact western snowy plover, California brown pelican, or peregrine falcon, because helicopter work will be generally accomplished distant from the coastal breeding and roosting areas of those species.

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

Cultural Resources

Archeological Resources

Removal of cattle within one year would have substantial, beneficial effects on archeological resources, islandwide. Removal of cattle would halt virtually all current trampling damage to archeological sites.

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. Implementation of this alternative would not prevent the Park from eventually establishing a small demonstration ranch in the Beecher's Bay area.

Cultural Landscape

Removal of all cattle within one year and reduction of deer and elk 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 cattle from the island and reduction of deer and elk would have slight, beneficial effects on ethnographic resources. 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 commercial cattle ranching operation on Santa Rosa Island would be terminated by the end of 1998. The effects of this on the regional economic environment are unknown, but likely to be negligible. If the termination of grazing encourages more visitors to travel to Santa Rosa Island, then overall effects on the regional recreation industry could be slightly positive.

Visitor Use

Implementation of Alternative F would have moderate, beneficial effects on visitor use. Visitor activities are managed according to the direction given in the Park's enabling legislation, that the Park be administered on a low-intensity, limited entry basis. This approach would not change under this alternative. If this alternative is implemented, Ranger escorts would no longer be required. The island would be more accessible to visitors, and recreational opportunities on Santa Rosa Island should increase. Additionally, the visitor experience will be enhanced by the recovery of riparian and other habitats.

Grazing/hunting Permittee

Implementation of this alternative would result in acceptable economic effects on the permittee, since this alternative is the result of settlement negotiations in which Vail & Vickers agreed to all of the terms of the settlement. Under adaptive management of deer and elk, Vail & Vickers would continue to profit from annual commercial deer and elk hunts. However, Vail & Vickers would also incur the costs of adaptive management, namely, support of scientists serving on the Adaptive Management Panel. Vail & Vickers would also incur the costs of removing deer and elk, but that cost would be incurred under all alternatives, including No Action. Vail &Vickers will pay for all removal, unless NPS decides to assist Vail & Vickers with animal removal, or unless the last few deer and/or elk in 2011 are very difficult to eliminate.

Vail & Vickers would still retain the right of non-commercial use and occupancy for the 8 acre ranch complex.

NPS Operations

Alternative F would, overall, have positive effects on Park operations. The Park would incur the additional costs of adaptive management for deer and elk. These costs include the annual costs of supporting scientists serving on the Adaptive Management Panel, the cost of monitoring of indicator species for adaptive management, and half the costs of annual deer and elk surveys. If exclosures are built for the adaptive management program, then the Park will incur one-time costs for exclosure construction. The NPS would not incur annual costs for range monitoring, construction and maintenance of fence to protect snowy plover habitat, or the costs of escorting visitors on Santa Rosa Island. Compared to costs of other alternatives, implementation of Alternative F would not include costs of fence maintenance and construction for small riparian exclosures or creation of riparian pastures.

Under Alternative F, the Park may share final removal costs of deer and elk in 2011, provided that Vail & Vickers has diligently tried to remove the deer and elk and has otherwise complied with their permit. The costs to NPS of final removal are unknown. Also, at its discretion, the NPS may assist the permittee with annual removal of deer and elk at other times, if such assistance would facilitate Park resources management. These costs are also unknown.

Alternative F would have an additional beneficial effect to Park operations, regarding restoration of the island's ecosystems. Removal of cattle by the end of 1998 would allow the Park to begin restoration of riparian areas faster than any other alternative, except Immediate Removal.

Wilderness

Implementation of this alternative would have moderate, beneficial effects on wilderness values, which would be improved. Wilderness suitability of the island would improve after all grazing is removed, and all restoration is completed. Under this alternative, that will not occur until deer and elk are removed, which could be as late as 2011.

Summary

Rapid removal of cattle would allow for rapid recovery of riparian areas and improvement in water quality in all drainages, and would remove some grazing pressure from rare plant species and their habitats. The permitees would terminate their cattle operation under this alternative.

Adaptive management of deer and elk would augment recovery of rare plant species and their habitats, due to the fact that allowable deer and elk levels would be tied to attainment of recovery standards.

Implementation of Alternative F 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.

Implementation of Alternative F would have acceptable economic effects on the permittee. It would have both benefits and impacts to NPS operations. The Park would no longer bear the cost of cattle management actions, after 1998, but would incur the costs of adaptive management of deer and elk, as well as potential deer and elk removal costs.

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 implementation of Alternative F are the same as described under previous alternatives. Future cattle grazing under this alternative includes that which would occur from now until the end of 1998, when all but 12 cattle are removed from the island.

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 impacts have occurred to soils on Santa Rosa Island as a result of past and current ranching operations. Implementation of Alternative F would begin abatement of all these effects within one year, when virtually all cattle are removed from the island. 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 sheep and cattle grazing on Santa Rosa Island has rendered many drainages non-functional as riparian areas (Rosenlieb et al. 1995). Under Alternative F, the removal of virtually all cattle by the end of 1998 would begin to restore riparian function to Santa Rosa Island drainages. Under this 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 in the Final RMP/EIS, 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 alien plants. The removal of cattle and reduction of deer and elk 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. Reduction of deer may 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 the island spotted skunk and the 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 would 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 six Santa Rosa species recently listed as Endangered. Under this alternative, the rapid removal of cattle and the adaptive management of deer and 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 11 species formerly 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 would 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 published a notice of intent to prepare a proposed rule removing peregrines 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 would 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 cattle under this alternative. This would comprise a significant beneficial cumulative effect on cultural resources on the northern Channel Islands.

Mitigation Measures

The annual monitoring of selected indicator species and their habitats and the potential reduction of deer and elk under the adaptive management program comprise mitigation measures to protect and foster recovery of rare species and their habitats. The effect of these measures is discussed in the section on vegetation.

To ensure visitor safety, 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 that there are no unacceptable impacts to other resources from vehicle use, etc. Therefore, NPS would require the permittee to submit a detailed removal plan, with timetable, subject to NPS approval. NPS staff would 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.

The Park will continue to monitor water quality in Santa Rosa's streams. If the Park's water quality monitoring program reveals problems due to deer or elk, Vail & Vickers will implement best management practices (BMP's) to achieve water quality standards. Likewise, if the monitoring program reveals water quality problems due to road management practices, NPS will implement BMP's for road management as mitigation measures.

In order to keep horses away from sensitive resource areas in Old Ranch Pasture, Vail & Vickers would place salt and molasses blocks in areas designated by NPS. If the NPS determines that passive means of keeping the horses away from sensitive resources are ineffective, Vail & Vickers and NPS will cooperate in construction of fencing to prevent horses from accessing sensitive resource areas.

In order to avoid damage to soils and vegetation from off-road vehicle use associated with deer and elk hunts, the Park has identified areas on Santa Rosa Island where off-road driving is prohibited (Fig. 2).

Unavoidable Adverse Impacts

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

Under Alternative F, there would be continuation of current adverse effects of continuous grazing on riparian areas, water quality, and archeological sites until all cattle are removed (by the end of 1998).

Relationship Between Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

Under this alternative, some short-term uses of the environment on Santa Rosa Island would continue until 2011. These include cattle ranching until the end of 1998. Additionally, the permittee could continue the commercial hunt operation for deer and elk as late as 2011. The permittee would use the available forage on the island to feed cattle for the stocker operation until the end of 1998, and would use available forage to feed deer and elk populations until as late as 2011. Under this alternative, there would be no new existing short-term uses that would affect long-term productivity.

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. An additional year of cattle grazing, at reduced stocking rates, would not impact long-term productivity, nor would maintenance of deer and elk herds at adaptive management levels.

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. Under Alternative F, there would be no irreversible or irretrievable loss of resources due to identified actions.

CONSULTATION AND COORDINATION

Public Review of the Draft Supplement to the Final Environmental Impact Statement and Resources Management Plan

Comments were received orally and in written form following the release of the Draft Supplement to the Final RMP/EIS in February 1998. All comments were examined and considered by the National Park Service according to the requirements of 40 CFR 1503 (the implementing regulations for the National Environmental Policy Act). Those comments which were "substantive", and not simple statements for or against the proposal, are responded to in the chapter Response to Public Comments.

Record of Public Comment

A Notice of Availability was published in the Federal Register on February 17, 1998, for the Draft Supplement to the Final Resources Management Plan and Environmental Impact Statement for Improvement of Water Quality and Conservation of Rare Species and their Habitats on Santa Rosa Island. The 60-day comment period was to end on April 17, 1998. Approximately 400 copies of the Draft Supplement were distributed to public agencies(see list of agencies, below), special interest groups, businesses, and individuals.

Written Comments

During the comment period, a total of 9 letters were received from public agencies, special interest groups, businesses and individuals. Some of the letters contained substantive comments that required clarification of information in the Draft Supplement, modification of the text, or direct responses. The substantive comments are addressed by subject matter in a question and answer format (see Response to Public Comments chapter).

Agencies Which Received Copies of the Draft RMP/EIS

California Coastal Commission
California Department of Fish and Game
California Department of Parks and Recreation
Cachuma Resource Conservation District
California Regional Water Quality Control Board - Central Coast Region
Natural Resources Conservation Service
Santa Ynez Indian Reservation
State Historic Preservation Office
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service, Los Padres National Forest
U.S. Navy, Naval Air Weapons Stations, Pt. Mugu

RESPONSE TO PUBLIC COMMENTS

Purpose and Methodology

The final environmental impact statement is to be an accurate analysis of impacts of the proposed action and its alternatives. Public and agency review of the draft statement helps to ensure quality.

The National Park Service received 244 comment letters during the public comment period for the *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*. This chapter contains responses to substantive comments received by the National Park Service during the public comment period.

Substantive comments are defined as

- not simple statements for or against the proposal
- those requiring additional explanation or analysis of data
- those that debate facts or conclusions reached in the draft environmental impact statement

Organization of Comments and Responses

Comments have been arranged by broad topic (such as Grazing Management) and specific issue (such as Management of Horses). Answers to questions and responses to comments are given in the Response to Comments section of this chapter, and have been incorporated into the text of this Final RMP/EIS as appropriate. The list of commentors is given in the Index of Comment Letters by Category of Author section, which follows.

Index of Comment Letters by Category of Author

BIBLIOGRAPHY

Bartolome, J.W., and W.J. Clawson. 1992. Range management plan, Santa Rosa Island: Revised final Report submitted to National Park Service.

Brumbaugh, R. W. 1980. Recent geomorphic and vegetal dynamics on Santa Cruz Island, California. Pp. 139-158 in D. M. Power, ed., The California Islands: proceedings of a multidisciplinary symposium. Santa Barbara Museum of Natural History, Santa Barbara, Calif. 787 pp.

DeNicola, A. J., D. J. Kesler, and R. K. Swihart. 1997. Remotely delivered prostaglandin $F_{2\alpha}$ implants terminate pregnancy in white-tailed deer. Wildlife Society Bulletin 25(2): 527-531.

EXTOXNET, 1993. Triclopyr. Information published on the Internet (triclopy.p93 at ace.ace.orst.edu) through the Extension Toxicology Network, a Pesticide information Project of Cooperative Extension Offices of Cornell University, Michigan State University, and UC Davis. 4 pp.

EXTOXNET, 1994. Glyphosate. Information published on the Internet (glyphos.p54 at ace.ace.orst.edu) through the Extension Toxicology Network, a Pesticide information Project of Cooperative Extension Offices of Cornell University, Michigan State University, and UC Davis. 4 pp.

Hiebert, R.D. and J. Stubbendieck, 1993. Handbook for ranking exotic plants for management and control. Natural Resources Report NPS/NRMWRO/NRR-93/08., USDI, National Park Service, Midwest Regional Office, Omaha, Nebraska. 29 pp.

Johnson, D. L. 1980. Episodic vegetation stripping, soil erosion, and landscape modification in prehistoric and recent historic time, San Miguel Island, California. Pp. 103-122 in D. M. Power, ed., The California Islands: proceedings of a multidisciplinary symposium. Santa Barbara Museum of Natural History, Santa Barbara, Calif. 787 pp.

McEachern, K. 1996. Summary of proposed endangered plant data collected on Santa Rosa Island by National Biological Service staff and collaborators, 1994-1996. Ventura, Calif.: USGS Biological Resources Division, California Science Center, Channel Islands Research Station. 10 pp.

McEachern, K., D. H. Wilken, and K. A. Chess. 1997. Inventory and monitoring of California Islands candidate plant taxa. Final report to Species at Risk Program, USGS-BRD.

Ventura, Calif.: USGS Biological Resources Division, California Science Center, Channel Islands Research Station. 46 pp.

Muller, L. I., R. J. Warren, and D. L. Evans. 1997. Theory and practice of immunocontraception in wild mammals. Wildlife Society Bulletin 25(2): 504-514.

National Park Service. 1980. General management plan. Vol. 2: Natural/cultural resource management. Channel Islands National Park, Calif. 212 pp.

National Park Service. 1985. General management plan. Vol. 1: Visitor use/interpretation/general development. Channel Islands National Park, Calif. 97 pp.

National Park Service. 1988. Management policies. 148 pp.

U. S. Fish and Wildlife Service. 1997. Final Rule for 16 plant taxa from the northern Channel Islands, California. Federal Register, Vol. 62, No. 147. Pp. 40954 - 40974.