

**Biological Assessment  
on the  
Renewal of Livestock Grazing Permits  
in  
Point Reyes National Seashore  
and the North District of  
Golden Gate National Recreation Area  
Marin County, California**



**Point Reyes National Seashore  
National Park Service  
July 12, 2001**

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**Livestock Grazing Permit Renewal  
Point Reyes National Seashore  
and Golden Gate National Recreation Area North District  
Marin County, California**

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**1.0 Purpose of Biological Assessment**

The purpose of this biological assessment (BA) is to review the proposed renewal of livestock grazing permits for areas managed by Point Reyes National Seashore (PRNS) to determine to what extent the proposed action may affect any of the Federally-listed Threatened or Endangered species listed in Table 1.0-1. This BA is prepared in accordance with legal requirements set forth under Section 7 of the ESA (16 U.S.C. 1536 (c)), and follows the standards established in the PRNS Statement for Management (1993) and guidelines for preparation of BAs provided by US Fish and Wildlife Service in a Feb. 21, 2001 workshop in Sacramento.

Table 1.0-1. Federally-listed Threatened and Endangered species that may be affected by renewal of livestock grazing permits in PRNS-administered grazing lands.

Common Name	Scientific Name	Listing Status <sup>a</sup>
Sonoma alopecurus	<i>Alopecurus aequalis</i> var. <i>sonomensis</i>	E
Sonoma spineflower	<i>Chorizanthe valida</i>	E
Tiburon paintbrush	<i>Castilleja affinis</i> ssp. <i>neglecta</i>	E
Marin dwarf flax	<i>Hesperolinon congestum</i>	T
beach layia	<i>Layia carnosa</i>	E
Tidestrom's lupine	<i>Lupinus tidestromii</i> (var. <i>layneae</i> )	E
California red-legged frog	<i>Rana aurora draytonii</i>	T
Myrtle's silverspot butterfly	<i>Speyeria zerene myrtleae</i>	E
central California coho salmon	<i>Oncorhynchus kisutch</i>	T
central California coast steelhead	<i>Oncorhynchus mykiss</i>	T
western snowy plover	<i>Charadrius alexandrinus nivosus</i>	T

a/ Listing status: E = Endangered, T= Threatened

**2.0 Action Area**

The Action Area is all land managed by PRNS on which livestock grazing or ranching-related activities takes place. This includes PRNS and the North District of the Golden Gate National Recreation Area (GGNRA). Several of the species to be considered in this BA have limited geographical ranges from which all current and historical records are known. One species, the California red-legged frog, is widespread on ranch lands. Critical habitat has been identified for this species and the Central California Coast coho salmon.

### **3.0 Consultation to Date**

A letter initiating consultation and requesting a list of species to be addressed was sent to USFWS on January 31. The list was received from USFWS on February 18. This BA was prepared in response to this list as the second step in consultation.

### **4.0 Current Management Direction**

#### **4.1 Legislative Mandates and Plans**

##### **4.1.1. General Management Plans (GMP)**

The PRNS GMP (1980) designates a "Pastoral Lands" zone of approximately 17,040 acres in the National Seashore "to permit the continued use of existing ranchlands for ranching and dairying purposes."

The GGNRA GMP (1980) specifies that the northern Olema Valley be part of a Pastoral Landscape Management Zone in which "where feasible, livestock grazing will continue within limits of carefully managed range capacities."

##### **4.1.2. PRNS Statement for Management (1993)**

This document gives overall guidance on management of lands administered by PRNS, including a statement of Seashore's Endangered Species Act policy.

##### **4.1.3. PRNS Resource Management Plan (updated 1999)**

This periodically updated plan describes current PRNS natural resources division priorities. These include participation in an NPS-wide effort to develop comprehensive Inventory and Monitoring protocols for targeted species in each park. Programs specific to PRNS are also set forth, including efforts to monitor, map, and assess protection needs of Threatened and Endangered plant species and rare plant communities, restore salmon and steelhead habitats, and monitor cattle grazing.

##### **4.1.4. Rangeland Management Guidelines (1990)**

Use of grazing lands administered by PRNS is directed by the Seashore's Rangeland Management Guidelines (1990), which establish ten goals for protection of natural resources on PRNS rangelands. Ranching operations are to be managed to protect threatened or rare species and their habitats, protect significant natural resources with special attention to streams, stream banks, wetlands, and riparian habitat, manage for the health and perpetuation of existing native plants and animals, and provide for the recovery of rangeland resources that are in deteriorated condition.

The Guidelines identify a number of management prescriptions that may be used to correct damage to rangeland resources stemming from livestock use, including reducing the number of livestock permitted, deferring grazing on seasonally vulnerable areas, excluding livestock from damaged or especially vulnerable areas, and removing invasive non-native plant species. All of these techniques have been implemented by PRNS to address livestock-related resource degradation on particular ranches. The terms and conditions of grazing permits have been made more rigorous since adoption of the Rangeland Management Guidelines to reflect the goals stated in it.

The Guidelines also set forth standards for cultivation of park lands for silage crops, including provision for a 200 foot buffer zone between cultivation and any natural bodies of water, marshes, or

sand dunes, and a prohibition against cultivating significant wildlife or plant areas. Use of biocides on cultivated or rangeland areas is strictly limited and must comply with NPS integrated pest management regulations and procedures.

#### **4.1.5. Rangeland Monitoring Guidelines**

The Guidelines also set forth grazing standards that define the proper level of vegetation removal by grazing and a method for monitoring to ensure that these standards are met. Based on recommendations of the University of California Cooperative Extension for coastal grasslands (Clawson et al. 1982), a standard for the minimum level of plant residue of 1200 lbs/acre was adopted. Retaining this level of living and dead vegetation on grazing lands at the end of the growing season is consistent with a “moderate” level of grazing that will protect soil from erosion and maintain rangeland plant community health. Procedures for monitoring residue, or “Residual Dry Matter” (RDM), are set out in the Guidelines. RDM is measured by averaging the dry weight of clipped vegetation samples taken along permanent monitoring transects located on sites deemed representative of rangelands on each ranch. Each ranch is mapped according to visual appraisals of the proportions of land on which residue did and did not meet required levels. Where grazing has consistently resulted in residue levels falling below the 1200 lb/acre level, ranchers have been required to reduce the number of livestock.

#### **4.2 PRNS NEPA Project Review Process**

In compliance with NEPA requirements that actions be evaluated for potential environmental impacts, PRNS conducts a review for all projects and Federal actions. If a project is deemed to have potential significant effects not covered by a categorical exclusion, an Environmental Assessment or Environmental Impact Statement is prepared. If Threatened or Endangered species are involved, a BA is prepared and consultation initiated.

PRNS has instituted a project review process for each livestock grazing agreement as it comes up for renewal. Park staff in the Natural Resources and other divisions work with the Rangeland Management Specialist to identify ranching impacts on sensitive plants, animals, and their habitats. Modifications to ranching operations that remove impacts are developed and implemented as part of renewal of grazing permits.

Projects on ranch lands beyond routine maintenance of structures and roads that will alter livestock use patterns or hydrology, vegetation, or other physical characteristics of the property are also subject to project review by park staff for potential adverse effects on plant and wildlife populations. Such projects include erosion control, new fencing, and new structures.

### **5.0 Current Grazing Activities**

#### **5.1 Overview**

PRNS contains approximately 18,900 acres currently used for traditional agricultural uses, including the 17,040 acre Pastoral Zone and other lands on which ranching takes place. The GGNRA North District includes approximately 10,000 acres currently in ranching operations. Another 3,100 acres that were used for ranching within the last five years are now ungrazed because agricultural permits were not renewed. Together these lands contain roughly 30 historic ranch sites on which active beef or

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dairy ranching was taking place at the time of purchase for inclusion in the two National Park units (Figures 5-1 and 5-2).

The legislation establishing both PRNS and GGNRA included provisions for continuing the historic ranching uses on some of the lands acquired for these parks. As agricultural lands were purchased, sellers were allowed to continue dairying or beef ranching activities under one of two arrangements. They could retain a Reservation of Possession (ROP), under which they would forego a portion of the purchase amount in exchange for the right to continue ranching activities for up to 25 years. Alternately, they could sell outright and enter into Special Use Permits (SUP) of up to five years with the park. Some sellers retained an ROP on part of their land, and entered into SUP agreements for the rest, while others have entered into more than one SUP agreement with the Park.

The 25 ranchers currently operating within the project area hold 12 ROPs and 32 SUPs, and another five SUPs have become vacant in the last few years (Table 5.1-1). Most of the ROPs will be expiring in the next decade. It has been the policy of PRNS in the past to allow ranchers whose ROP terms expire to continue ranching operations under SUPs. If this policy is maintained, the number of grazing permits managed by PRNS may increase to a maximum of 49. Together these permittees and ROP holders support approximately 6,350 cattle on a year-round basis.

Table 5.1-1. Livestock operations under management by PRNS.

Operator Name / Ranch Name <sup>a</sup>	Total Acres	Grazed Acres	# of Animals Authorized	# of AUMs Authorized
Cheda Ranch ROP <sup>b</sup>	914	570	44	(ROP)
D Ranch	1,092	922	<i>vacant</i>	
D Ranch / North Headland	32	32	<i>vacant</i>	
D Ranch / South Headland	59	49	<i>vacant</i>	
Gallagher / F Ranch	1,510	1,346	175	2,100
Genazzi Ranch ROP	438	361	55	660
Giacomini, Ralph	1,832	810	95	1,140
Giacomini, Robert	320	229	35	420
Grossi, A. / H Ranch	1,033	785	280	3,360
Grossi, A. / H – Abbotts Lagoon	71	71	5	60
Grossi, A. / K Ranch	710	685	72	864
Grossi, R. / M Ranch	1,193	986	175	2,100
Kehoe / J Ranch ROP	615	289	836	dairy
Kehoe / J SUP	415	285	37	444
Lunny / G Ranch	1,151	665	95	1,140
Lupton Ranch	834	442	75	900
Martinelli Ranch ROP	259	236	40	480
McClure / I Ranch	1,320	600	976	dairy
McDonald / N Ranch	925	580	90	1,080
McFadden Ranch ROP	335	244	35	420
McFadden SUP	6	6	7	35
McIsaac Tocaloma Ranch ROP	1,065	650	not specified	(ROP)



Figure 5-1. Point Reyes National Seashore grazing lands.

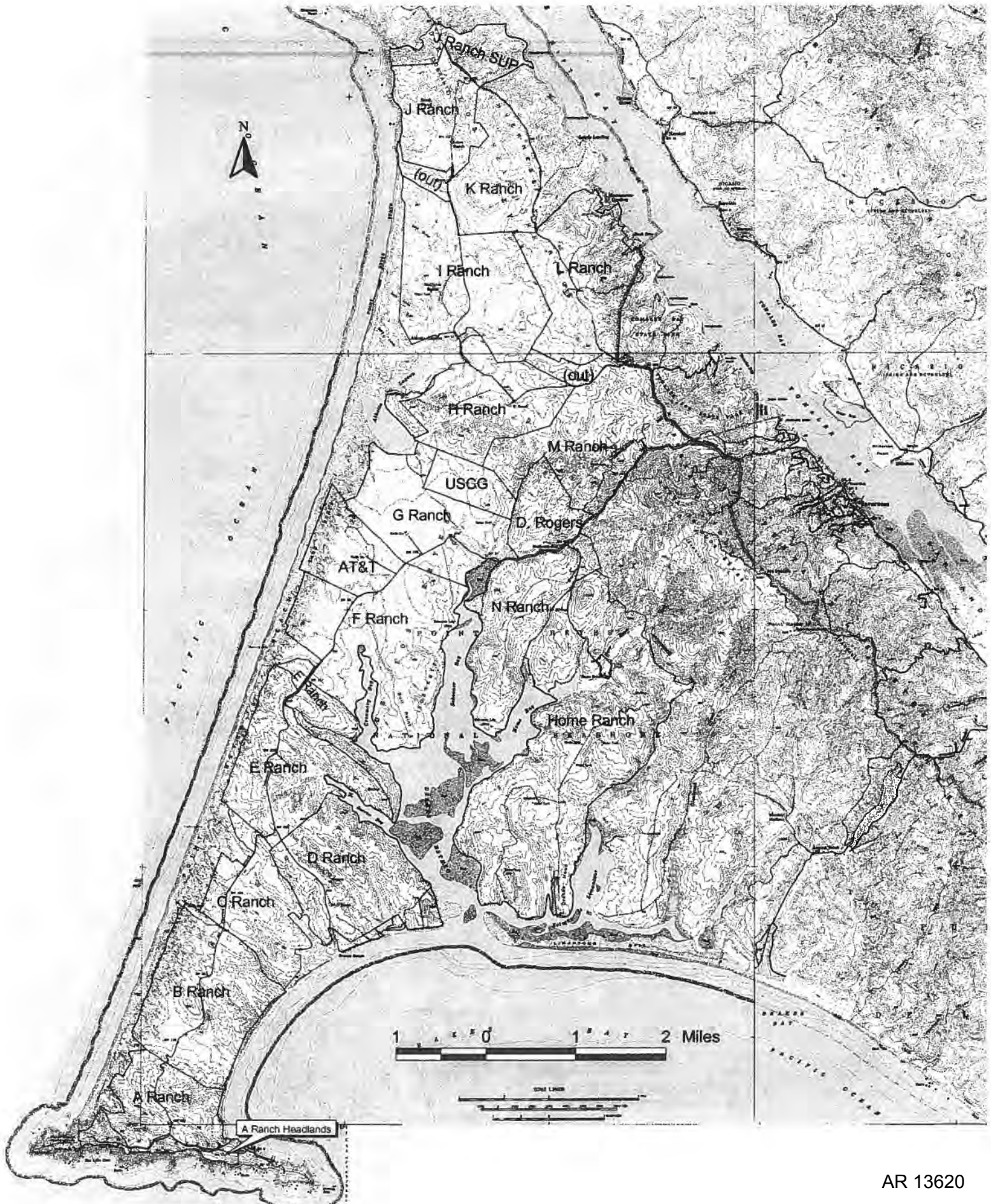
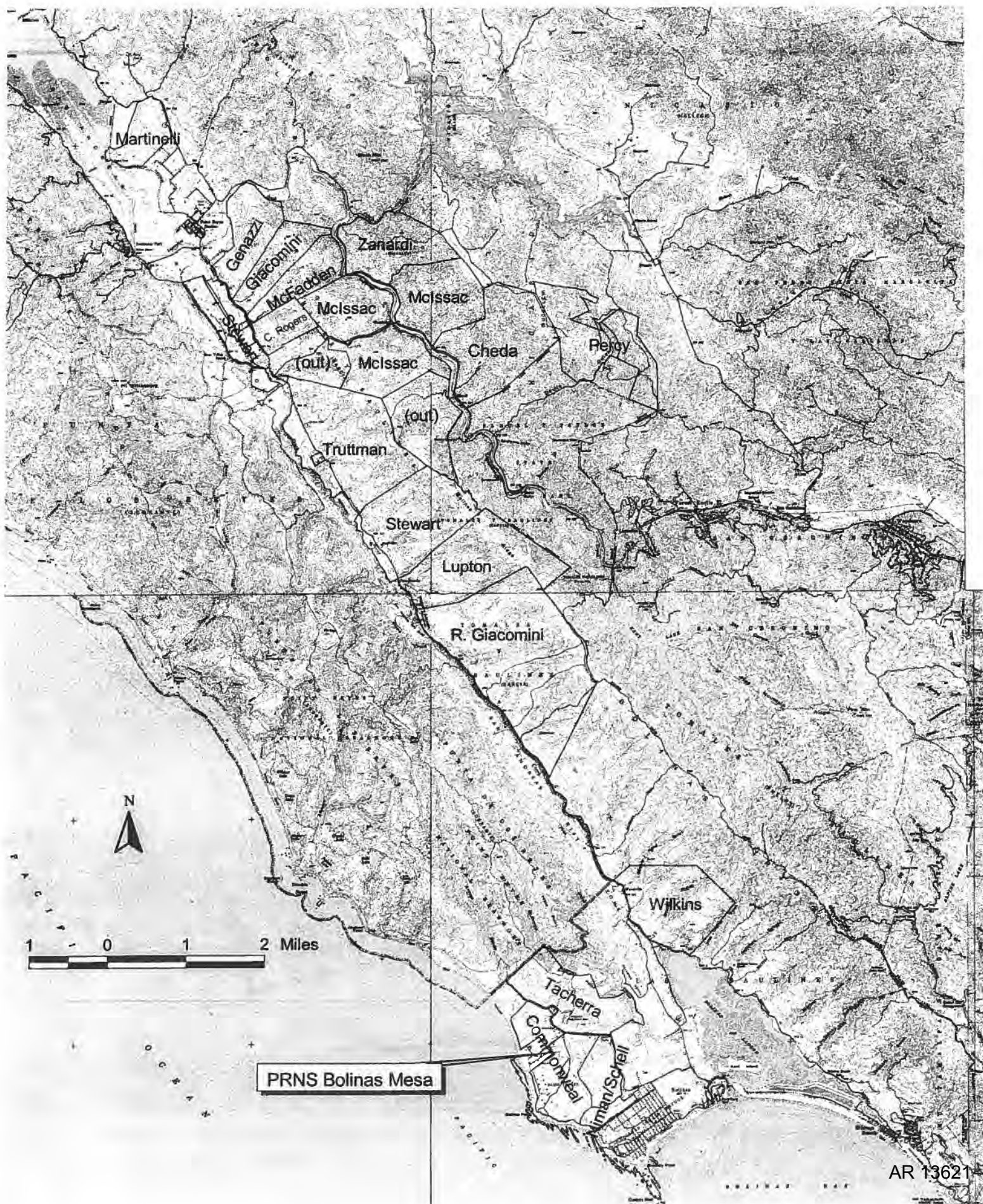


Figure 5-2. GGNRA North District and PRNS Bolinas Mesa grazing lands.





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Table 5.1-1. Livestock operations under management by PRNS (continued).

Operator Name / Ranch Name <sup>a</sup>	Total Acres	Grazed Acres	# of Animals Authorized	# of AUMs Authorized
McIsaac SUP	530	258	45	540
Mendoza / B Ranch	1,242	916	850	dairy
Mendoza / L Ranch	1,126	716	430	dairy
Murphy / Home Ranch	3,045	2,360	318	3,816
Murphy / Home Ranch ROP	20	16	horses only	
Niman Ranch ROP	206	198	not specified	(ROP)
Niman / Commonweal	575	513	66	792
Niman / Mesa Ranch	90	70	9	108
Nunes / A Ranch	771	607	480	dairy
Nunes / A Ranch headlands	96	96	10	120
Nunes / E Ranch	1,010	692	175	2,100
Nunes / E-Creamery Bay	329	98	13	156
Nunes / E-North Beach	36	36	cultivated	
Percy Ranch ROP	240	78	20 sheep	(ROP)
Percy SUP	443	206	25	240
Rogers, C. Ranch ROP	219	207	30	(ROP)
Rogers, C. SUP	10	10	1	12
Rogers, D. Ranch	398	342	66	792
Spaletta / C Ranch	709	630	430	dairy
Stewart Stables ROP	18	18	horses only	
Stewart Ranch SUP	885	784	50	600
Stewart / Truttman Ranch	1,128	873	140	1,680
Stewart / Olema East	95	95	63/3 mo.	189
Stewart / Olema West	200	200	63/9 mo.	567
Tacherra Bros.	516	325	vacant	
Wilkins Ranch	1,382	359	vacant	
Zanardi Ranch ROP	573	329	45	540
<b>Totals</b>	<b>32,021</b>	<b>21,875</b>	<b>6350</b>	

a/ Unless designated otherwise, ranches are Special Use Permits or leases.

b/ Reservation of Possession.

Land counted under total acreage includes areas that are little used by cattle. For ranches in PRNS, 27% of land is considered ungrazable due to topography and vegetation cover. This land is largely shrublands and intermixed woodlands located on north-facing slopes. On GGNRA ranches, 41% of the land is considered ungrazable, reflecting this area's more rugged topography and greater cover by shrubland and woodlands. Much of this land is steeply sloping wooded canyons dominated by California bay, coast live oak, and a variety of understory shrubs. Most grazing is concentrated on grassy ridgelines, open slopes, and flats in the Olema Valley floor.

Cattle stocking on grazing lands of PRNS is 6.7 acres per Animal Unit (AU). (A cow, or a cow-calf pair together equal one AU.) Such stocking would be high on less productive inland ranges but is sufficient to maintain the required plant cover in coastal grasslands. Soils classed as grazable on Point Reyes ranch lands produce between 2,400 and 3,500 lbs/acre of forage in an average rainfall year (SCS 1985). In GGNRA, cattle stocking on lands classified as grazable is 7.5 acres per AU. The lower stocking reflects the slightly less productive grasslands in the ranching area of GGNRA, which produce between 2,400 and 3,000 lbs/acre in average rainfall years.

Six of the PRNS ranches are dairies, which differ from beef ranches in a number of ways. Dairies have many more cattle on each ranch than do beef ranches. Approximately two-thirds of the livestock on PRNS-administered lands are on dairies. Because they are milked twice daily, milk cows are kept near dairy headquarters and are maintained on high-nutrition feeds. They produce large quantities of manure wastes that must be managed to avoid pollution of nearby streams by excess nutrients and coliform bacteria.

In addition to livestock grazing on open rangelands, other operations related to maintaining livestock on PRNS-administered land are considered in this BA. These operations are discussed in the next section.

## 5.2 Livestock Related Activities

### 5.2.1 Dairy Waste Capture and Disposal

Because large numbers of cows are confined to small areas near milking facilities on dairies, ranchers must collect and dispose of manure. Small pastures where cows are held between milkings are typically scraped by tractor and the manure stockpiled. On most of the dairies, cows are kept in barns during the winter. The barns, milking parlors, and travel lanes between them are cleaned by washing manure into ponds, where the manure slurry is stored during the winter. Stored manure is spread as fertilizer on rangelands and silage fields during the dry season, as discussed below.

### 5.2.2 Fertilizing with Animal Manure

Dairies dispose of accumulated animal manure by spraying it on fields from trucks or pumping it through pipes which drain waste out onto fields. Pipes are moved periodically to distribute manure. Such disposal takes place in upland areas so that nutrients in the manure will be taken up by plants before they reach creeks. Another method of disposing of wastes is to plow them into fields in the fall before planting silage crops.

### 5.2.3 Silage Production

Five of the permittees, including three of the dairies, are allowed to raise grass crops on approximately 1,200 acres to provide silage for feeding their livestock. Non-native grasses, such as ryegrass (*Lolium* spp.) and oat grass (*Avena* spp.) are typically planted. Permittees who raise silage are required to leave adequate crop residues to protect the soil from erosion.

## 6.0 Description of Proposed Action

The proposed action is the renewal of ranching permits to continue grazing on PRNS lands as presently conducted, or subject to conditions resulting from the Project Review Process described in section 4.2.

Permits for dairies would be renewed subject to provisions that insure that each dairy meets EPA water quality standards.

## **7.0 Federal Special Status Species**

### **7.1. Federally-listed Threatened and Endangered Animal and Plant Species.**

A list of species that may occur in the Action Area was sent as Attachment A of the USFWS response to PRNS' request to initiate consultation on renewal of grazing permits. Federally-listed Threatened, Endangered, Candidate, or Proposed species are listed in Tables 7.1-1 and 7.1-2 with information on whether or not they are known to occur in PRNS and/or GGNRA and whether or not each species is likely to be adversely impacted by continuation of livestock grazing and related ranching activities, based on PRNS' best professional judgement.

Several of the listed animal species are considered unlikely to be subject to adverse ranching impacts for the following reasons (see annotations in Table 7.1-1 under "Subject to Impacts"):

1. Offshore marine species receive minimal impact from ranching activities in the form of pollutants in runoff draining ranching areas. Such pollutants include nutrients and fecal coliform from manure, and sediment from livestock-induced erosion. Because these pollutants are moderate in concentration and are quickly diluted when they reach the ocean, impacts to marine species are expected to be insignificant.
2. Species that may use beaches as haulouts may be disrupted by cattle that get on the beach. Among Threatened and Endangered species, such habitat use is restricted to marine turtles which are unlikely to occur at PRNS. Steller's sea-lions are more likely to use rocky shorelines as haulouts. All ranches are fenced along beach frontage so that cattle trespass onto beaches is a fairly uncommon occurrence not expected to cause significant disruption to species using beach habitat.
3. Threatened and Endangered bird species do not use habitats found in ranching areas as breeding, feeding, or sheltering areas. Although western snowy plovers do not use habitats found on ranches, an adverse impact was found for this species because ranches support common ravens that predate plovers and destroy plover nests.
4. Within PRNS/GGNRA, California freshwater shrimp has consistently been found only in Lagunitas Creek in an area extending from Shafter Bridge in Samuel P. Taylor Park to roughly 1.6 km below the confluence with Nicasio Creek (Fong 1997). Shrimp habitat along mainstem Lagunitas Creek within GGNRA is generally protected from ranching activities in the watershed. Ranches are separated from the creek by ungrazed areas, so that the creek is bordered by substantial riparian plant corridors. Ongoing erosion control work in the watershed also protects shrimp habitat. Freshwater shrimp were also found in small numbers in the lower 1.1 km of Olema Creek near its junction with Lagunitas Creek in 1996 and 1997. Potentially suitable habitat for the species, consisting of pools with California or Himalayan blackberry overhanging into the water, exists in the lower 4 km of the creek. Areas where the shrimp have been found and areas that may have suitable habitat are fenced off from livestock access.

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Table 7.1-1. Federal Threatened, Endangered, Candidate, and Proposed animal species that may occur in PRNS-administered grazing lands (Enclosure A in USFWS Letter, February 15, 2001).

Common Name	Scientific Name	Listing status <sup>a</sup>	Known to Occur	Subject to Impacts <sup>b</sup>
<b>Mammals</b>				
blue whale	<i>Balaenoptera musculus</i>	E	no	no
finback (=fin) whale	<i>Balaenoptera physalus</i>	E	no	no
Guadalupe fur seal	<i>Arctocephalus townsendi</i>	T	yes	no <sup>1</sup>
humpback whale	<i>Megaptera novaeangliae</i>	E	yes	no <sup>1</sup>
right whale	<i>Eubalaena glacialis</i>	E	no	no
sei whale	<i>Balaenoptera borealis</i>	E	no	no
sperm whale	<i>Physeter catodon (macrocephalus)</i>	E	yes	no <sup>1</sup>
Steller (=northern) sea-lion	<i>Eumetopias jubatus</i>	T	yes	no <sup>2</sup>
<b>Birds</b>				
American peregrine falcon	<i>Falco peregrinus anatum</i>	E	yes	no <sup>3</sup>
bald eagle	<i>Haliaeetus leucocephalus</i>	T	rare	no <sup>3</sup>
California brown pelican	<i>Pelecanus occidentalis californicus</i>	E	yes	no <sup>3</sup>
California clapper rail	<i>Rallus longirostris obsoletus</i>	E	no	no
marbled murrelet	<i>Brachyramphus marmoratus</i>	T	no	no
northern spotted owl	<i>Strix occidentalis caurina</i>	T	yes	no <sup>3</sup>
short-tailed albatross	<i>Diomedea albatrus</i>	PE	rare	no <sup>1</sup>
western snowy plover	<i>Charadrius alexandrinus nivosus</i>	T	yes	yes
<b>Reptiles</b>				
green turtle	<i>Chelonia mydas (incl. agassizi)</i>	T	rare	no <sup>2</sup>
leatherback turtle	<i>Dermochelys coriacea</i>	E	rare	no <sup>2</sup>
loggerhead turtle	<i>Caretta caretta</i>	T	rare	no <sup>2</sup>
olive (=Pacific) ridley sea turtle	<i>Lepidochelys olivacea</i>	T	rare	no <sup>2</sup>
<b>Amphibians</b>				
California red-legged frog	<i>Rana aurora draytonii</i>	T	yes	yes
California tiger salamander	<i>Ambystoma californiense</i>	C	no	no



Common Name	Scientific Name	Listing status <sup>a</sup>	Known to Occur	Subject to Impacts <sup>b</sup>
<b>Fish</b>				
central California coho salmon	<i>Oncorhynchus kisutch</i>	T	yes	yes
central California coast steelhead	<i>Oncorhynchus mykiss</i>	T	yes	yes
delta smelt	<i>Hypomesus transpacificus</i>	T	no	no
Sacramento splittail	<i>Pogonichthys macrolepidotus</i>	T	no	no
So. OR/CA coastal chinook salmon	<i>Oncorhynchus tshawytscha</i>	T	no	no
tidewater goby	<i>Eucyclogobius newberryi</i>	E	no	no
<b>Invertebrates</b>				
black abalone	<i>Haliotis cracherodii</i>	C	yes	no <sup>1</sup>
California freshwater shrimp	<i>Syncaris pacifica</i>	E	yes	no <sup>4</sup>
Myrtle's silverspot butterfly	<i>Speyeria zerene myrleae</i>	E	yes	yes
white abalone	<i>Haliotis sorenseni</i>	PE	no	no

a/ Listing status: E: Endangered, T: Threatened, C: Candidate, PE: Proposed endangered.

b/ Reasons species known to occur in PRNS/GGNRA are considered unlikely to be subject to impacts, designated 1-4, are discussed in text.

Table 7.1-2. Federal Threatened, Endangered, Candidate, and Proposed plant species that may occur in PRNS-administered grazing lands (Enclosure A in USFWS Letter, February 15, 2001).

Common Name	Scientific Name	Listing status <sup>a</sup>	Known to Occur	Subject to Impacts <sup>b</sup>
Sonoma alopecurus	<i>Alopecurus aequalis</i> var. <i>sonomensis</i>	E	yes	yes
Tiburon paintbrush	<i>Castilleja affinis</i> ssp. <i>neglecta</i>	E	yes	yes
Sonoma spineflower	<i>Chorizanthe valida</i>	E	yes	yes
Baker's larkspur	<i>Delphinium bakeri</i>	E	no	no
Marin dwarf flax	<i>Hesperolinon congestum</i>	T	yes	yes
beach layia	<i>Layia carnosa</i>	E	yes	yes
Tidestrom's lupine	<i>Lupinus tidestromii</i> (var. <i>layneae</i> )	E	yes	yes
showy Indian clover	<i>Trifolium amoenum</i>	E	historic	no

a/ Listing status: E: Endangered, T: Threatened.

b/ Impacts of livestock grazing on these taxa are not all adverse and may be for beneficial for some. See Sections 8.1-8.4 for discussion of livestock impacts.

All plant species Federally listed as Threatened or Endangered that are present in the Action Area are considered for potential adverse impacts from ranching activities.

### **7.2 Federal Species of Concern and California-listed species.**

Federal Species of Concern and species protected under the California ESA are listed in Tables 7.2-1 and 7.2-2.

### **7.3 Federally listed Threatened and Endangered Species Covered in this BA**

Plant and animal species considered likely to be affected by renewal of grazing permits on PRNS-administered lands are identified in Table 1.0-1 in Section 1.0. Discussion of the effects of continuation of livestock grazing on these species is organized into the following sections:

- 8.0 Assessment of Plant Species of Management Concern
  - 8.1 Sonoma alopecurus *Alopecurus aequalis* var. *sonomensis* (E)
  - 8.2 Sonoma spineflower *Chorizanthe valida* (E)
  - 8.3 Serpentine endemic plants
    - Tiburon paintbrush *Castilleja affinis* ssp. *neglecta* (E)
    - Marin dwarf flax *Hesperolinon congestum* (T)
  - 8.4 Dune plant species
    - Beach layia *Layia carnosa* (E)
    - Tidestrom's lupine *Lupinus tidestromii* (var. *layneae*) (E)
- 9.0 Assessment of Animal Species of Management Concern
  - 9.1 California red-legged frog *Rana aurora draytonii* (T)
  - 9.2 Myrtle's silverspot butterfly *Speyeria zerene myrtleae* (E)
  - 9.3 Anadromous fish
    - Central California coho salmon *Oncorhynchus kisutch* (T)
    - Central California Coast steelhead *Oncorhynchus mykiss* (T)
  - 9.4 Western snowy plover *Charadrius alexandrinus nivosus* (T)

Each section will include the following subsections:

- Status of the Species in the Action Area
- Effects of the Action
- Cumulative Effects
- Conclusion and Determination

Table 7.2-1. Federal Species of Concern and California-listed animal species that may occur in PRNS-administered grazing lands (Enclosure A in USFWS Letter, February 15, 2001).

Common Name	Scientific Name	Known to Occur	Subject to Impacts
<b>Mammals</b>			
fringed myotis bat	<i>Myotis thysanodes</i>	yes	no
greater western mastiff-bat	<i>Eumops perotis californicus</i>	no	no
long-eared myotis bat	<i>Myotis evotis</i>	yes	no
long-legged myotis bat	<i>Myotis volans</i>	yes	no
Pacific western big-eared bat	<i>Corynorhinus (Plecotus) townsendii townsendii</i>	yes	no
Point Reyes jumping mouse	<i>Zapus trinotatus orarius</i>	yes	unknown
Point Reyes mountain beaver	<i>Aplodontia rufa phaea</i>	yes	no
Yuma myotis bat	<i>Myotis yumanensis</i>	yes	no
<b>Birds</b>			
Allen's hummingbird	<i>Selasphorus sasin</i>	yes	no
American bittern	<i>Botaurus lentiginosus</i>	yes	unknown
ashy storm petrel	<i>Oceanodroma homochroa</i>	yes	no
bank swallow (CT) <sup>a</sup>	<i>Riparia riparia</i>	no	no
Bell's sage sparrow	<i>Amphispiza belli belli</i>	no	no
Bewick's wren	<i>Thryomanes bewickii</i>	yes	no
black rail (CT) <sup>a</sup>	<i>Laterallus jamaicensis coturniculus</i>	yes	no
black-crowned night heron	<i>Nycticorax nycticorax</i>	yes	no
common loon	<i>Gavia immer</i>	yes	no
ferruginous hawk	<i>Buteo regalis</i>	rare	no
grasshopper sparrow	<i>Ammodramus savannarum</i>	yes	yes
Harlequin duck	<i>Histrionicus histrionicus</i>	rare	no
little willow flycatcher (CE) <sup>b</sup>	<i>Empidonax traillii brewsteri</i>	no	no
loggerhead shrike	<i>Lanius ludovicianus</i>	rare	no
long-billed curlew	<i>Numenius americanus</i>	yes	no
olive-sided flycatcher	<i>Contopus cooperi</i>	yes	no
Pacific-slope flycatcher	<i>Empidonax difficilis</i>	yes	no
red-breasted sapsucker	<i>Sphyrapicus ruber</i>	yes	no

Livestock Grazing Biological Assessment, Point Reyes National Seashore.

Common Name	Scientific Name	Known to Occur	Subject to Impacts
rufous hummingbird	<i>Selasphorus rufus</i>	no	no
saltmarsh common yellowthroat	<i>Geothlypis trichas sinuosa</i>	yes	no
short-eared owl	<i>Asio flammeus</i>	yes	unknown
tricolored blackbird	<i>Agelaius tricolor</i>	yes	yes
Vaux's swift	<i>Chaetura vauxi</i>	yes	no
white-tailed (=black shouldered) kite	<i>Elanus leucurus</i>	yes	yes
<b>Reptiles</b>			
California horned lizard	<i>Phrynosoma coronatum frontale</i>	no	no
northwestern pond turtle	<i>Clemmys marmorata marmorata</i>	yes	yes
<b>Amphibians</b>			
foothill yellow-legged frog	<i>Rana boylei</i>	no	no
northern red-legged frog	<i>Rana aurora aurora</i>	no	no
<b>Fish</b>			
longfin smelt	<i>Spirinchus thaleichthys</i>	no	no
Pacific lamprey	<i>Lampetra tridentata</i>	yes	no
<b>Invertebrates</b>			
bumblebee scarab beetle	<i>Lichnanthe ursina</i>	yes	unknown
globose dune beetle	<i>Coelus globosus</i>	yes	no
Marin elfin butterfly	<i>Incisalia mossii</i>	unknown	unknown
Nicklin's peninsula Coast Range snail	<i>Helminthoglypta nickliniana awania</i>	unknown	unknown
Oplers longhorn moth	<i>Adela opterella</i>	unknown	unknown
Point Reyes blue butterfly	<i>Icaricia icaridides</i> ssp	yes	unknown
Ricksecker's water scavenger beetle	<i>Hydrochara rickseckeri</i>	no	no
sandy beach tiger beetle	<i>Cicindela hirticollis gravida</i>	yes	unknown
Sonoma arctic skipper	<i>Carterocephalus paleemon</i> ssp	unknown	unknown
William's bronze shoulderband snail	<i>Helminthoglypta arrosa williamsi</i>	unknown	unknown

a/ CT: Listed as threatened under the California Endangered Species Act.

b/ CE: Listed as endangered under the California Endangered Species Act.



Table 7.2-2. Federal Species of Concern and California-listed plant species that may occur in PRNS-administered grazing lands (Enclosure A in USFWS Letter, February 15, 2001).

Common Name	Scientific Name	Known to Occur	Subject to Impacts <sup>e</sup>
pink sand verbena	<i>Abronia umbellata</i> ssp. <i>breviflora</i>	yes	no
Blasdale's bentgrass	<i>Agrostis blasdalei</i> var. <i>blasdalei</i>	yes	no
Point Reyes bentgrass	<i>Agrostis clivicola</i> var. <i>punta-reyesensis</i> <sup>b</sup>	yes	yes
Tamalpais manzanita	<i>Arctostaphylos hookeri</i> ssp. <i>montana</i>	no	no
Point Reyes stickseed	<i>Blennosperma nanum</i> var. <i>robustum</i>	yes	yes
Thurber's reedgrass	<i>Calamagrostis crassiglumis</i> <sup>c</sup>	yes	yes
swamp harebell	<i>Campanula californica</i>	yes	yes
Humboldt Bay owl's-clover	<i>Castilleja ambigua</i> ssp. <i>humboldtensis</i>	yes	unknown
Mt. Vision ceanothus	<i>Ceanothus gloriosus</i> var. <i>porrectus</i>	yes	no
Mason's ceanothus	<i>Ceanothus masonii</i>	yes	no
San Francisco Bay spineflower	<i>Chorizanthe cuspidata</i> var. <i>cuspidata</i>	yes	yes
Mt. Tamalpais thistle	<i>Cirsium hydrophilum</i> var. <i>vaseyi</i>	no	no
Tomaes clarkia	<i>Clarkia concinna</i> ssp. <i>raichei</i>	no	no
northcoast bird's-beak	<i>Cordylanthus maritimus</i> ssp. <i>palustris</i>	yes	yes
supple daisy	<i>Erigeron supplex</i>	no	no
San Francisco wallflower	<i>Erysimum franciscanum</i>	no	no
fragrant fritillary	<i>Fritillaria liliacea</i>	yes	yes
San Francisco gumplant	<i>Grindelia hirsutula</i> var. <i>maritima</i>	yes	unknown
Tiburon tarweed	<i>Hemizonia multicaulis</i> ssp. <i>vernalis</i>	no	no
Kellogg's horkelia	<i>Horkelia cuneata</i> ssp. <i>sericea</i>	no	no
Point Reyes horkelia	<i>Horkelia marinensis</i>	yes	yess
coast lily	<i>Lilium maritimum</i>	yes	yes
Tamalpais lessingia	<i>Lessingia micradenia</i> var. <i>micradenia</i>	no	no
Pt. Reyes meadowfoam (CE) <sup>a</sup>	<i>Limnanthes douglasii</i> ssp. <i>sulphurea</i>	yes	yes
Gairdners yampah	<i>Perideridia gairdneri</i> ssp. <i>gairdneri</i>	yes	yes
northcoast phacelia	<i>Phacelia insularis</i> var. <i>continentis</i>	yes	yes
San Francisco popcornflower	<i>Plagiobothrys diffusus</i> <sup>d</sup>	yes	unknown
northcoast semaphore grass	<i>Pleuropogon hooverianus</i>	no	no

Livestock Grazing Biological Assessment, Point Reyes National Seashore.

Common Name	Scientific Name	Known to Occur	Subject to Impacts <sup>e</sup>
Marin knotweed	<i>Polygonum marinense</i>	yes	no
California beaked-rush	<i>Rhynchospora californica</i>	no	no
valley sagittaria	<i>Sagittaria sanfordii</i>	no	no
Marin checkerbloom	<i>Sidalcea hickmanii</i> ssp. <i>viridis</i>	no	no
Santa Cruz microseris	<i>Stebbinoseris decipiens</i>	no	no
Tamalpais streptanthus	<i>Streptanthus batrachopus</i>	no	no
San Francisco owl's-clover	<i>Triphysaria floribunda</i>	yes	yes

a/ CE: Listed as endangered under the California Endangered Species Act.

b/ Recognized by The Jepson Manual (1993) as *A. densiflora*.

c/ Recognized by The Jepson Manual (1993) as *C. stricta* ssp. *inexpansa*.

d/ Recognized by The Jepson Manual (1993) as *P. reticulatus* var *rossianorum*.

e/ Impacts of livestock grazing on these taxa are not all adverse and may be for beneficial for some.

## 8.0 Assessment of Plant Species of Management Concern

Table 8.0-1. Number of known occurrences and estimated population trends for listed plant species in livestock grazed areas of PRNS and GGNRA.

Species	Number of known occurrences in Action Area	Population Trend <sup>a</sup>
<b>PRNS</b>		
Sonoma alopecurus (E) <i>Alopecurus aequalis</i> var. <i>sonomensis</i>	4	Unknown
Sonoma spineflower (E) <i>Chorizanthe valida</i>	2	Stable-increasing
beach layia (E) <i>Layia carnosa</i>	13	Stable
Tidestrom's lupine (E) <i>Lupinus tidestromii</i> (var. <i>layneae</i> )	7	Stable
<b>GGNRA</b>		
Tiburon paintbrush <i>Castilleja affinis</i> ssp. <i>neglecta</i>	1	Stable
Marin dwarf flax (T) <i>Hesperolinon congestum</i>	6	Increasing

a/ Population size trends are based on very limited data as described in the following sections.

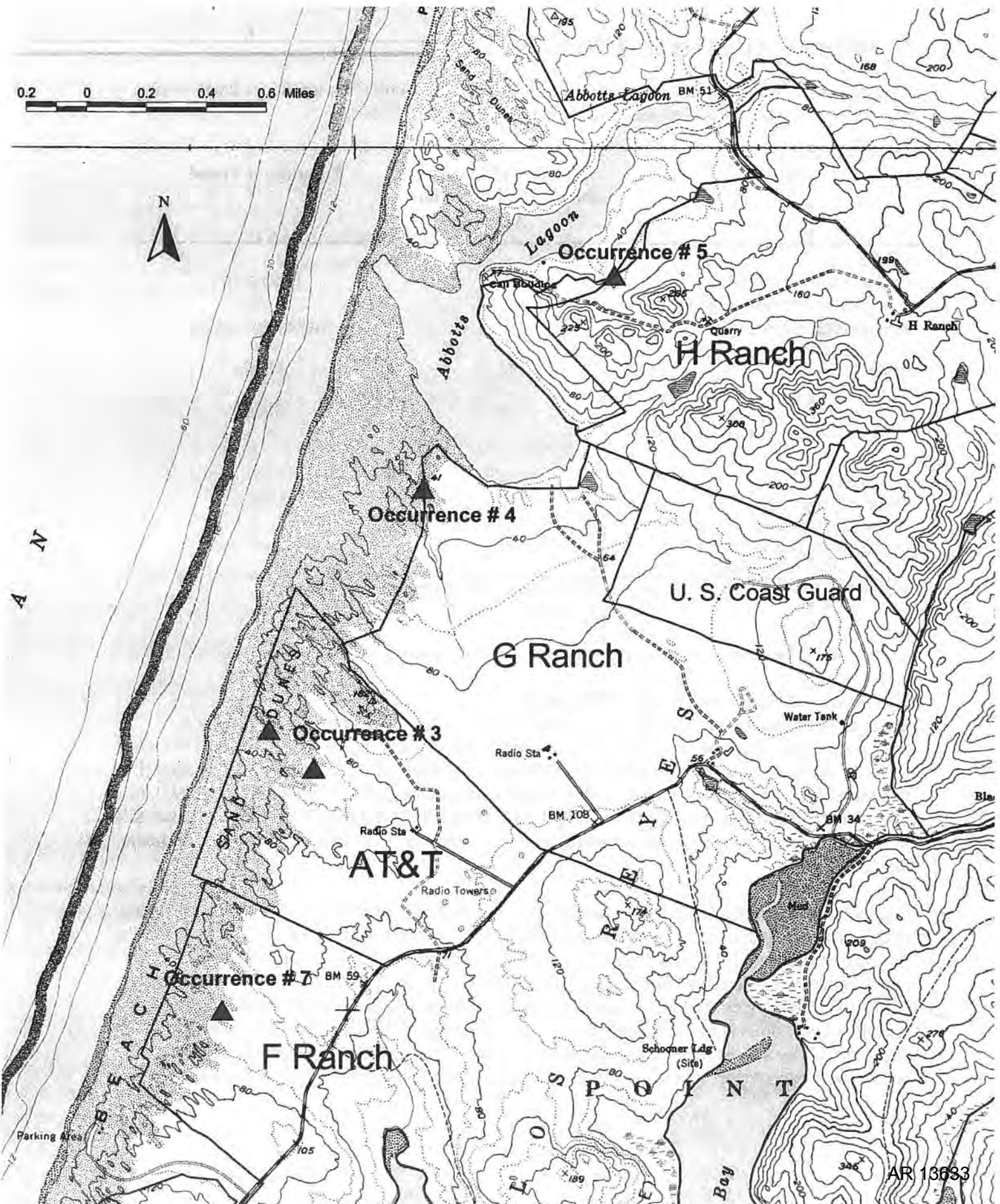
### 8.1 Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*) – Endangered

#### 8.1.1 Status of the Species in the Action Area

Sonoma alopecurus is a perennial grass growing 9-47 cm tall from stolons, and bearing a compressed spike-like inflorescence. It is a variety of the widespread nominate species, which is found in wet meadows and shorelines in California, the eastern U.S., and Eurasia. The central California form, which was lumped with the nominate species in The Jepson Manual (1993), is differentiated from it by a slightly longer spikelet. Because alopecurus flower within a given site at different times throughout the late spring and early summer, it is difficult to estimate numbers of plants.

Four occurrences of this species are currently known on the Point Reyes peninsula, all occurring within pastures on agricultural permit lands (Table 8.1-1). Two occur in the vicinity of Abbott's Lagoon, on the G and H ranches, another on the F Ranch, and a fourth on a private inholding within the PRNS owned by American Telephone and Telegraph (AT&T). All occurrences are within the low-lying coastal plain that occupies most of the west-central Point Reyes peninsula (Figure 8.1-1). Soils are of the highly sandy Sirdrak and Sirdrak variant series, the latter characterized by a weakly cemented discontinuous hardpan producing a seasonal high water table, which can support robust growth of wetland species such as small-fruited bulrush (*Scirpus*

Figure 8.1-1. Extant occurrences of *Sonoma alopecurus* (*Alopecurus aequalis* var. *sonomensis*) at PRNS.





*microcarpus*) and bog rush (*Juncus effusus*). While the present range of this taxon within PRNS is restricted to sandy soils, the distribution of the taxa as a whole suggests that it could occur, or could have occurred in the past, in wetland sites dispersed over much of PRNS.

Table 8.1-1. Sonoma alopecurus occurrences and numbers of plants in 2000 (PRNS 2001).

Site	2000 Numbers
G Ranch	1,572
H Ranch	60-328
F Ranch	53
AT&T	
Sub- occurrence 1	470
Sub- occurrence 2	1,696

#### G Ranch occurrence

The G Ranch occurrence is located in a back dune area near the southwest corner of Abbott's Lagoon, in a swale that supports freshwater marsh vegetation. The swale is located along a fence built in 1989 to exclude cattle from the shores of the lagoon and out of the dunes west of Abbott's Lagoon. The occurrence numbered 33 plants in 1994, 38 plants in 1995, and 40+ plants in 1998. In June, 2000, a more thorough and systematic survey than previously conducted documented a peak population size of 1,572 individuals.

#### H Ranch occurrence

The H Ranch occurrence is in a freshwater marshy swale along a fence that borders an ungrazed area south of Abbott's Lagoon. The fence was built in 1983 to keep cattle away from the eastern, freshwater lobe of Abbott's Lagoon and from a trail running from Pierce Point Road to the beach. Alopecurus was sown in a part of the swale excluded from grazing after the fence was constructed. This location is now grown over with dense native wetland vegetation and no alopecurus is present (W. Shook, pers. comm.). The site that does presently support plants, within the pasture, is immediately above a small berm carrying the trail across the swale. The berm may have altered the hydrology above it, making it wetter and more favorable for alopecurus, while cattle may remove competing taller wetland plant species. This occurrence was most recently surveyed several times over the summer of 2000, with plant numbers varying from 60 to 328 individuals.

#### F Ranch occurrence

The third occurrence was newly discovered on F Ranch in 2000, in a wetland swale between semi-stabilized dunes. This occurrence supported 53 individuals when censused in July, 2000. This survey, however, was done late in the blooming season and may not have included all of the alopecurus present.

#### AT&T occurrence

This alopecurus occurrence is located on privately owned AT&T land. This 521 acre tract previously served as a base for telecommunications transmission and reception, and has limited development of facilities. Poles bearing transmission wires are scattered over part of the parcel,

and only minimal ground disturbance for maintaining poles takes place. The land is leased to one of the PRNS ranchers for cattle grazing. The two suboccurrences located on this tract supported a total of over 2,100 plants when last surveyed in May and July, 2000.

One historic colony of Sonoma alopecurus, located in a pasture near Mesa Road north of Bolinas, has been extirpated since rare plant monitoring began in the park in 1983. Following exclusion of cattle from the site by fencing in 1985, it became overgrown with wetland and weedy vegetation. Alopecurus was last seen there in July, 1991.

Efforts to establish new occurrences of Sonoma alopecurus took place in the late 1980's at five sites. By 1990, no alopecurus were found in any of these sites (W. Shook, pers. comm.).

Monitoring of Sonoma alopecurus described above suggests that alopecurus thrives in wetlands that are grazed just enough to reduce competing vegetation. New occurrences of alopecurus may be found in areas of seasonally saturated soils as rare plant surveys continue. Such areas are most common in, but not exclusive to, the relatively gentle topography of the west-central Point Reyes peninsula.

#### **8.1.2 Effects of the Action on Sonoma alopecurus**

Cattle have mixed effects on this species (USFWS 1997). There is evidence that moderate grazing of competing wet habitat vegetation promotes continued survival of Sonoma alopecurus. Grazing and trampling of inflorescences, however, adversely affect alopecurus and excessive grazing and livestock induced erosion may threaten existing occurrences.

All four extant occurrences of the taxon at PRNS occur in grazed pastures, while no occurrences have been located in ungrazed areas, despite surveys of potential habitat by California Native Plant Society (CNPS) volunteers over the years. Two of the occurrences are located along fences separating grazed and ungrazed areas, growing only on the grazed sides of these fences. One of these occurrences, on the H Ranch, resulted from planting locally collected alopecurus seed in an adjacent area at the time it was excluded from grazing in 1983. The species is no longer found in the area excluded from grazing, but did become established on the grazed side of the fence, in a pasture that is grazed annually on a seasonal basis.

Grazing may promote the persistence of Sonoma alopecurus by reducing the density and shading effects of tall stature wetland competitors, such as bulrushes and sedges. Such reduction has been observed at both fenceline alopecurus sites, where alopecurus blooms appear among grazed down or trampled wetland vegetation on the pasture side but not among similar vegetation on the ungrazed side. Competition resulting from lack of grazing (or other) disturbance may account for the apparent extirpation of an alopecurus occurrence in a pasture along Mesa Road near Bolinas.

Cattle have also been observed to harm colonies of alopecurus at PRNS (M. Coppoletta and S. Gennett, pers. comm.). Presence of cattle in pastures containing alopecurus over the summer, when other forages dry out and wetlands become particularly desirable feeding and loafing areas, has resulted in grazing and trampling of alopecurus during its blooming period (May through July depending on site conditions.) It has been observed that wetland sites occurring in sandy

back dune areas, where little palatable forage is found, are especially favored by cattle. The two occurrences located along fences likely receive additional trampling due to cattle's habit of travelling along fences.

Potential livestock impacts that have not been observed at PRNS are associated with alteration of wetland habitat characteristics. The species appears to require a habitat of slow-moving or shallowly ponded water over a mud substrate. Filling of natural depressions by sedimentation due to livestock-associated erosion or diversion of drainage along incised trails may dry out wetland soils.

Ranching activities associated with maintaining livestock could have effects on Sonoma alopecurus. Such activities include driving vehicles into wetland areas and alteration of hydrological characteristics by grading or draining. Feeding of hay in wetland areas could result in localized excessive trampling by cattle, suppression of wetland plant growth, or introduction of weedy non-native species. These activities are unlikely to occur in the remote locations where alopecurus occur. Grading or draining of grazing lands is forbidden by the terms of park permits and Reservations of Possession.

Future effects harmful to the taxon are not anticipated because no changes to the management regime for the areas supporting Point Reyes' Sonoma alopecurus population will take place, except those designed to benefit the alopecurus. For example, the H Ranch occurrence will be fenced during the flowering season starting in 2001.

#### **8.1.3 Cumulative Effects**

Sonoma alopecurus could be effected by actions on the AT&T inholding bordering G Ranch. AT&T has closed the radio facility on its property, and the possibility of acquisition of the land by PRNS is currently being explored. No changes in land management are anticipated for the AT&T site.

#### **8.1.4 Conclusion and Determination**

Renewal of grazing permits for the F, G, and H Ranches may affect, is not likely to adversely affect Sonoma alopecurus at PRNS. Based on plant numbers in the G Ranch occurrences between 1994 and 1998, the population appears be stable or possibly increasing under current grazing management. All extant occurrences are located in areas grazed by cattle, while exclusion of cattle is likely the cause for loss of the occurrence at Mesa Road.

Alopecurus would probably benefit, however, from grazing prescriptions that would prevent grazing or trampling during their May-July flowering season. Such measures, including subdivision of pastures in which alopecurus occurs to allow for more carefully controlled seasonal grazing, are currently under consideration and are being implemented in some locations.

## 8.2 Sonoma spineflower (*Chorizanthe valida*) – Endangered

### 8.2.1 Status of the Species in the Action Area

Sonoma spineflower is an annual, growing 10-30 cm tall on sandy soils. A member of the Buckwheat family, it is named for its stiff involucre awns. It is thought to have originally been widespread in Marin and Sonoma counties, and was believed to have gone extinct during the mid-1900s due to agricultural and urban development. In 1976, the species was rediscovered in PRNS south of Abbott's Lagoon in the same pasture on G Ranch in which Sonoma alopecurus is located (Figure 8.2-1). This population has been monitored by CNPS since 1983. These surveys provide only coarse estimates of plant numbers. Survey data show population size ranging from several hundred plants in 1983 to 30,000 plants in 1993 (Table 8.2-1). The Marin chapter of CNPS has actively searched other areas for this plant since its 1980 rediscovery without success, and it is considered unlikely that other populations of spineflower will be found. The closely related San Francisco Bay spineflower (*C. cuspidata* var. *villosa*) is also found at Point Reyes in greater numbers and over a larger area, primarily in dune habitat.

Table 8.2-1. Population estimates for Sonoma spineflower on G Ranch 1980-2000.

Year	Estimated Numbers	Year	Estimated Numbers	Year	Estimated Numbers
1980	100	1990	2,000	1994	7,570
1984	1,000	1991	25,000	1998	5,400
1986	2,500	1992	27,000	1999	23,000
1988	2,500	1993	30,000	2000	6,200 <sup>a</sup>
1989	3,000				

a/ Survey of sub-population only.

Monitoring conducted since the mid-1980's has shown that the Sonoma spineflower can experience large variations in numbers from year to year, and estimated plant numbers have ranged from as low as several thousand individuals occupying less than 0.4 acres (0.85 ha) to as high as 30,000 (PRNS 2001).

The biology of Sonoma spineflower in relation to cattle grazing was studied from 1988 to 1991 (Davis 1992). Two livestock exclosures were constructed within the occurrence, and density of spineflowers inside and outside of the exclosures was measured. The ratio of individual plant density inside the exclosures compared to a nearby grazed comparison plot was 71% in the baseline year and 82% in the first year of exclosure, but dropped to 4% in each of the following two years of the study. Plants inside the exclosures were more than twice as tall as the plants outside, growing as tall as the grasses that were protected from cattle. The protected plants also had more inflorescences than those outside. Despite this, there were no plants inside the exclosures in 1996.

From his results, Davis concluded that "[c]attle grazing on competitive, non-native plants apparently had a significant positive influence on *C. valida*." Davis noted that cattle did not appear to eat either *C. valida* nor the morphologically similar San Francisco Bay spineflower at the Abbott's Lagoon study site, and suggested that the spiny inflorescences of these species may



This topographic map of the Point Reyes Peninsula, California, illustrates the distribution and management of Sonoma spineflowers. The map includes a scale bar (0 to 0.4 miles) and a north arrow in the upper left. Key geographical features include the coastline, various ranches (G Ranch, F Ranch), and the U.S. Coast Guard area. The map also shows the locations of Sonoma spineflower occurrence (indicated by a shaded area) and seeding plots (indicated by a circle with three dots). Other features include the AT&T area, Radio Stations, Radio Towers, and various landmarks like the Quarry, Water Tank, and Schooner Ldg (Site). The map is labeled with 'AR 13638' in the bottom right corner.

be an adaptation to resist grazing by the tule elk that were once numerous in the region. Avoidance of yet another spineflower species (*C. coriacea*) by cattle also has been noted (Halligan 1974). Grazing of competing taller plant species may reduce shading, which was found to greatly reduce survival of another spineflower species, *C. pungens* var. *hartwegiana*, found on sandy soils (McGraw and Levin 1998). Shade intolerance may be the major factor that limits spineflower to open sandy habitats, in areas where competition from taller plant species is minimal. Because Sonoma spineflower is only known to occur on sandy, well-drained soils that will support a low to moderate growth of competing plants, it is likely that suitable habitat at PRNS is small and patchily distributed, and that this, rather than historic and current livestock grazing, has limited its total population.

Livestock effects on Sonoma spineflower are discussed in *Seven Coastal Plants and the Myrtle's Silverspot Butterfly Recovery Plan* (USFWS 1998), in which it is concluded that "changes in grazing or trampling intensity (cattle stocking rates) could alter the vegetation structure that has allowed *C. valida* to persist. Increased grazing or trampling may increase seedling mortality, and reduced grazing/trampling could allow surrounding vegetation to close vegetation gaps and outcompete *C. valida*."

Further evidence that moderate grazing benefits Sonoma spineflower is shown by the initial success of four seeding efforts that have been made in grazed pastures as described below. It may also be significant that the last record of Sonoma spineflower before its presumed extinction was made near the F Ranch dairy at PRNS, which had been in operation for 50 years when the observation was made in 1903.

One of the requirements for downlisting Sonoma spineflower is to establish and maintain two new populations (USFWS 1998). Several efforts have been made to establish new occurrences from seed within grazed pastures at PRNS. In 1988 seeds were planted in three 2x2 meter plots within 100-200 meters of the existing population. Although reproducing spineflowers initially grew in all three plots, two of the plots eventually failed. The third, however, has expanded outside the original seeded plot and had 690 individuals in 2000. Two smaller seed plots planted near the successful plot had 122 plants between them in 2000.

In 1999, Sonoma spineflower was seeded at F Ranch, in the vicinity of an occurrence last observed in 1903. The site chosen for planting is regularly frequented by cattle to the extent that the soil is disturbed and competing vegetation is well grazed down. Although it is too early to know if the population will persist, 34 plants were counted there in 2000. In 2001, the original seeding had 182 plants, while a second seeding made in 2000 had 26 plants.

### **8.2.2 Effects of the Action on Sonoma spineflower**

The beneficial effects of livestock grazing on Sonoma spineflower discussed above is contingent on proper management of the pasture in which the entire population of this species is found.

Livestock use of the 360 acre "Beach pasture" on G Ranch, in which Sonoma spineflower is found, is spread over seven months each year. The allowed stocking for G Ranch is 95 beef cows and their calves, of which up to 65 cow/calf pairs are typically present in Beach pasture from October to June. During the winter months they are fed hay and use range forage only

during the spring. Forage monitoring conducted in this pasture since 1987 indicates that the Beach pasture had adequate levels of RDM except during the drought of 1990-91. G Ranch reduces grazing pressure on pasture forage by growing a silage crop on 190 acres that is sufficient to support the herd during fall and winter, when rangeland forage is low. Sufficient feed is available to livestock using the Beach pasture that it is unlikely that they would graze the unpalatable spineflower.

The chief potential livestock threat to the spineflower population derives from trampling, to which the brittle spineflower is highly vulnerable when full grown. Heavy trampling by livestock of the small area occupied by spineflower (0.85 ha) during its June-August flowering season could have adverse effects on reproduction. Qualitative monitoring of the Sonoma spineflower since the 1980s by CNPS, however, has indicated that this has not been a problem. Because of the unpalatability of the spineflower, the relative paucity of other forage, and a fairly distant water supply, excess trampling by cattle is unlikely to take place.

Activities related to maintaining livestock have caused trampling of Sonoma spineflower in the past, because the area where it occurs was formerly used for feeding cattle during summer and fall. Shortly after its discovery, feeding was relocated to an area well away from the population. This may account in part for the large increase in Sonoma spineflower numbers and aerial extent since the 1980's. This management practice for the pasture will continue.

The Sonoma spineflower population occurs interspersed around several dirt tracks used to access the pasture, where off-road driving through the population or dumping of dirt or materials could take place. The ranch permittees, however, are aware of the location of the population and that renewal of their permit could be jeopardized by such actions.

Future management of the area in which Sonoma spineflower occurs will involve continuation of the grazing regime that has proven successful to date.

### **8.2.3 Cumulative Effects**

Because the entire extent of the only known population of Sonoma spineflower in the world is restricted to land within PRNS, and spread of the population except by intentional planting is unlikely, actions by other agencies are not anticipated to affect the species.

### **8.2.4 Conclusion and Determination**

Based on the results of the enclosure study, the stable to increasing population numbers on G Ranch, and the success to date of seeding efforts on F and G Ranches, continuing the present level of cattle grazing under careful management and ongoing monitoring may affect, is not likely to adversely affect Sonoma spineflower at PRNS.

### 8.3.0 Serpentine species

**Tiburon paintbrush** (*Castilleja affinis* ssp. *neglecta*) - Endangered

**Marin dwarf flax** (*Hesperolinon congestum*) - Threatened

#### 8.3.1 Status of the Species in the Action Area

An area of approximately 300 acres at the crest of Nicasio Ridge at the northern border of GGNRA's North District contains serpentine soils and rocky outcrops that support a number of serpentine endemic species. Serpentine soils are found on a relatively flat ridgetop, most of which is on private land outside of GGNRA, and on smaller rocky outcrops within GGNRA. In addition to the two species discussed here the area supports a number of Species of Concern, including Oakland star-tulip (*Calochortus umbellatus*), Mt. Tamalpais jewelflower (*Streptanthus glandulosus* ssp. *pulchellus*), hayfield tarweed (*Hemizonia multicaulis* ssp. *vernalis*), and fragrant fritillary (*Fritillaria liliacea*).

Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*) is a semi-woody perennial, with erect, branched stems 30 to 60 cm (1 to 2 ft) tall. It is known from a total of six locations, with one each in Napa and Santa Clara Counties, three on Ring Mountain in eastern Marin County, and one on Nicasio Ridge. The Nicasio Ridge occurrence covers approximately 11 acres on the McIssac Ranch in GGNRA and adjoining private ranchland (Figure 8.3-1). Tiburon paintbrush is found growing in association with an evergreen, spiny-leafed ceanothus taxa that has been identified as *Ceanothus jepsonii* var. *jepsonii* but is now being studied as a possibly undescribed taxa. The number of Tiburon paintbrush on Nicasio Ridge was counted at 100 individuals in 1998, 41 in 1999, and 84 in 2000 (GGNRA 2000).

The Marin dwarf flax (*Hesperolinon congestum*) is an annual species growing 5-15 cm tall on serpentine grassland from Marin to San Mateo counties. It is known from six locations on Nicasio Ridge, with the largest occurrence overlapping with the Tiburon paintbrush area extending along the ridgetop from the McIssac Ranch into private land (Figure 8.3-2). The other five occurrences are located on small rocky outcrops on the Cheda, McIssac, and Zanardi ranches. Abundance of Marin dwarf flax on Nicasio Ridge appears to vary widely from year to year (Table 8.3-1). Survey efforts in 1998-2000 were the same but the number of occurrences

Table 8.3-1. Occurrences and estimated numbers of Marin dwarf flax on Nicasio Ridge (GGNRA 2000).

Occurrence	1998	1999	2000
#1	157	87	2,000
#2	56	0	350 <sup>b</sup>
#3	n.a. <sup>a</sup>	2	740
#4	n.a. <sup>a</sup>	n.a. <sup>a</sup>	285
#5	n.a. <sup>a</sup>	n.a. <sup>a</sup>	350 <sup>b</sup>
#6	n.a. <sup>a</sup>	n.a. <sup>a</sup>	350 <sup>b</sup>

a/ Occurrence not found.

b/ Observers stopped counting at 350 plants.



Figure 8.3-1. Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*) occurrence in GGNRA and private land.

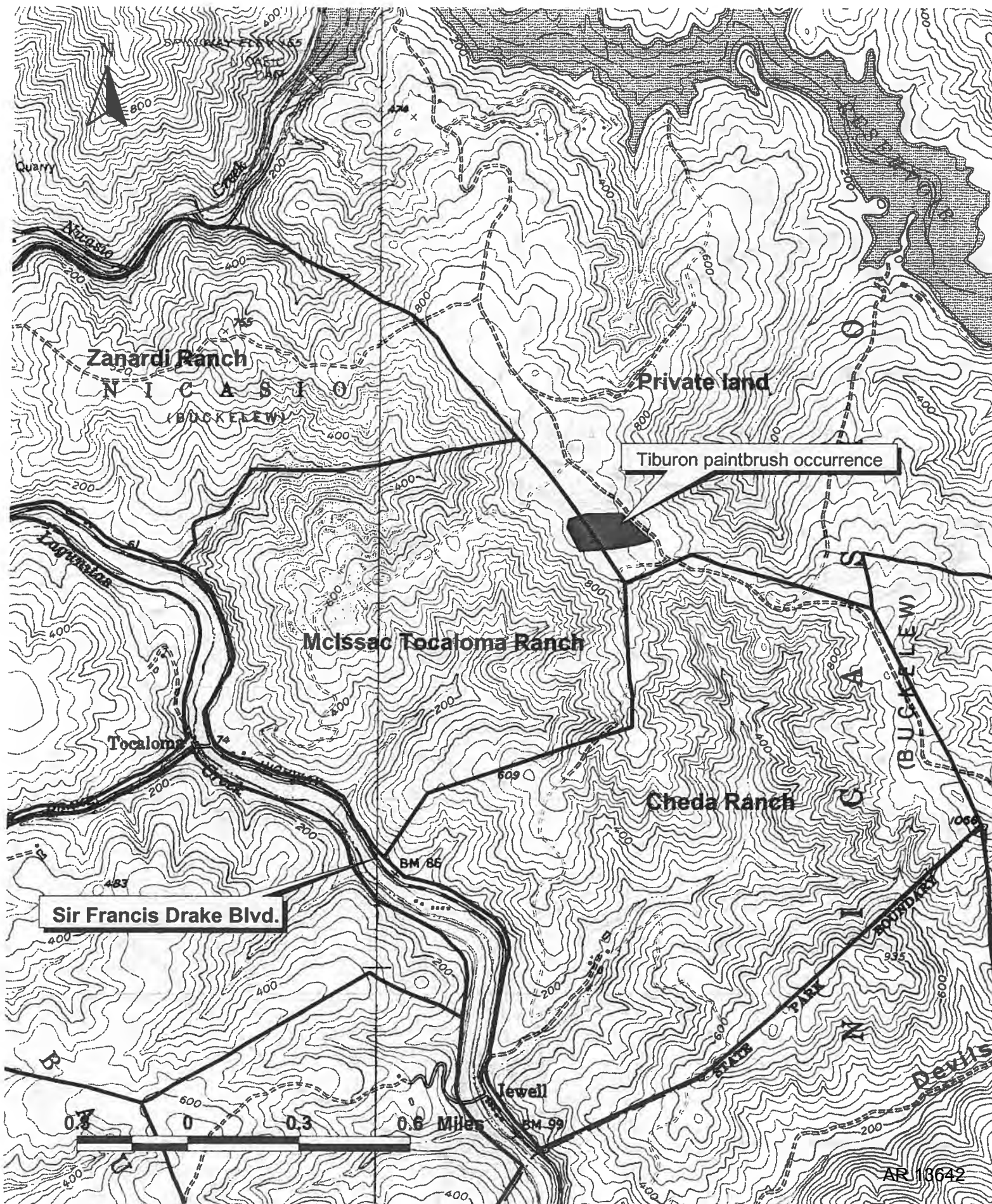
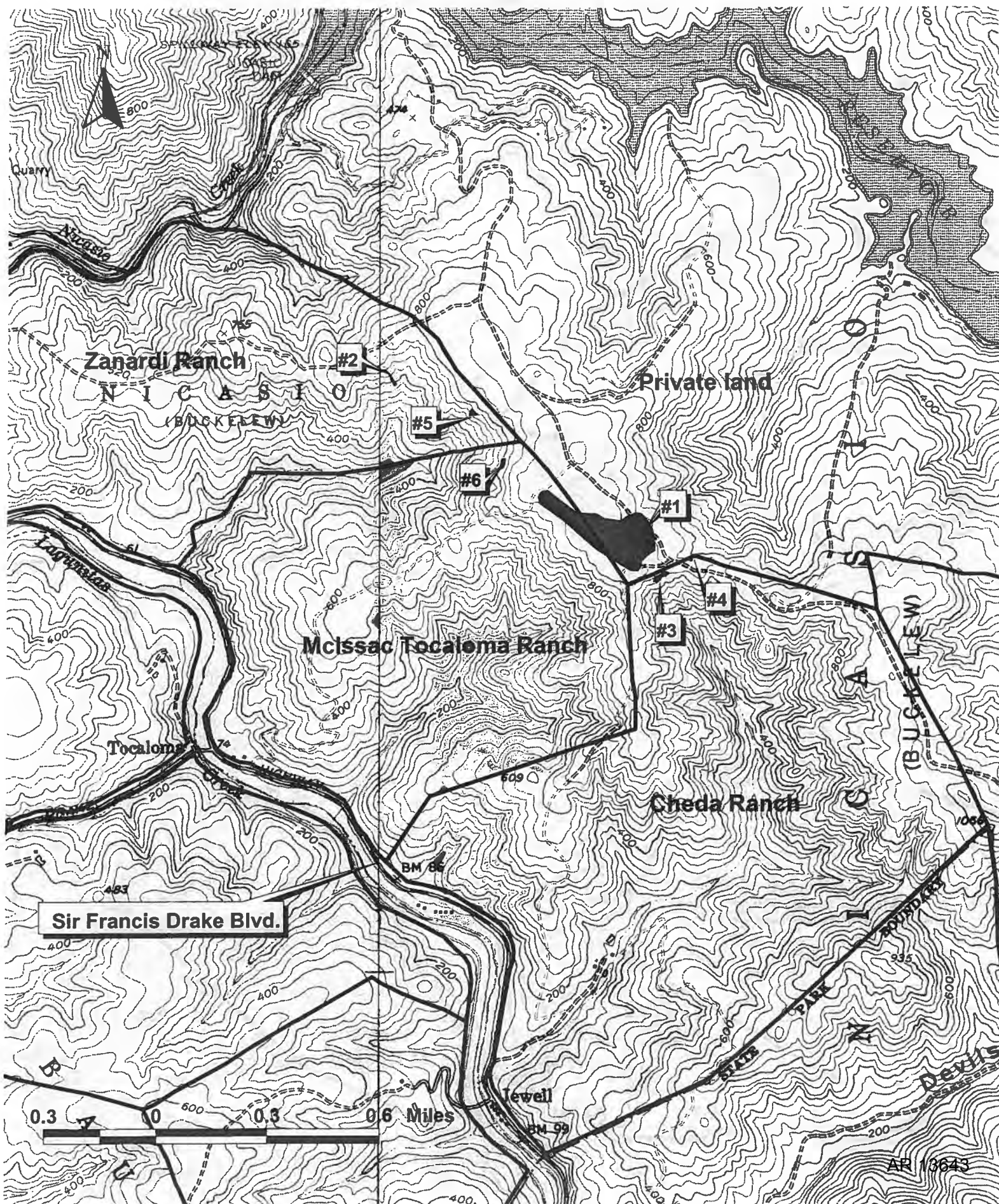


Figure 8.3-2. Marin dwarf flax (*Hesperolinon congestum*) occurrences (#1-6), GGNRA.





and estimates of individual plants differed substantially, with new occurrences found in 1999 and 2000 (L. Cushing, pers. comm.). This suggests the distribution of Marin dwarf flax on Nicasio Ridge is not fully known, and it may appear in other sites in the future due to seed dispersal, weather, or localized disturbances.

### **8.3.2 Effects of the Action**

The Cheda, McIssac and Zanardi ranches are Reservations of Possession (ROPs) with terms expiring between 2005 and 2009. While livestock numbers are not specified under terms of ROPs, these ranches are held to the same standards as those under Special Use Permits to maintain RDM levels averaging 1200 lb/acre. Monitoring of RDMs has been conducted by PRNS on these ranches since 1987. As a result of inadequate residues in the late 1980's, the Cheda and Zanardi ranches were required to reduce livestock numbers. Since that time, all three ranches have met RDM standards in most years.

These ranches were dairies from the time of their establishment in the 1860's through the 1970's, when they switched to raising beef cattle. It is likely that livestock use of the serpentine ridge top was minimal during the century of dairying, since it was remote from the dairies themselves, which were located in valleys below. With the transition to beef operations, livestock became more dispersed over the ranches. Observed cattle impacts on the serpentine area has varied from year to year. Rare plant monitors saw little evidence of cattle presence in 1998, but in 2000 some grazing and trampling of Marin dwarf flax was found (D. Robertson, pers. comm.). Some herbivory on Tiburon paintbrush was observed in 1998 but none in 2000. Monitors noted that cattle may avoid the unpalatable *Ceanothus* spp. with which the paintbrush is found. The chief impact recorded by monitors has been cattle trails, which have been observed in the ridgetop area where Tiburon paintbrush and the largest Marin dwarf flax occurrence are located (GGNRA 2000). While cattle often favor flat areas on ridges, little water is available on the upper portion of Nicasio Ridge, limiting cattle presence there. Cattle use may vary depending on annual rainfall or movement between other grazing areas. Because of the short time period covered by monitoring data, no consistent pattern of cattle impacts on the serpentine area has been observed. Annual monitoring of serpentine plant species on Nicasio Ridge, to be conducted by GGNRA botanists, will provide a means to detect if cattle are adversely impacting the area in the future.

Marin dwarf flax may benefit from a moderate level of cattle grazing through the reduction of taller competing vegetation. Growing to a height of 5-15 cm, the flax is subject to shading by competing grasses, or may be suppressed by buildup of the residue of previous year's grass that could reduce direct sun and heat required for germination. The large increase in Marin dwarf flax numbers in occurrences #1 and #2, and the recent discovery of new occurrences in the area suggests that current conditions on the ranches are favorable for this species.

Because of the rocky terrain and difficult access to the Nicasio Ridge serpentine area, ranching related activity such as winter feeding of cattle is conducted in lower elevation, more accessible areas.

### **8.3.3 Cumulative Effects**

Because of its remote location requiring travel on steep roads traversing unstable soils, it is unlikely that substantial habitat alteration will take place on Nicasio Ridge. Marin County

zoning and ranch land protection ordinances protect the site from development. Both Tiburon paintbrush and Marin dwarf flax are listed as Threatened by the State of California, providing further protection for the Nicasio Ridge serpentine area.

#### **8.3.4 Conclusion and Determination**

Monitoring conducted since 1995 suggests that both the Tiburon paintbrush and Marin dwarf flax populations on Nicasio Ridge are stable. No consistent pattern of adverse cattle impacts to the population have been identified. Marin dwarf flax may benefit from moderate levels of cattle disturbance of soils and grazing of competing plants. For these reasons, continuation of cattle grazing on the ranches where Tiburon paintbrush and Marin dwarf flax are known to occur may affect, is not likely to adversely affect the species. Regular monitoring of population status and potential threats will continue.

#### 8.4.0 Dune Species

**Beach layia** (*Layia carnosa*) – Endangered

**Tidestrom's lupine** (*Lupinus tidestromii*) – Endangered

##### 8.4.1 Status of the Species in the Action Area

These two plant species occur in coastal dunes on the western edge of the PRNS peninsula. Both have been monitored by CNPS volunteers and PRNS staff since the 1980's. Monitoring reports include an estimate of plant numbers, a description of site characteristics, and apparent threats to each occurrence. These reports have been assembled in the PRNS Rare Plant Database.

Beach layia is an annual, usually prostrate member of the Asteraceae family found in 19 dune sites on the northern and central California coast from Humboldt to Santa Barbara counties. It has been recorded at 13 sites within the dunes at PRNS (Figure 8.4-1), with estimated numbers of individual plants varying widely among occurrences (Table 8.4-1). Its habitat is the central foredune community characterized by some drifting sand and low growing herbaceous and perennial species. Beach layia can experience large fluctuations in plant numbers and local

Table 8.4-1. Beach layia occurrences and estimated numbers, 2000 (PRNS 2001).

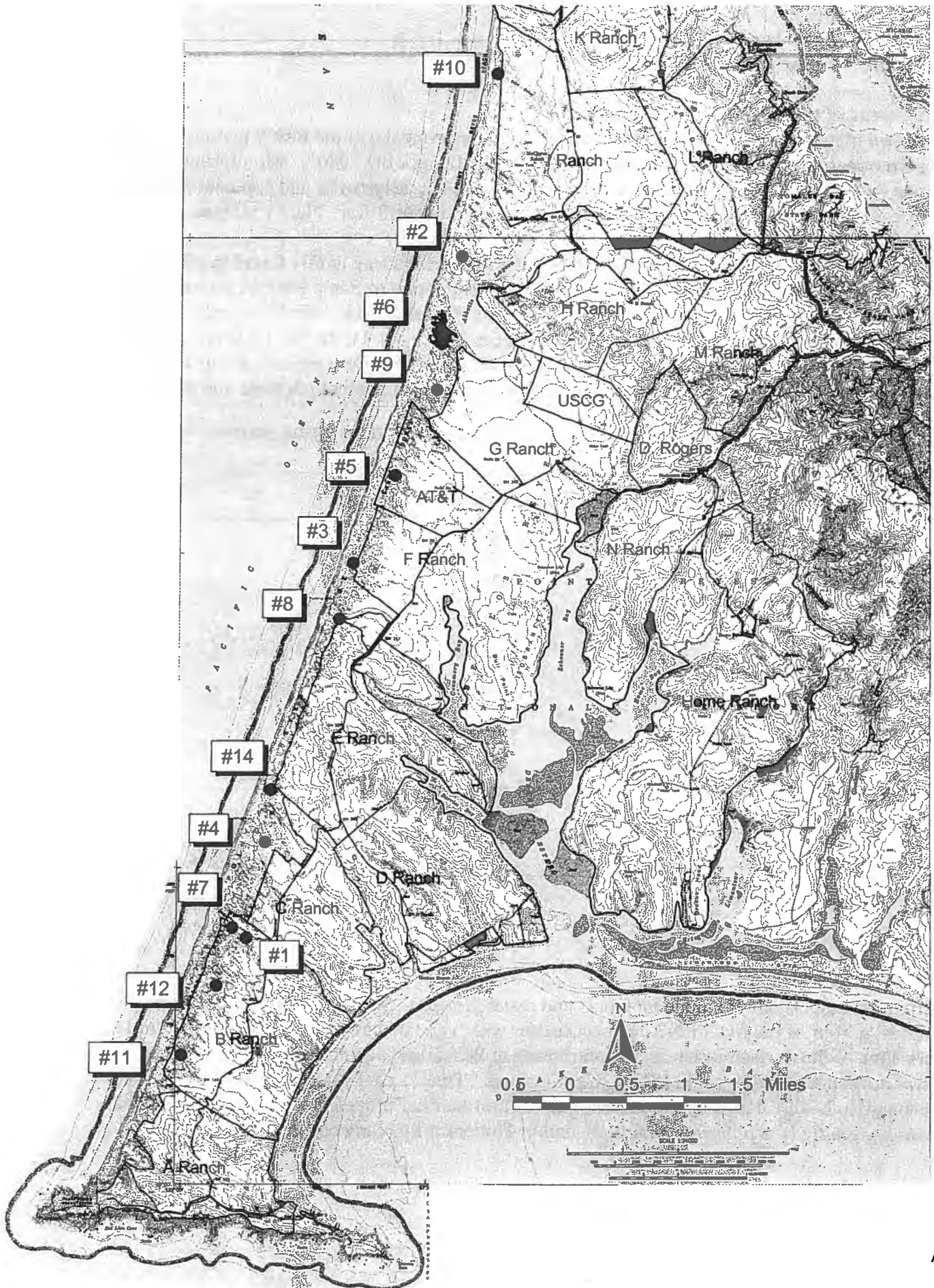
Occurrence #	Estimated Number of Individuals
1	2,140
2	250
3	667
4	36 <sup>a</sup>
5	<10
6	792
7	632
8	8
9	1,879
10	350
11	15,000
12	15
13 <sup>b</sup>	
14	664
Total	22,433

a/ Surveyed in 1988.

b/ There is no occurrence 13.

distribution associated with dune blowouts and restabilization. Such fluctuations have been observed in four of the five PRNS occurrences for which counts have been made over multiple years. Five of the thirteen beach layia occurrences at PRNS are located in pastures, but plant monitors did not consider cattle to be a threat to them. Twelve of the occurrences were considered to be threatened by the presence of the non-native European beachgrass (*Ammophila arenaria*), sea fig (*Carpobrotus chilensis*), and/or Hottentot fig (*Carpobrotus edulis*) nearby.

Figure 8.4-1. Beach layia (*Layia carnosa*) occurrences (#1-12,14), PRNS.



These perennial, rhizomatous non-native species form monotypic stands that virtually exclude less competitive native species.

Tidestrom's lupine is a small (10-30 cm) decumbent shrub found in 11 areas in dunes from southern Sonoma County to Monterey County. It is known from seven occurrences at PRNS (Figure 8.4-2), of which four have been monitored since the 1980's by CNPS (Table 8.4-2).

Table 8.4-2. Tidestrom's lupine occurrences and estimated numbers, 2000 (PRNS 2001).

Occurrence #	Estimated individuals
1	2,000
2	79
3	13
4	7
5	0
6	5,940
7	64
Total	8,103

The largest occurrence is in the large stable plain behind dunes southwest of Abbotts Lagoon, where the taxa is found on an estimated 383 acres. Once part of G Ranch, this area was fenced off from cattle in 1989. This occurrence has been monitored from 1983 to the present and appears to be stable. Other occurrences of the lupine are located on the north side of Abbotts Lagoon and further to the south, near the North Beach parking area and the Old Lifesaving Station. Three of the seven occurrences are within pastures but grazing was not considered a threat by plant monitors. Six of the occurrences are considered threatened by European beachgrass and ice plant.

A project to remove non-native species near Abbotts Lagoon will be carried out from 2001-2003. The project is focused on areas where native vegetation is still relatively intact and may provide an effective means of protecting beach layia, Tidestrom's lupine, and other native dune species from invading non-natives.

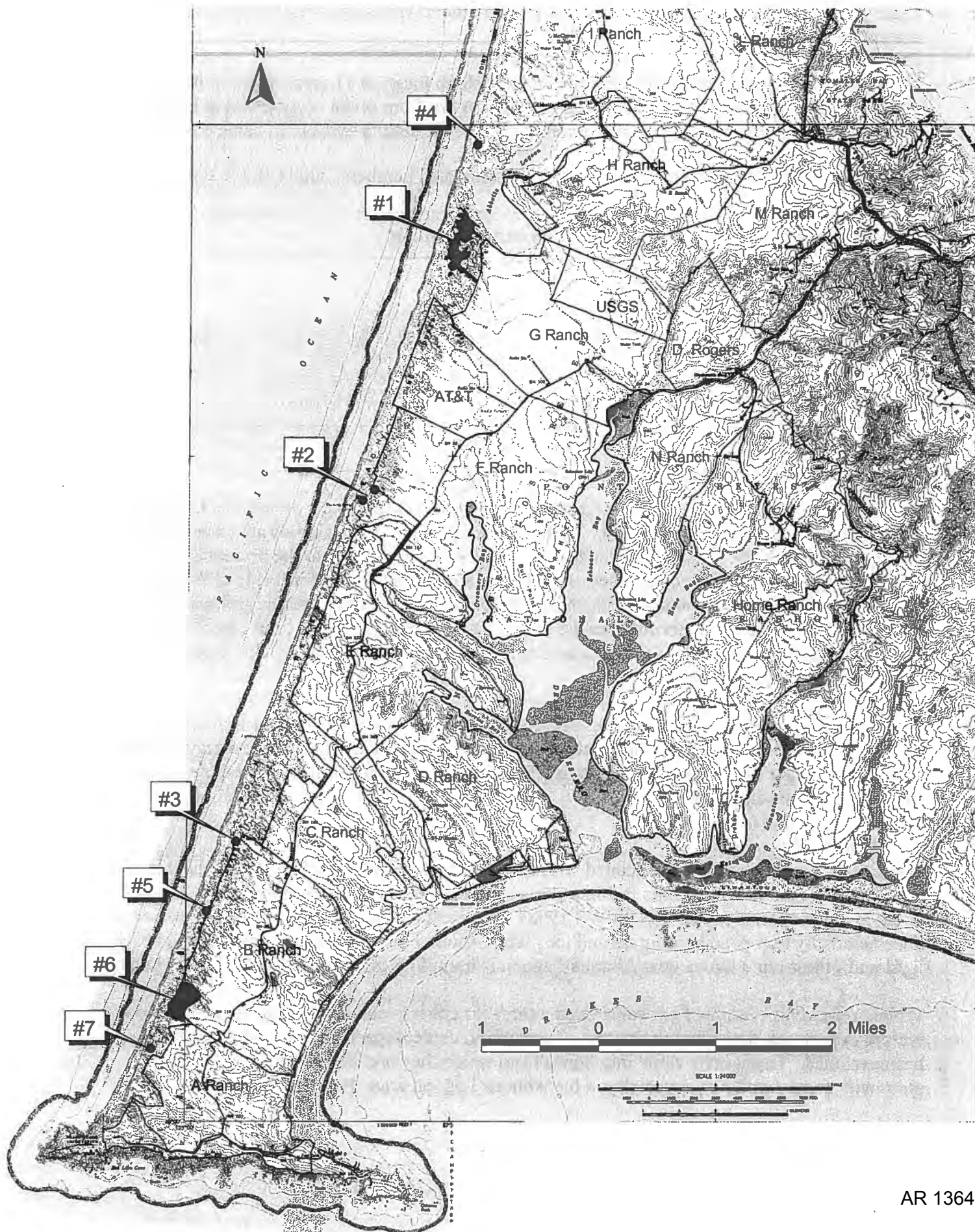
#### **8.4.2 Effects of the Action**

While cattle grazing has been associated with extirpation of Tidestrom's lupine elsewhere in Marin County, the Recovery Plan for this species and for beach layia does not cite grazing as a threat to either species in PRNS (USFWS 1998). The most serious threat at PRNS is invasion of dune habitat by European beachgrass and ice plant. Another threat to occurrences of both beach layia and Tidestrom's lupine near Abbotts Lagoon is trampling of fragile dune habitats by hikers.

While presence of cattle was not considered a threat to either beach layia or Tidestrom's lupine located in pastures, these species are more secure from cattle impacts in areas where cattle have been excluded. Trespass by cattle into dunes from which they are fenced out, however, takes place with some regularity, especially in the Abbotts Lagoon area. Poor siting of some pasture



Figure 8.4-2. Tidestrom's lupine (*Lupinus tidestromii*) occurrences (#1-7), PRNS.





fences in sandy areas that provide a poor substrate for permanent fencing makes such trespass more likely, as does inadequate fence maintenance by ranchers.

Ranch employees occasionally drive all terrain vehicles into dune areas, either to round up cattle that have gotten through fences or for recreation. Such driving is not permitted by PRNS regulations, but has been an ongoing, although minor, problem.

#### **8.4.3 Cumulative Effects**

Beach layia has been recorded since 1987 at 19 sites covering approximately 1,390 acres extending from Humboldt County to Santa Barbara County. Over half the acreage occupied by the species is found at Humboldt Bay, where dune habitat is protected by management plans instituted by Humboldt County, the Bureau of Land Management, and the City of Eureka. Much of this habitat has been degraded by vehicle access and invasion by non-native plant species. The USFWS Lanphere Dunes preserve, which is also near Humboldt Bay, has instituted a program to remove non-native plant species which has resulted in an increase in beach layia numbers (USFWS 1998).

Tidestrom's lupine has been recorded since 1985 at 11 sites ranging from Sonoma County to Monterey County and covering approximately 500 acres. Over 85% of the area containing the species is in PRNS. The largest site by far is the 383 acre occurrence located in the dunes west of Abbott's Lagoon in PRNS, which has been protected from cattle access since 1989. The largest occurrence of Tidestrom's lupine outside of PRNS is at Asilomar State Park, where a project to protect and restore the lupine's habitat is underway. Protective measures have also been instituted for a number of occurrences on private land on the Monterey peninsula.

#### **8.4.4 Determination**

Because cattle are excluded from most of the dune habitat where they occur, and where cattle are present they do not appear to be a threat to the species, the continuation of grazing at PRNS may affect, is not likely to adversely affect beach layia or Tidestrom's lupine. Fences excluding cattle from dune areas will be properly maintained and improved if necessary to prevent cattle trespass. Regulations against use of all terrain vehicles in dune areas will be strictly enforced. If future monitoring of occurrences of the two species located in pastures detects adverse impacts by cattle, changes in grazing regime will be instituted or exclusionary fencing constructed.

## 9.0 Assessment of Animal Species of Management Concern

### 9.1 Red-legged Frog (*Rana aurora draytonii*) – Threatened

#### 9.1.1 Status of the Species in the Action Area

PRNS and GGNRA support one of the largest known populations of California red-legged frogs. The U.S. Geological Survey Biological Resources Division (USGS-BRD) has conducted surveys of aquatic habitats in PRNS and GGNRA since 1993 under the direction of Gary Fellers. Survey work has been conducted by a series of field workers under Dr. Fellers' direction, including Kathleen Freil, Leslie Long, and Patrick Kleeman. Survey protocol is adapted from USFWS practices and has been published as a NPS Technical Report (Fellers & Freil 1995).

Surveys have been conducted on virtually all sites containing aquatic habitat that could support amphibians. Field data includes information on habitat type (permanent or seasonal, natural or created), water characteristics, (depth, flow, turbidity, etc.), vegetation (emergent, floating, and surrounding the site), disturbance, including current grazing, and the age classes and physical condition of amphibians found.

Field surveys have led to documentation of numerous sites used by red-legged frog; sites have been mapped in a geographically-related database (Figure 9.1-1). Approximately 76 sites are located on ranch lands, with a large proportion located at stock ponds (Table 9.1-1). A breakdown of sightings according to the type of habitat use observed (breeding vs. non-breeding, upland dispersal vs. other upland habitat use, etc.) has yet not been made, since survey work is ongoing and it is believed that new locations will be detected.

Table 9.1-1. California red-legged frog (CRLF) sites on PRNS and GGNRA ranches.

Ranch	Total CRLF sites	Stock pond	Riparian	Other <sup>a</sup>
<b>Point Reyes NS</b>				
A Ranch (Nunes)	1			1 <sup>b</sup>
B Ranch (Mendoza)	3	1		2
C Ranch (Spaletta)	3	1	1	1
D Ranch (vacant)	5	3		2
E Ranch (Nunes)	1			1
F Ranch (Gallagher)	1	1		
G Ranch (Lunny)	6	4	1 <sup>b</sup>	1
H Ranch (D. Grossi)	5	5		
I Ranch (McClure)	6	6		
J Ranch (Kehoe)	0			
K Ranch (Evans)	1	1		
L Ranch (Mendoza)	6	5		1
M Ranch (R. Grossi)	3	2	1	
N Ranch (McDonald)	3		2	1
D. Rogers Ranch	4	2	2	

Figure 9.1-1. Red-legged frog occurrences and ranch boundaries, PRNS and GGNRA.



Livestock Grazing Biological Assessment, Point Reyes National Seashore.

Table 9.1-1. California of red-legged (CRLF) frog sites on PRNS and GGNRA ranches (continued).

Ranch	Total CRLF sites	Stock pond	Riparian	Other <sup>a</sup>
Home Ranch (Murphy)	13	12		1
Tacherra Bros.	0			
Niman Ranch, Mesa, Commonweal	0			
<b>Golden Gate NRA</b>				
Martinelli Ranch	2	2		
Genazzi Ranch	2		2	
Giacomini, Robert	2		2	
McFadden Ranch	0			
Rogers, C. Ranch	0			
Stewart / Olema	2			2
Truttman Ranch (Stewart)	3	2		1
Stewart Ranch	0			
Lupton Ranch	2	2		
Giacomini, Ralph	1	1		
Wilkins Ranch	1	1		
McIsaac Tocaloma Ranch	0			
McIsaac SUP	0			
Cheda Ranch	0			
Zanardi Ranch (Martin)	0			
Percy Ranch	0			
PRNS & GGNRA Totals <sup>c</sup>	76	51	11	14

a/ Includes ephemeral pools, wetlands, and springs.

b/ Cattle excluded from site.

c/ Sites on Olema Creek and tributaries not counted.

It is likely that further surveys will document additional red-legged frog sites at PRNS/GGNRA. Several new breeding sites have recently been found along tributaries of Olema Creek. Several large bodies of water, such as Abbott's Lagoon, are expected to yield new sites during a planned boat survey, which will allow more thorough coverage than has been attained by foot surveys.

Creation of stock ponds and other small impoundments on ranches over the past 100 years has likely resulted in increased numbers and an expansion in range for red-legged frogs in the PRNS area (G. Fellers, pers. comm.). Frogs appear to move readily between these ponds during periods when the ground is moist, which is prolonged on the foggy PRNS peninsula. Numerous wet swales, seasonal springs, and ephemeral pools provide dispersed travel and feeding habitats. In GGNRA, riparian habitat along creeks provides corridors for travel along the Olema Valley and its tributaries.

**Critical Habitat**

PRNS, GGNRA, and adjoining areas of Marin County comprise one of the 57 core areas for focussed recovery of red-legged frogs established in the Draft Recovery Plan for the species

(USFWS 2001). Much of the PRNS-administered ranching area falls within the recently established criteria for red-legged frog critical habitat (USFWS 2001). The central peninsula has roughly 75 stock ponds in an area extending from the Kehoe Ranch near Pierce Point south to Point Reyes itself and east to Tomales Bay, Mt. Vision, and the Laguna Ranch (now the Clem Miller Environmental Education Center). Approximately 50 of these ponds are located on land currently used for ranching, with most of the remaining 25 on former ranch lands on Inverness Ridge and above Limantour Estero. Most of these ponds retain water at least 20" deep well into the summer, and a number are perennial in typical rainfall years. Evidence of breeding red-legged frogs has been observed in many of these ponds. Pond habitat and several perennial creeks are densely clustered on the Point. Distances of under 1.25 miles separate one or more adjacent aquatic habitats, and the ground between them is suitable for red-legged frog overland movement. Traffic along Sir Francis Drake Boulevard, the only major potential barrier to movement, is less than 30 cars per hour on late fall and winter nights, when adult red-legged frogs are most likely to be traveling overland. The habitat area for red-legged frogs on central Point Reyes encompasses all of the grazing land there.

A second interconnected habitat area extends along the Olema Valley, where the perennial segment of Olema Creek links scattered off-stream aquatic habitats from the vicinity of Point Reyes Station south approximately 13.5 km. Stock ponds are less common in the Olema Valley than on the peninsula, numbering less than 20. Red-legged frogs have been observed in most of the tributaries on the eastern side of Olema Creek, where ranching occurs.

Suitable habitat along Olema Creek and its tributaries may have been adversely affected by geomorphological instability associated with historic logging of parts of Inverness Ridge, channel alterations in the lower 2.8 km of Olema Creek, and the effects of highway culverting. Areas of downcutting, bank cutting, and sedimentation are present along the mainstem and its tributaries, resulting in a probable reduction in numbers of backwaters and pools.

Red-legged frogs have also been found on Bolinas Mesa and at several ponds on top of Bolinas Ridge. Since frogs could be present in unsurveyed locations on Inverness Ridge, and could travel along seasonally wet riparian corridors over the ridge, all the red-legged frog sighting locations have been linked into one metapopulation.

### **9.1.2 Effects of the Action on California Red-legged Frog**

#### **Effects on Aquatic Habitats**

The types of potential impacts of livestock on California red-legged frog aquatic habitats are summarized in Table 9.1-2 below, which is based on pages 31-34 of the Draft Recovery Plan.



Table 9.1-2. Potential livestock impacts on California red-legged frog aquatic habitats.

<b>Livestock Impact</b>	<b>Potential Effect on RLF Habitat</b>
Emergent vegetation removed	Emergent vegetation used for anchoring egg masses. Excessive vegetation may reduce sunlight needed for basking and growth of algae, which is chief tadpole food.
Shading vegetation removed (emergent and bank side)	Chiefly harmful to adults, for whom shaded refugia may be critical in drier inland areas during the summer.
Insect habitat vegetation removed	Harmful to adults and juveniles that mainly feed on invertebrates for which bank side vegetation is prime habitat.
Alteration of stream morphology by caving in banks	May cause loss of pool habitat in streams.
Excess trampling of shallow margins of ponds or streams	Risk of trampling egg masses, tadpoles and adults or destroying vegetation.
Excess water drawdown in ponds	May strand egg masses, tadpoles or adults.
Excess sediment from cattle-induced erosion	Could cause filling of pond habitat, reduce primary productivity.
Change hydrological regime by accelerating runoff	Pools may dry before metamorphosis completed.
Excess nutrients from livestock manure	Possible impact where animals concentrated - requires study.

#### Effects on Riparian Areas

Surveys for red-legged frogs have been less thorough in riparian areas than at stock ponds. Continuing surveys may detect frogs in creeks where they have not yet been recorded. While they are known to use small seasonal creeks, surveys in the Action Area have most consistently found red-legged frogs in creeks of relatively low gradients that have late season water flow or water retention in pools. On Point Reyes itself, such creeks support relatively few of the frog breeding sites documented so far, but they may serve as connector and refuge habitats. The most important of these are Kehoe Creek and Abbotts Lagoon Creek on the north end of the peninsula, and Schooner Creek, which drains into Drake's Estero. Portions of all three of these creeks, including areas that are known red-legged frog sites, are fenced off from livestock access. Cattle are excluded from Kehoe Creek below the confluence of its north and south forks and along parts of both forks. The lower 0.6 km of the south fork of Abbotts Lagoon Creek and most of its 0.8 km long north fork is fenced off from cattle. The lower 1.6 km of Schooner Creek's west fork and its entire east fork are excluded from grazing.



Riparian areas along other creeks are adversely affected by ranching operations. Red-legged frogs have been observed in several wetlands along Kehoe Creek, in sites both accessible and inaccessible to cattle. This creek, however, suffers from degraded water quality due to runoff from dairies into each of its forks. The south fork lies below L Ranch, and receives runoff from cow holding pens and possibly overflow from a dairy waste pond. The north fork receives polluted runoff from a pasture on J Ranch where cattle have unrestricted access to the creek. Water quality testing conducted by PRNS has documented that Kehoe Creek experiences high levels of coliform bacteria and total suspended solids from influx of dairy waste during rainfall events. Efforts are currently underway to reduce runoff of pollutants from these dairies.

The portion of the south fork of Abbotts Lagoon Creek that is not permanently fenced off flows through two pastures on I Ranch, each of which contains a pond where red-legged frogs have been observed. One pasture is grazed seasonally and there appears to be no impact on the pond from cattle. The other pasture is a feeding area where dairy heifers are maintained year round. These cattle use a pond located on the creek for watering and as a loafing area. Despite much trampling of part of its margin, the pond supports emergent and marginal vegetation on its less accessible portion.

The upper portion of Schooner Creek's west fork flows through M Ranch, where it is accessible to cattle. Red-legged frogs have been observed at two stock ponds and two riparian sites along this portion of the creek. Frog habitat may be affected by grazing of riparian vegetation along part of this creek.

A 2.0 km stretch of Home Ranch Creek runs through pastures that are seasonally grazed from March to November. Cattle use the creek for water and loafing, which has damaged riparian vegetation. No red-legged frogs have been observed along this creek, although they have been seen at a nearby stock pond also used by cattle.

In summary, riparian habitat known to support red-legged frogs on PRNS peninsula ranches includes both sites from which cattle are excluded and those where regular cattle use occurs. Portions of most creeks in the ranching areas have been affected by trampling and vegetation removal in limited high cattle use areas.

In GGNRA, Olema Creek is the most significant non-breeding habitat for red-legged frogs that likely move to more seasonal habitats for breeding. Approximately one-third of its length is outside of the Action Area, while the remainder is fenced off from direct access by cattle along its entire length except for an approximately 1.0 km section near Five Brooks. Riparian habitat buffer zones within this fencing are narrow, typically extending no more than 10 meters from the creek bank. Fencing has also been constructed along a 0.6 km stretch of Blueline Creek, the largest tributary of Olema Creek. The excluded area of this creek is relatively flat and meandering. Red-legged frogs have recently been observed in this portion of the creek. With the exception of the Blueline Creek exclusion, cattle have access to the tributaries of Olema Creek on the east side of Olema Valley.

Cattle grazing could result in accelerated runoff on steep Olema Valley slopes by reducing vegetation cover and causing soil compaction. Most of the tributary creeks in the valley,

however, flow through deep wooded canyons, so that there is a substantial buffer area between grazed ridgelines and creeks for infiltration to take place. Olema Creek is buffered by ungrazed areas along most of its length. Where pastures border the creek on the Stewart and Truttman ranches, they are on flat ground with high rates of infiltration.

The character of Olema Creek changes near the town of Olema, where it develops a substantial floodplain that extends to Sir Francis Drake Boulevard, just before the confluence with Lagunitas Creek. A small part of this floodplain west of Olema Creek is permanently fenced off from cattle, as is the creek channel itself. The larger portion of the floodplain, consisting of 95 acres between the creek and Highway 1, is seasonally grazed as part of the Stewart/Olema permit. Grazing is restricted to the period between June 1 and October 31, so cattle will be out of the floodplain when it is flooded or saturated during the winter. Several slough-like channels occur in the floodplain, fed either by Olema Creek or several tributaries that empty onto it. Red-legged frog breeding sites have been found in several of these channels.

#### Effects on Stock Ponds

Red-legged frogs have been detected in over 40 of the stock ponds scattered over the ranching area of the Point and in another 10 in GGNRA. These ponds comprise the majority of documented red-legged frog sites on ranch lands and receive the most regular and heavy cattle use. Many of the ponds have minimal shading vegetation, although this may be a characteristic of the pond site rather than cattle presence. This is especially true on the Point, where trees are relatively sparse in the grassland areas. Bank side vegetation has typically been reduced by cattle. In some cases, where topography restricts cattle access to the pond, impacts are restricted to a limited area, while in others the entire pond edge is bare. Emergent vegetation also varies by pond, but overall is considered to be enough for red-legged frog reproduction but not excessive, which would reduce open water needed by larvae and the algal growth they feed on (G. Fellers, pers. comm.).

Observations on vegetation surrounding ponds, and on percent cover of emergent and floating vegetation on pond surfaces is part of the data collected in PRNS amphibian survey work. The extent to which presence of such vegetation beyond minimal levels is important to red-legged frog reproduction is not clear. In an effort to identify the optimal level of emergent and submerged vegetation for red-legged frogs, biologists at the East Bay Regional Park District used data from 265 ponds located in their parks, which together support an estimated 500-600 breeding adult frogs. Presence of frogs was compared at ponds with three levels of vegetation cover: no cover, cover less than 15%, and cover more than 15%. No significant differences in the presence of red-legged frog larvae, juveniles, or adults were found (S. Bobzien, pers. comm.).

Cattle wade into stock ponds, destroying egg masses or trampling tadpoles and adult frogs. This is more likely in warmer inland areas of GGNRA where cattle may wade into ponds to cool off during the summer. Most stock ponds are large enough that tadpoles and adult frogs can take refuge in deep water. The extent to which such disturbance takes place and its impact on frogs is not known.

Because red-legged frog eggs are deposited in winter and require only 6-14 days to hatch, stranding by excessive water drawdown of ponds is unlikely. Virtually all stock ponds hold sufficient water to support tadpoles and adult frogs through the spring and summer.

Both pond and riparian pool habitats may experience sedimentation caused by cattle-induced erosion. Many of the stock ponds on the Point Reyes peninsula are located on gently sloping ground and have not been substantially reduced in size by sedimentation, but riparian habitats in both PRNS and GGNRA have been observed to carry heavy sediment loads during high flow periods, indicating both channel instability and erosion in watersheds. Such erosion usually takes the form of gullying. Some of the sandy soils on Point Reyes are especially prone to gully formation, as are steeply sloping areas in GGNRA. Many of the most serious gullies date from high rainfall El Nino winters such as 1982/83 and 1997/98. Reduced plant cover due to grazing, and soil disturbance and trails caused by cattle may have contributed to the erosion caused by these events, although active erosion sites are also present in ungrazed areas of PRNS. Much of the worst gullying is associated with roads, either poorly sited and constructed dirt roads dating from before the establishment of PRNS and GGNRA, or from poorly designed culverts along paved county and State roads.

PRNS has conducted several projects to reduce erosion on ranchlands. Between 1985 and 1988, over 20 erosion control and riparian protection projects were completed within PRNS and the North District of GGNRA, including fencing cattle out of sensitive wetland habitats. A survey of erosion sites was conducted in 1997, and over 20 erosion sites on ranchlands identified. Ongoing repair of erosion sites is being carried out through cooperative efforts between ranchers and PRNS or the Natural Resource Conservation Service (NRCS).

The possibility that ponds will wash out due to erosion of dams or failure to correct headward gully erosion below dams poses a greater threat to red-legged frog pond habitat than sedimentation. Dam repairs needed to maintain pond habitats will be carried out in a manner that is not harmful to red-legged frog populations.

Nutrients from cattle manure and urine may not be sufficiently concentrated to harm red-legged frogs at pond sites in rangeland grazing situations where moderate cattle numbers are present. Red-legged frog tadpoles and adults have been observed in highly nutrient-enriched ponds, suggesting that they are tolerant of such conditions.

#### Effects on Dispersal Habitats

Much of the Point Reyes peninsula uplands is suitable dispersal habitat for red-legged frogs. Within the ranching area, 27% of land is considered ungrazable due to topography and vegetation cover. These are largely shrublands and woodlands little used by cattle. Grasslands generally have adequate cover for red-legged frogs because numbers of cattle allowed on ranches has been set by PRNS so that on average at least 1,200 lb/acre of cover will be present all year during average rainfall years.

On GGNRA ranches, approximately 41% of the land consists of steeply sloping wooded canyons dominated by woodlands and understory shrubs. Most grazing is concentrated on grassy

ridgelines, open slopes, and flats. Many red-legged frog habitats in GGNRA are linked by permanent or seasonal creeks.

The level of vegetation maintained on PRNS grazing lands is sufficient to maintain numerous small wetland areas that are used seasonally by red-legged frogs. Moderate cattle numbers and the nocturnal inactivity typical of cattle means the frogs travelling overland between aquatic sites are in little danger of cattle trampling.

#### Effects of Ranching Activities

Activities associated with maintaining livestock in the Action Area that could affect red-legged frogs include: driving vehicles for routine ranch operations; operations relating to distributing manure as fertilizer on silage fields and rangelands; operations related to production of silage (PRNS only); and construction and maintenance of ranch facilities, including stock water supply systems and ranch roads.

Ranchers drive vehicles overland to check on and move cattle, repair fences and, during the winter season, to distribute hay as supplemental feed to cattle when natural forage is at its annual minimum. ATVs are used on dairies and some beef ranches to herd cattle. While overland driving could harm red-legged frogs, it is largely restricted to upland, non-wetland areas, so this is not a serious concern.

Manure spreading takes place periodically during dry periods, when dairies draw down stored manure from ponds and distribute it on fields using tank trucks. On some dairies (A, I, and J ranches) much of the manure is spread on silage fields, while others (B, C, and L ranches) have no silage fields and spread manure on upland rangeland areas. Ranchers are not permitted to spread manure near riparian areas. Manure spreading is unlikely to disturb red-legged frog habitats.

Production of silage takes place on 1,200 acres in PRNS. No-till cultivation is practiced on 190 of these acres, while the remainder are plowed and seeded every fall. PRNS Rangeland Guidelines follow cultivation practice recommendations of the NRCS, which include prohibitions on plowing land with greater than 20% slope, within 200 feet of natural water bodies or marshes, or on land classified by the NRCS as "highly erodible." Cultivation and planting is to take place so that a cover crop is established before the fall rains begin, and at least 30% of plant material is left as residue after cutting to protect soil. These practices mean that little erosion from silage fields into aquatic habitats takes place.

Ranchers are allowed to maintain fences and structures. Any major maintenance projects or new improvements involving ground disturbance or alteration of hydrological regimes require review and approval by PRNS biologists, including a review of potential impacts on sensitive species.

#### **9.1.3 Cumulative Effects**

Lands outside of PRNS and GGNRA fall into four categories of protection from development or other alteration that would impair their potential to support red-legged frogs: public land protected from development in perpetuity, privately owned conservation land, private land, and private land with conservation easements. These categories are discussed below.

## Livestock Grazing Biological Assessment, Point Reyes National Seashore.

Public lands protected from development in perpetuity. These include the 2,700 acre Samuel P. Taylor State Park and the 21,250 acres held as watershed and public recreation areas by the Marin Municipal Water District (MMWD). These lands border the North District of GGNRA along Nicasio and Bolinas Ridges and provide unbroken habitat connections to an extensive area of central Marin County. The Tomales Bay State Park provides unbroken habitat along the east side of the bay contiguous to GGNRA lands at and near the mouth of Lagunitas Creek.

Privately owned conservation land. Land that has been purchased by non-profit groups for conservation purposes offer long-term habitat protection only slightly less secure than that of publicly held land. The Audubon Canyon Ranch (ACR) includes an inholding on Bolinas Lagoon that connects GGNRA lands adjoining it. Other ACR holdings on Tomales Bay protect undeveloped bay frontage adjoining State Park lands. A second non-profit group, the Vedanta Society, holds a 2,143 acre parcel in the Olema Valley bounded by PRNS and GGNRA lands. Acquisition of this land by the NPS has not been pursued because the Vedanta Society conducts only low impact activities on the property. Acquisition could still take place if management of the land was considered inconsistent with NPS policies.

Private land. In 1971, county supervisors enacted A-60 zoning (one house per 60 acres) for much of western Marin, significantly limiting the development potential of agricultural properties. Such zoning covers extensive areas of private land adjoining public park and watersheds, including San Geronimo Valley, Nicasio Valley, and the northwestern portion of the county. Since that time, zoning for the West Marin Planning Area has been elaborated to include a variety of zoning densities in areas adjacent to established towns, with minimum lot sizes ranging from one unit per acre to one unit per 60 acres. The county's Local Coastal Program provides additional protection for streams, lagoons, Tomales Bay, and wetlands. The integrity of ranch and other agricultural lands is addressed by in the Agriculture Element of the Countywide Plan.

While these policies provide substantial protection for red-legged frog habitats, they could be overturned by the county Board of Supervisors, and so cannot be regarded as permanent protection. At this time, support for low-growth, low-density development policies in Marin County is high and it seems highly unlikely that this will change in the future.

Private land with conservation agreements. Agricultural land in west Marin has been and continue to be at risk of being broken up into the large residential lots permitted by county zoning. To prevent this, a private non-profit land trust, the Marin Agricultural Land Trust (MALT), has been acquiring development rights to agricultural land since 1980. At present, this group holds the rights for over 30,000 acres on 43 ranches in western Marin County. Like other conservation lands held by non-profit groups, the security of protection of these lands depends on the future financial condition of the non-profit, which in the case of MALT appears to be secure.

In summary, extensive areas adjoining the ranching area of PRNS and GGNRA, and having continuous habitat connections with them are permanently protected in public ownership from alteration that would diminish their value as red-legged frog habitats. Virtually all of the



remainder of western Marin County has among the best levels of protection from substantial alteration of any private land in California.

#### **9.1.4 Conclusion and Determination**

Since coming under NPS ownership and oversight, ranching practices on PRNS ranchland have been modified in ways that have likely benefited California red-legged frogs, especially the reduction of cattle numbers on excessively grazed ranchlands and exclusion of cattle from a number of wetland sites. Actions taken since listing of the species in 1996, including excluding cattle from portions of Schooner and Blueline creeks, may improve red-legged frog habitats. The species appears to be thriving under the current PRNS management of grazing lands, although cattle may be having adverse impacts in some locations as described above. Current information supports the conclusion that grazing may both benefit and harm red-legged frogs, and that more research on optimal habitat conditions for the species is needed. Therefore, it is determined that a renewal of grazing permits may affect, is likely to adversely affect California red-legged frogs. Because cessation of grazing may be more deleterious to the species than its continuation, however, ranching permits should be renewed. Efforts to identify and protect potentially vulnerable habitats and to develop research that will improve knowledge of the best habitat conditions for the species, as described in the Draft Recovery Plan (USFWS 2000), will be undertaken. Current or future efforts include the following:

##### **1) Develop and implement a management and protection plan for wetlands within PRNS**

PRNS is currently conducting a two-year (2000-2001) survey of wetlands. The purpose of this work is to refine maps and data on wetland types and distribution. Wetlands were previously documented using National Wetlands Inventory (NWI) procedures, which produced incomplete wetland mapping for PRNS and some areas of GGNRA. Only larger, more visible wetland types were mapped, while many of the variety of wetland types found at Point Reyes were missed. Field surveys are currently being conducted for a comprehensive wetland identification and mapping project. When completed, this work will provide data needed for future wetland protection planning. Such protection will likely benefit red-legged frogs.

##### **2) Conduct studies on the interactions of cattle grazing and California red-legged frogs.**

Design of such studies will require a collaborative effort between PRNS staff (Rangeland Specialist, Plant Ecologist) and USGS-BRD herpetologists. Studies of several types, as described below, could be implemented.

a) Comparisons between ponds in currently grazed pastures and ponds on former ranchlands. The PRNS peninsula has over 20 red-legged frog aquatic habitats originally constructed as stock ponds on ranches that were taken out of ranching production in the 1970's. Most are located southeast of the ranching zone around Glenbrook Creek, Muddy Hollow and Laguna Creek, including ponds situated in topography, soils and climatic conditions similar to those on the adjoining Home Ranch. Study of ponds on former ranchlands would provide information on aquatic habitat changes associated with livestock use of ponds. Because there is no initial condition information on the ponds on former ranchlands, comparative study of pond vegetation and frog populations between these two sets of ponds would be correlative, rather than



experimental, but could produce information on habitat conditions most beneficial to red-legged frogs.

b) Experimental exclusion of cattle from aquatic habitats by fencing.

Conducting studies on the effects of restricting cattle access to aquatic habitat would assist with determining optimal aquatic habitat conditions. It is likely that the conditions at breeding sites are most critical to red-legged frog populations, and that finding the optimum conditions for breeding would have the most beneficial effects on increasing frog numbers.

The best location for such a study is Home Ranch, which has 13 ponds with documented occurrences of red-legged frogs. All of these ponds are within ready dispersal range of other ponds on the ranch. Five pastures have two ponds in which frogs occur, so one could be fenced off from livestock without requiring any additional development of water for cattle.

A more controlled comparison of the effect of cattle access on ponds would be to fence cattle out of one-half of a pond, while permitting access to the other. This would ensure that conditions such as water depth, periodicity, and quality were the same in treatment and control sides of the pond. It would also test the possibility that such an arrangement produces optimal conditions for frogs by combining aquatic vegetation and open water in the same pond. Such partial fencing could be done at a number of ponds on Point Reyes, although using ponds at Home Ranch would best allow for both within and between pond comparisons with other stock ponds on this ranch.

Riparian areas readily lend themselves to comparative study of adjoining habitats to which cattle do and do not have access. Several existing exclosures along creeks have been recently completed and offer opportunities for such study. The exclosure on Schooner Creek excludes cattle from the lower 1.0 km of the creek, above which cattle have access to the creek for 2.5 km. Frogs have been documented in both portions. Blueline Creek has an exclosure of about 1.0 km just east of Highway 1; above it cattle have access to a section of the creek that is very similar in channel form and vegetation to the excluded stretch.

PRNS has many red-legged frog habitats that experience a variety of grazing conditions. Analysis of existing data on red-legged frogs may provide information that would aid in designing a study on the best grazing management regimes for these habitats.

## **9.2 Myrtle's Silverspot Butterfly (*Speyeria zerene myrtleae*) – Endangered**

### **9.2.1 Status of Species in the Action Area**

Myrtle's silverspot butterflies inhabit coastal dune, coastal prairie, and coastal scrub habitats at elevations ranging from sea level to 300 meters, and as far as 5 kilometers inland (Launer et al. 1992). Its historic distribution is believed to have extended from near Fort Ross south to Punta Ano Nuevo. By the 1970's populations south of the Golden Gate were believed to be extinct and extant populations of the butterfly were believed to exist only within PRNS. Reasons for this decline include urban and agricultural development, invasive non-native plants, livestock grazing, overcollecting, and other human impacts.

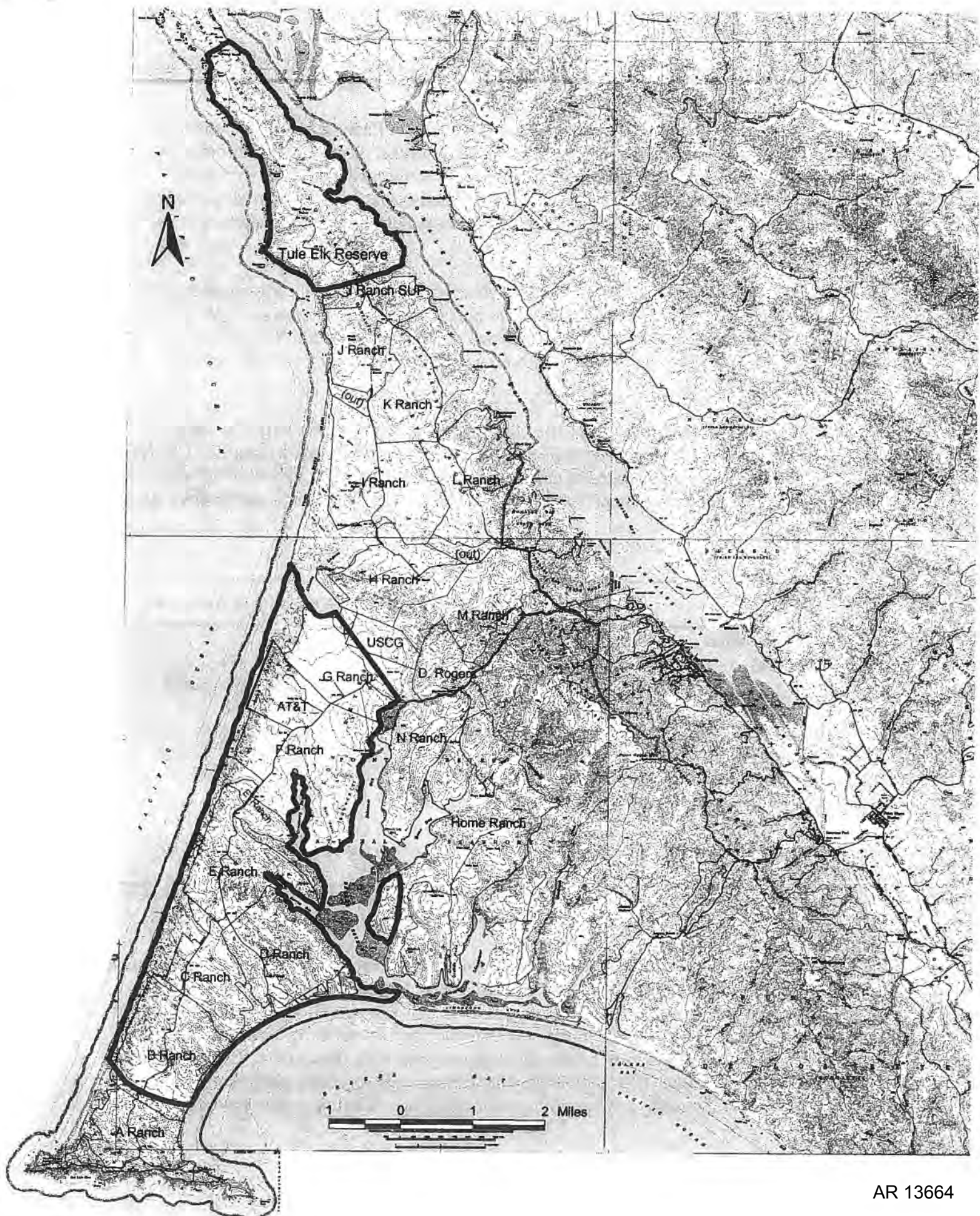
Following discovery of a population near the Estero de San Antonio in the early 1990's, field surveys were conducted by the Center for Conservation Biology at Stanford University. Two additional apparently separate populations in PRNS were located and fieldwork was done to estimate populations sizes (Figure 9.2-1). One population, centered on North Beach, extended from Abbotts Lagoon to South Beach and east to Drakes Estero and Drakes Beach. The highest numbers were found along the dune-scrub interface in the back dune area of the central peninsula on F and G ranches and the AT&T property, and on the bluffs on either side of the Drakes Beach visitor center. The population was estimated to number in the low thousands in 1993. More recent survey work in 1997 put the population estimate at 50-200 individuals, with no silverspots being found in portions of the 1993 range. The other population was found on the Tule Elk Reserve, with small numbers on the adjacent J Ranch. In 1993, the number of individuals in this population was estimated to be in the mid-hundreds. The 1997 survey of this northern Point Reyes population gave a population estimate of 250-500 (Launer et al. 1998).

Silverspot numbers in the area outside of park lands around the Estero de San Antonio were estimated at 2,000-5,000 individuals in 1991. Other nearby areas with potentially suitable habitat were not surveyed. Together with those found at Point Reyes, estimated numbers for the three known populations of the species total less than 10,000 individuals (USFWS 1998).

Known Myrtle's silverspot nectar plants include bull thistle (*Cirsium vulgare*), gum plant (*Grindelia* spp.), western pennyroyal (*Monardella undulata*), yellow sand verbena (*Abronia latifolia*), seaside daisy (*Erigeron glaucus*), and mule ears (*Wyethia* spp.). Brownie thistle (*Cirsium quercetorum*) and groundsel (*Senecio* spp.) are also fed upon. Many of these species are commonly found at Point Reyes. Oregon silverspot (*Speyeria zerene hippolyta*) feeds on other common plant species that may also be used by Myrtle's silverspot.

Myrtle's silverspot larvae are known to use only one species as a host plant, western dog violet (*Viola adunca*). It is possible that, like other subspecies of *Speyeria zerene* and other species of silverspots, Myrtle's silverspot uses other violet species as larval hosts, although this has not been observed. The perennial, rhizomatous western dog violet is found on open grassy slopes, sandy flats behind dunes, and on the edge of brush under pines (Howell 1970). While it is described as "rather common near the coast", including the Point Reyes dunes, distribution of the species is patchy. Abundance of western dog violet alone is not a good predictor of silverspot presence. Myrtle's silverspot presence also is associated with protection from high coastal winds

Figure 9.2-1. Myrtle's silverspot butterfly habitat areas, PRNS.



## Livestock Grazing Biological Assessment, Point Reyes National Seashore.

that are common during the summer flight season (Launer et al. 1992). The complex habitat needs of breeding Myrtle's silverspots may be the species' limiting factor.

Populations of *Speyeria* butterflies experience large population fluctuations, and population increases of tenfold or more in a single year have been observed. In 1994/95, California's central coast experienced a very wet winter that reduced numbers of many late-spring and summer-flying butterflies (silverspots are the latter). Another wet winter occurred in 1997-98, which may have resulted in the low numbers for the central Point Reyes population observed in summer, 1998.

Due to the lack of historic data previous to the 1990's, it is not known if the silverspot has declined at Point Reyes. While surveys of the two populations during the period 1993-1997 found that the Tule Elk Reserve population remained stable and the central Point Reyes population declined sharply, such variation is well within that normally found in *Speyeria* species (USFWS 1998).

Eight ranches are within the current identified habitat area of Myrtle's silverspot butterfly (Table 9.2-1). Four ranches in the North Beach population area have dune habitat (C, E, F, and G ranches), with the others comprised of upland grassland habitats. The section of J Ranch bordering the Tule Elk Reserve spans Tomales Point and includes grasslands and shrub areas.

Table 9.2-1. Ranches within known habitat of Myrtle's silverspot butterfly.

Ranch	Total Acres	Grazable Acres	# of Animals Authorized
<b>North Beach population</b>			
C Ranch (Spaletta)	709	630	430
D Ranch	1,183	1,003	currently ungrazed
E Ranch (Nunes)	1,375	790	188
F Ranch (Gallagher)	1,510	1,346	175
G Ranch (Lunny)	1,151	665	95
N Ranch (McDonald)	925	580	90
Home Ranch (Murphy)	3,065	2,360	318
<b>Tule Elk Reserve population<sup>a</sup></b>			
J Ranch (Kehoe)	415	285	37

a/ This population mostly occurs in the Tule Elk Reserve, with a few individuals detected on J Ranch.

### 9.2.2 Effects of the Action

Grazing may benefit or harm Myrtle's silverspot habitat depending on grazing pressure and plant species composition in individual pastures. Grazing that reduces the height of competing vegetation and prevents buildup of dead plant residue is likely to benefit short stature wildflower species such as western dog violet. Grazing may produce conditions more attractive to gravid female silverspots, which have been observed to bypass areas with thatch cover in favor of areas of relatively short vegetation (USFWS 1998). Cattle help maintain moderately open canopy cover in shrub areas by grazing and trampling shrub seedlings. Cattle use may promote presence



of bull thistle, a nectar plant for silverspot. On the other hand, back-dune areas may be more vulnerable to reduction or loss of western dog violet and nectar plants caused by cattle trampling of fragile soils (Woods 1995). Presence of cattle in dune areas does little to control the spread of sea fig and Hottentot fig (*Carpobrotus* spp.) or European beachgrass (*Ammophila arenaria*), which are the greatest threats to this habitat at Point Reyes.

Much remains to be learned about silverspot habitat needs and the optimal grazing regime for silverspot habitat (USFWS 1998). Response to changes in grazing regimes will be gradual, so research on these questions will require long-term studies. The best short-term approach to ensure adequate silverspot habitat is to maintain a variety of cover types produced in part by differing levels of grazing pressure (Launer et al. 1992).

Silverspots are exposed to a variety of grazing conditions in the two areas in which they are found in PRNS. The 2,500 acre Tule Elk Reserve is grazed relatively lightly by tule elk. Within the range of the central Point Reyes population, several areas have been removed from grazing, including the bluffs on either side of the Drakes Beach Visitor Center and corridors along the approaches to the North and South Beach parking areas. Fences have been constructed to exclude cattle from dunes and some back-dune areas on C and G Ranches. Grazing pressure varies among pastures and ranches within the central Point Reyes habitat area. Required RDM levels of 1200 lb/acre insure against overgrazing of needed nectar and larvae plant species and provide a variety of vegetation cover and types within the ranching area.

Several options to improve Myrtle's silverspot habitat have been identified. A survey of fencing along the dunes in the North Beach area to determine if back dune habitats are adequately protected is planned. Where cattle impacts to these areas are taking place, change in grazing management will take place. Changes in the duration or season of grazing, or in the number of cattle grazing pastures adjoining dunes may be necessary to reduce impacts to back dune areas. If such measures are not successful in reducing cattle impacts to back dune areas, relocation of fencing or removal of pastures from grazing may be necessary.

Back dune habitat also will be improved by the removal of non-native plants (ice plant and European beachgrass) that have invaded these areas, thereby excluding native nectar plants used by Myrtle's silverspot. A project to remove these non-native species near Abbotts Lagoon will be carried out between 2001 and 2003. The project is designed to remove non-natives invading areas where native vegetation is still relatively intact, thereby preserving and expanding Myrtle's silverspot habitat.

Excessive impacts by cattle may be damaging Myrtle's silverspot habitat and limiting expansion of one of the populations in the area immediately south of the Tule Elk Reserve (Launer et al. 1998). Concentrated livestock use has reduced plant cover to minimal levels and, in places, to bare ground. With steep canyons on either side, this area may be a bottleneck blocking access of the Tule Elk Reserve Myrtle's silverspot populations to apparently suitable habitat further south. A number of approaches to modifying grazing in this area are currently under consideration, including reducing the number of cattle in the pasture or fencing them out of highly impacted areas.



A Masters thesis project which will include mapping the distribution of larval host and nectar plants at PRNS and monitoring the response of these species to different grazing regimes is currently being developed by a member of PRNS Resource Management staff. Additionally, plant species composition response to tule elk grazing and to exclusion from grazing is being assessed as part of long term monitoring of vegetation in the Tule Elk Reserve. Together with continued censusing of Myrtle's silverspot numbers, this research will help provide the needed grazing management information identified by the Myrtle's silverspot recovery plan (USFWS 1998).

### **9.2.3 Cumulative Effects**

The largest numbers of Myrtle's silverspot butterflies documented in the early 1990's occurred on private land in the vicinity of Estero de San Antonio in Marin County northeast of PRNS. A golf course development proposed at that time was withdrawn, and the area is currently ranchland grazed by cattle and sheep. It is given a measure of protection from development by Marin County's agricultural zoning and policies to maintain the integrity of ranchlands in the western half of the county. Several of the ranches in the habitat area have sold development rights to the MALT, an organization seeking to preserve agricultural land in western Marin County. Any proposed development would have to comply with requirements of the ESA to protect the Myrtle's silverspot.

### **9.2.4 Conclusion and Determination**

While it is difficult to determine the status of Myrtle's silverspot population at PRNS given current information, the species does not appear to be at risk of extinction in the near future (Launer et al. 1992). Cattle grazing has been identified as only one of a number of possible reasons for the species decline, but is also considered valuable in maintaining Myrtle's silverspot habitat. While several areas have been identified where grazing may be adversely affecting the species' habitat at PRNS, overall grazing management has helped maintain a variety of plant cover conditions in Myrtle's silverspot habitats. For this reason, it is concluded that continuation of grazing at PRNS, may affect, is not likely to adversely affect the species. Monitoring of grazing impacts as described above, and modification of grazing practices where needed, will be carried out.

### **9.3 Anadromous fish**

**Central California Coast Coho Salmon (*Oncorhynchus kisutch*) - Threatened**

**Central California Steelhead (*Oncorhynchus mykiss*) - Threatened**

#### **9.3.1 Status of the Species in the Action Area**

Central California coast coho salmon and Central California steelhead (hereafter referred to as coho and steelhead) occur in several creeks on the Point Reyes peninsula (Figure 9.3-1) and in the Lagunitas Creek watershed that drains portions of PRNS and GGNRA (Figure 9.3-2).

Designated critical habitat for coho in PRNS includes all accessible estuarine and stream areas in the coastal watersheds of Marin County except areas above longstanding, naturally impassable barriers or above Peters Dam on the mainstem of Lagunitas Creek and Seeger Dam on Nicasio Creek (NMFS 2000). Although critical habitat has not been established for central California steelhead, it is likely to be the same as that for coho in Marin County.

Historically the Lagunitas/Olema Creek drainage sustained sizable runs of coho sufficient to support a fishery in Tomales Bay at the end of the 1800's. Interviews with long time residents and fisheries managers suggest that coho and steelhead in the Action Area have been declining since the turn of the century, with significant declines occurring as late as the mid-1950's. Most historic information on salmonid numbers is anecdotal, while quantified data are lacking. Accounts by local residents of "excellent trout fishing" along Lagunitas and Olema creeks may refer to young steelhead, which are indistinguishable from rainbow trout during the three year period they typically spend in fresh water. Similarly, early accounts of "salmon runs" may refer to both coho and steelhead, which may not have been distinguished by fishermen. Such anecdotal information suggests that salmonids were abundant in the Lagunitas/Olema Creek drainage before extensive alteration by dam-construction, logging, and channelization. Currently, the Lagunitas watershed, including Olema Creek, supports 10% of the Central California Coast coho population (NMFS 1995).

Reliable quantitative survey data for coho salmon dates from 1948, when the California Department of Fish and Game (CDFG) began annual surveys of coho numbers and spawning activity on Devil's Gulch, a tributary of Lagunitas Creek. Survey work on the Lagunitas mainstem began in the winter of 1982-83, and was conducted by consultants for the MMWD. Surveys began on Olema Creek in 1994-95. Data are currently collected by PRNS biologists.

Historic and current data on coho and steelhead populations in the entire Lagunitas watershed have been gathered as part of the Coho Salmon and Steelhead Trout Restoration Project (CSRP). This joint PRNS/GGNRA effort is conducting intensive monitoring of Olema and Pine Gulch creeks to identify problem areas and implement restoration. Data reported here are drawn from a draft progress report of the CSRP (PRNS 2001).

For most drainages, only data on coho abundance have been gathered. Differences between steelhead trout and coho salmon life cycles are pertinent to conservation efforts. While virtually all coho in Action Area watersheds have an 18 month freshwater life cycle, steelhead juveniles may migrate to the ocean after 18 months or extend freshwater residence for up to three years. Most coho return to spawn after 18 months, but steelhead may spend several years in the ocean

Figure 9.3-1. Anadromous fish habitat in PRNS ranching area.

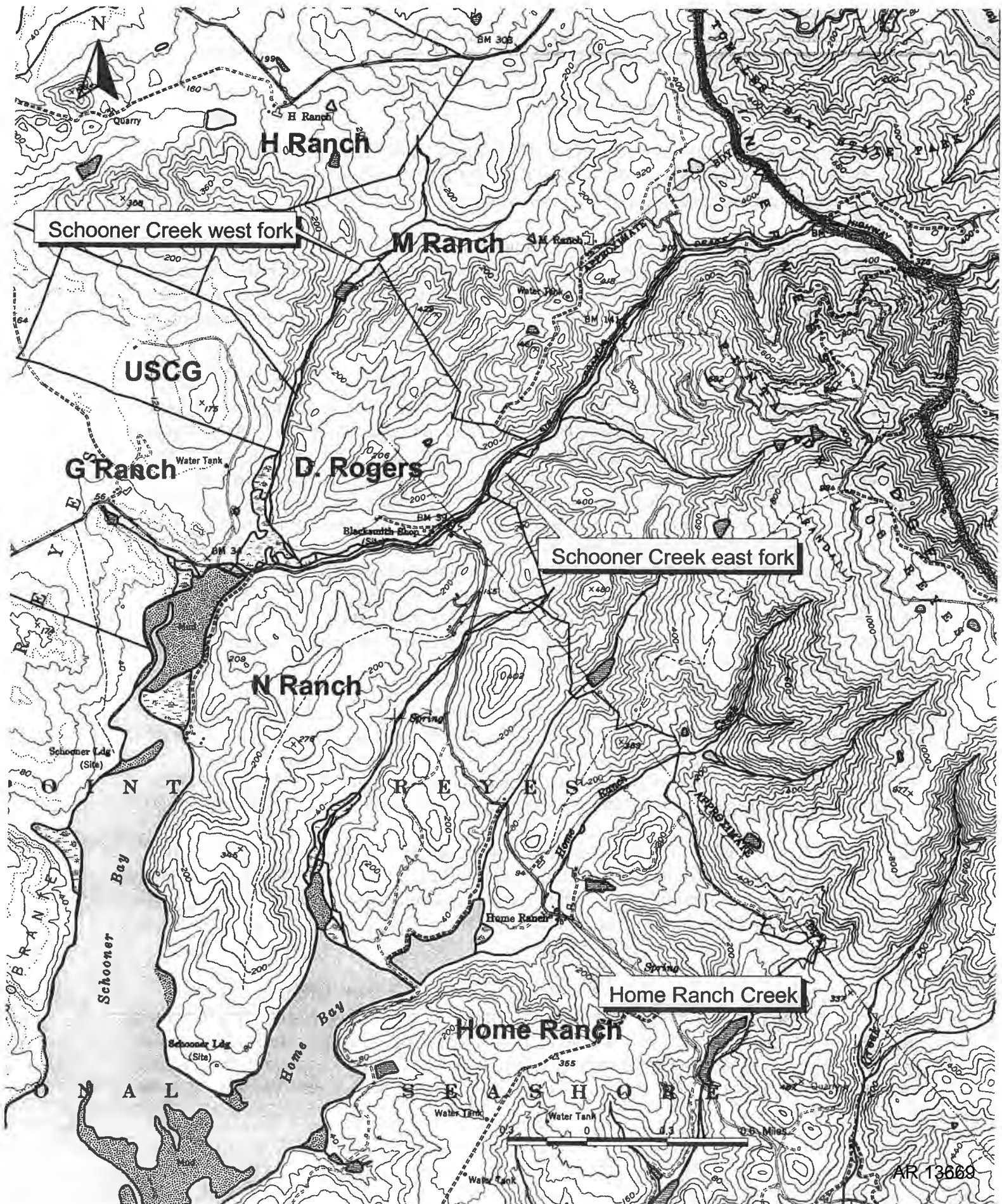




Figure 9.3-2. Anadromous fish watersheds in GGNRA ranching area.



before returning to spawn. Additionally, steelhead may make several spawning migrations while all coho spawn once and die. The variable life cycle of steelhead makes population analysis more difficult, but also makes them more resilient to adverse environmental conditions. In general, if the habitat requirements for coho are met, steelhead habitat requirements will also be met.

Estimates for numbers of spawning coho were derived using the peak live plus cumulative dead (PL) index method, in which the highest count of living fish found in a single survey is added to the cumulative number of dead fish counted up to that time. The PL index method is designed to count the total number of spawning fish in the survey area in a season. Accuracy of PL index values assumes surveys capture the peak numbers of live fish using a drainage in a given winter. Since this cannot be known with certainty, PL index values should be interpreted with caution.

Creeks have not been surveyed using the PL index method every year. Another method of assessing salmonid activity, counting redds, has been more consistently used. Because redds can be marked to avoid double-counting, this method is a reliable indication of spawning activity. However, since coho and steelhead may construct false redds, such data are best used to indicate relative spawning activity between years and watersheds. In the last five years, efforts to count redds have been made to support or augment actual fish counts.

Despite the potentially tenuous nature of spawning survey data and inconsistencies in data collection, review of historical spawner abundance data supports anecdotal evidence of declining numbers of coho over the last 50 years. Devil's Gulch, the only drainage for which long term data are available, has experienced a sharp decline in PL index values since 1948.

Data on salmonid activity derived from recent survey work by PRNS biologists and information on PRNS-administered grazing in each watershed are reported in the following section.

The following watersheds are described below:

- Lagunitas Creek (overview of drainage, mainstem, mouth and floodplain)
- Devil's Gulch
- Cheda Creek
- Olema Creek
- Point Reyes peninsula

#### **9.3.1.1 Lagunitas Creek**

##### **Overview of Drainage**

Lagunitas Creek and its tributaries (Nicasio Creek, San Geronimo Creek, Devil's Gulch, Cheda Creek, Bear Valley Creek, and Olema Creek) drain more than 230 square kilometers of western Marin County. The headwaters of the Lagunitas Creek mainstem lie within the 53,000 ha watershed lands administered by MMWD. The mainstem originally totaled about 40 km of perennial stream draining the northern slope of Mt. Tamalpais, but was reduced by more than 50% by construction of Alpine Dam in 1918 and Peters Dam in 1953. Because neither dam has provision for fish passage, their construction resulted in permanent loss of the upper portion of the drainage to anadromous fish.



The portions of the Lagunitas drainage most significant for salmonids are under a number of ownerships. Approximately 12 km of the mainstem is bordered by lands within GGNRA. A major tributary, San Geronimo Creek, flows through privately-held land in San Geronimo Valley. Devil's Gulch lies almost entirely within Samuel P. Taylor State Park with its headwaters in GGNRA. Only one smaller tributary of Lagunitas Creek, Cheda Creek, lies entirely within GGNRA lands. The Olema Creek drainage mostly lies within PRNS and GGNRA, but approximately 4.5 km of the mainstem is bordered by pastures owned by a private group, the Vedanta Society.

Coho numbers for the Lagunitas watershed taken as a whole based on surveys of 36 km of the mainstem and its tributaries, including Olema Creek, Devil's Gulch, and San Geronimo Creek, are shown in Table 9.3-1. Surveys were conducted during three periods between 1982-1999. Surveys differed in coverage and data gathered, but show an increasing trend in number of redds located. Total numbers of spawning coho using the drainage are suggested by PL Index value high counts of 525 fish in 1996/97 and 628 fish in 1998/99.

Table 9.3-1. Coho salmon spawning survey data for overall Lagunitas Creek watershed.

Year	Number of Surveys	Survey Area(km)	PL Index <sup>c</sup>	Total Carcasses	Total New Redds	Source
1982/83 <sup>a</sup>	6	22.4	n.a.	n.a.	139	Bratovich & Kelly 1988
1983/84 <sup>a</sup>	6	22.4	n.a.	n.a.	44	Bratovich & Kelly 1988
1991/92 <sup>a</sup>	1	20.0	n.a.	n.a.	41	Wise 1992
1995/96 <sup>b</sup>	10	36	290	n.a.	86	Trihey & Assoc. 1996
1996/97 <sup>b</sup>	8	36	525	92	254	Trihey & Assoc. 1997
1997/98 <sup>b</sup>	10	36	241	112	360	MMWD; PRNS
1998/99 <sup>b</sup>	10	36	628	70	243	MMWD

a/ Survey totals for mainstem Lagunitas Creek and its tributaries only.

b/ Survey totals include mainstem Olema Creek and its tributaries.

c/ PL Index = Peak Live and Cumulative Dead Index; n.a. = not available.

### Redds Data

As discussed earlier, PL index data have not been consistently gathered for all creeks in the Action Area and can vary in quality depending on the number of surveys conducted and other factors. Data on the number of new redds provides a good overview of recent spawning activity in PRNS watersheds (Table 9.3-2). These data indicate the high annual variability in coho spawning activity and the relative importance of Olema Creek to spawning in the Lagunitas Creek drainage.

Table 9.3-2. Total coho redds observed in Lagunitas Creek and tributaries, 1995-2001 (MMWD).

Year	Lagunitas Creek mainstem	San Geronimo Creek	Devil's Gulch	Olema Creek <sup>a</sup>	Total new redds <sup>a</sup>
1995/96	70	6	10	n.a.	n.a.
1996/97	98	115	41	n.a.	n.a.
1997/98	80	121	52	126	379
1998/99	92	60	32	42	226
1999/00	139	61	3	27	230
2000/01	119	74	11	142	346

a/ n.a. = not available.

### **Lagunitas Creek Mainstem**

The contribution of the Lagunitas Creek mainstem to overall spawning activity in that drainage is indicated by data collected by MMWD in 1982-98 (Table 9.3-3). PL Index value and redd data show that much spawning activity takes place on Lagunitas Creek tributaries. Spawning on the mainstem takes place largely in Samuel P. Taylor State Park, upstream of PRNS-administered grazing lands.

Table 9.3-3. Coho salmon spawning survey data for Lagunitas Creek mainstem.

Year	Number of Surveys	PL Index	Total Carcasses	Total New Redds	Source
1982/83	6	n.a	n.a	65	Bratovich & Kelly 1988
1983/84	6	n.a.	n.a.	26	Bratovich & Kelly 1988
1991/92	1	n.a.	n.a.	34	Wise 1992
1995/96	10	129 <sup>a</sup>	n.a.	70	Trihey & Assoc. 1996
1996/97	8	170 <sup>a</sup>	23	98	Trihey & Assoc. 1997
1997/98	10	46	27	80	MMWD 1998

a/ Peak live fish counts only, no cumulative dead.

n.a. = not available.

### **Lagunitas Creek Mouth and Floodplain**

The mouth of Lagunitas Creek and adjacent floodplain supports activities associated with the Waldo Giacomini dairy. This 563-acre property, once tidal wetlands, was diked and drained in the early 1940's to create pastures. For many years, a gravel dam was constructed annually just below the confluence of Lagunitas and Olema creeks for irrigation and stock watering. The dam created an abrupt transition from fresh to saline water for smolts and spawning adults, eliminating the transition zone found in an unimpaired estuarine system. The transition zone allows smolting fish time to adjust to saline conditions and provides productive feeding zones where both freshwater and saltwater invertebrates are available.

The dam and the levees concentrated the area where spawning fish could hold and smolts could feed, and increased the potential for predation. While the annual construction of the dam has been discontinued, the levees are still in place. PRNS is currently acquiring these lands and

developing a floodplain restoration plan. A phased restoration project requiring from five to ten years is planned to begin after final acquisition in 2007. Such restoration is expected to improve estuarine smolt and adult emigration habitat for both coho and steelhead.

### 9.3.1.2 Devil's Gulch

Devil's Gulch has the longest period of spawner survey records for the Lagunitas Creek watershed. CDFG biologist Eric Gerstung and warden Al Giddings noted live coho and steelhead observations from 1948 to 1977. Consultants for MMWD conducted surveys from 1982-84 and 1995-97. PRNS expanded the sampling area further upstream in 1996-97 (Table 9.3-4). Prior to 1982/83, no more than two surveys were conducted in a single season and carcasses and redd data were not consistently collected. During a single survey in 1948, 174 coho and steelhead were counted in a 2.6 km reach. Between 1957/58 and 1976/77, peak counts of live coho ranged between 70 and 130 fish. Numbers of coho had dropped by the 1990's, with PL index values between 1995/96 and 1998/99 ranging from 19 to 47 fish.

Table 9.3-4. Coho salmon spawning survey data for Devil's Gulch.

Year	Number of Surveys	Survey Area (km)	PL Index	Total Carcasses	Total New Redds	Source
1948	1	2.6	174 <sup>a</sup>	n.a.	n.a.	Gerstung & Giddings
1957/58	2	2.4	100 <sup>b</sup>	n.a.	74	Gerstung & Giddings
1960/61	1	2.6	77 <sup>b</sup>	n.a.	n.a.	Gerstung & Giddings
1961/62	1	2.6	70 <sup>b</sup>	n.a.	n.a.	Gerstung & Giddings
1964/65	1	1.6	91 <sup>b</sup>	76	n.a.	Gerstung & Giddings
1965/66	2	2.6	130 <sup>b</sup>	n.a.	n.a.	Gerstung & Giddings
1976/77	1	2.4	100	90	n.a.	Gerstung & Giddings
1982/83	6	2.4	n.a.	n.a.	23	Bratovich & Kelly 1988
1983/84	6	2.4	n.a.	n.a.	11	Bratovich & Kelly 1988
1995/96	6	2.4	19	n.a.	10	Trihey & Assoc. 1996
1996/97	3	3.2	47	20	42	Trihey & Assoc. 1997; PRNS
1997/98	8	3.2	27	9	46	PRNS
1998/99	6	3.2	27	5	30	PRNS
1999/00	3	3.2	10	1	3	PRNS

a/ Peak live fish count includes both coho and steelhead.

b/ Peak live fish counts without accumulated carcass data.

n.a. = not available.

### 9.3.1.3 Cheda Creek

Cheda Creek, a Lagunitas Creek tributary, was surveyed in 1996/97 and 1997/98 by PRNS to detect the presence or absence of coho. Surveys were during peak migrations of coho in nearby drainages. Passage and attraction flows were sufficient and water clarity was not limiting. During two surveys over the 1997/98 spawning period, one coho was seen in Cheda Creek. No carcasses or redds were observed in that period. Two surveys were also conducted on Cheda Creek during the winter of 1998/99, but no live coho, redds, or carcasses were seen.

Until recently, much of the creek's potential spawning area was blocked by a failed sediment control structure. Construction of a fish passage structure consisting of a series of stepped pools was completed in 2000. Fencing to exclude cattle from 2.5 km of the creek above and below this structure has been completed. During fall, 2000, juvenile coho were observed in the project area. In anticipation of future spawning activity resulting from greater access to suitable habitat, monitoring of coho and steelhead juveniles on Cheda Creek will be implemented in 2001.

#### **9.3.1.4 Olema Creek**

Olema Creek flows through the rift valley created by the San Andreas fault and joins Lagunitas Creek roughly three km south of Tomales Bay. It is the largest drainage within the PRNS administrative area, providing the greatest habitat area and diversity. Most of Olema Creek's watershed is contained within the boundaries of GGNRA and PRNS, with only small pockets of private lands concentrated around the town of Olema. The Vedanta Society owns and manages 2,143 acres on the west side of the stream, but the land-use intensity on most of the property is very low.

The 37 km<sup>2</sup> Olema Creek watershed consists of a linear drainage basin that is approximately 14.5 km long and 3.2 km across at its widest point. The creek consists of 17.4 km of stream channel, which has several distinct sections. From its mouth to 11.9 km, it has continuous perennial flow, while above this section the creek becomes a series of isolated pools during the summer. Above 15.0 km, the creek usually dries up entirely in the summer. Numerous short tributaries enter Olema Creek from the east and west. Olema Creek crosses the San Andreas Fault near Five Brooks, and again about 1 km downstream. At this location there are substantial natural landslides occurring on both sides of the creek. The west side of the drainage is largely covered by Douglas-fir forest. Extensive logging in this area prior to 1964 resulted in further instability of the channel. The hydrology of Olema Creek also has been altered by the straightening of the lower 3 km of its channel in the 1920's, and by construction of levees on Lagunitas Creek below the confluence with Olema Creek. Channel instability caused by these factors continues to cause bank cutting and failure, which is dramatic in several locations. The east side of Olema Valley consists of deep canyons dissecting the extensive grasslands of Bolinas Ridge. These grasslands have been grazed by cattle for 150 years.

The perennial section of Olema Creek has been systematically surveyed for live adult coho, carcasses, and redds since the winter of 1994/95 (Table 9.3-5). Results have shown considerable variability from year to year. As in other creeks in the Lagunitas drainage, Olema Creek had a high count for coho salmon in the winter of 1996-97, with a PL Index value of 174. Numbers fell below this level for the following three years, but in 2000/01 they rebounded, with a PL index value of 161 fish, total carcasses numbering 95, and a total redd count of 142.

Table 9.3-5. Coho salmon spawning survey data for Olema Creek mainstem.

Year	Number of Surveys	Survey Area (km)	PL Index	Total Carcasses	Total New Redds	Source
1994/95	3	13.4	53	1	9	Tomales Bay Association (TBA)
1995/96	2	13.4	106	37	n.a.	PRNS; TBA
1996/97	2	15.6	174	16	n.a.	PRNS; TBA
1997/98	8	13.4	88	39	126	PRNS; D. Manning 1999
1998/99	6	13.4	52 <sup>a</sup>	14	42	PRNS
1999/00 <sup>b</sup>	2	10.0	28	9	27	PRNS
2000/01	3	13.0	161	95	142	PRNS

a/ Includes two peaks, 7 weeks apart.

b/ Surveys missed peak numbers.

n.a. = not available.

Surveys have also been conducted on tributaries of Olema Creek and its headwaters, which is the section of creek above 17.4 km from its mouth. These surveys have confirmed spawning activity in five of the tributaries and in the Olema Creek headwaters. Except for Blueline and Quarry creeks, fish observed have been within a few hundred meters of the mainstem confluence.

Blueline Creek is the most significant of the Olema Creek tributaries, having a greater average flow and more potentially suitable spawning habitat (2.2 km) than any other. A sharp drop below a culvert under Highway 1 limited access to most of the spawning habitat; only 3 of 22 coho observed in Blueline Creek in 1997-99 were above the culvert. In 1999, a structure was constructed to aid fish passage through the culvert. In the following two years, 59 of the 77 coho observed in Blueline Creek were above the passage structure. As part of this project, fencing to exclude cattle from 1 km of the creek was installed.

Starting in 1997, the CSRP has undertaken intensive survey work on Olema Creek to assess salmonid habitat condition and reproductive success. The focus of the CSRP is to correlate salmonid abundance at three life stages with habitat conditions to ascertain limiting factors on overall abundance. Index sections have been established along stream reaches representative of fish habitats and electrofishing is being used to determine juvenile coho and steelhead numbers. Results will be used to prioritize habitat restoration efforts and buffer threatened salmonid populations against potentially detrimental environmental conditions.

Data indicate that a high proportion of juvenile salmonids found in Olema Creek are located in the upstream, intermittent section above 11.9 km. A special study of the intermittent section of Olema Creek was conducted in 1999. Results indicate a significant loss of juveniles stranded in drying pools, which could be an important factor in reducing overall reproductive success in Olema Creek. Repeating this study, together with outmigrant trapping the following spring, could provide valuable information on the adequacy of Olema Creek juvenile salmonid habitat.

The CSRP also conducted a survey of in-stream salmonid habitat conditions on upper section Olema Creek (11.8-15.0 km). The survey found that much of the Olema Creek salmonid habitat



may be sub-optimal due to high sediment loads that fill interstitial spaces in spawning gravel, fill pools, and reduce the overall stream volume.

The CSRP survey work to date shows that Olema Creek and its tributaries contain viable habitat for salmonids but there is not yet enough information to determine whether coho and steelhead populations are stable, increasing, or decreasing.

#### **9.3.1.5 Point Reyes Peninsula**

The Point Reyes peninsula is a landmass disjunct from adjoining Marin County, separated by the San Andreas Rift Valley. Despite having a limited drainage area, its underlying geology gives rise to a number of perennial creeks. A park-wide survey found juvenile steelhead in seven creeks in the Wilderness Area and two in the ranching zone on the peninsula (PRNS 1984). The latter two, Schooner and Home Ranch creeks, both drain into Drakes Estero. Schooner Creek has two forks; only the west fork flows through ranch land. A large stock pond dam, 1.8 km upstream from its mouth, may block passage of migrating fish to the upper section of the west fork. The east fork is paralleled by Sir Francis Drake Boulevard and is impacted by road culverts. Nevertheless, adult steelhead have been observed in this fork. Home Ranch Creek flows through pastures and the headquarters of Home Ranch, and is affected by a road culvert and by cattle access to the channel. Beyond confirming their continued presence, PRNS has not gathered information on juvenile steelhead in these creeks.

### **9.3.2 Effects of the Action**

#### **9.3.2.1 Overview of Areas Potentially Subject to Impact**

Cattle grazing on PRNS and GGNRA lands occurs in the drainages of the Lagunitas Creek mainstem and its tributaries Cheda Creek, Devil's Gulch, and Olema Creek. Grazing is also permitted in the drainages of the two creeks used by anadromous fish on the Point Reyes peninsula, Schooner and Home Ranch creeks. A description of ranches in these drainages follows.

#### **Lagunitas Creek Watershed**

The Lagunitas Creek mainstem could be effected by grazing on several beef ranches on GGNRA (Table 9.3-6). Ranches are classed as "bordering" the creek if a pasture boundary reduces a riparian corridor to less than 30 meters in width. While there is debate over the width of adjacent riparian habitat needed to protect instream habitat for salmonids, there is substantial support for a width of 30 meters as an adequate minimum (National Marine Fisheries Service 2000). All of the spawning habitat on Cheda Creek lies within Cheda Ranch, but is currently being fenced off from livestock. A portion of the Genazzi Ranch managed by PRNS borders Lagunitas Creek. Cattle on this ranch have access to the banks of the deep, tidally influenced portion of the creek. The McIssac Tocaloma and Zanardi ranches are separated from the creek by Sir Francis Drake Boulevard and Platform Bridge Road. A pasture on the McIssac Tocaloma Ranch bordering Lagunitas Creek and previously accessed by a cattle underpass beneath Platform Bridge Road has been ungrazed for over 10 years. Willows and other riparian plants are growing vigorously both along the creek and in overflow channels in this former pasture. The McIssac SUP borders a tributary of Lagunitas Creek to which cattle have access at its headwaters. The Percy Ranch includes parts of the heads of the Cheda Creek and the Devil's Gulch drainages.

Table 9.3-6. PRNS-managed grazing lands in the Lagunitas Creek watershed.

<b>Ranch</b>	<b>Total Acres</b>	<b>Grazed Acres</b>	<b>Number of Animal Units</b>	<b>Relation to Lagunitas Creek</b>
Cheda Ranch (McIsaac)	914	570	64	Watershed, bordering habitat tributary
Genazzi Ranch	438	361	55	Bordering
McIsaac Tocaloma Ranch	1,065	650	45	Watershed
McIsaac SUP	530	258	45	Watershed
Percy Ranch	683	284	31	Watershed, bordering
Zanardi Ranch	573	329	45	Watershed

Several other ranches are located on the ridge separating Lagunitas and Olema creeks. These are the Robert Giacomini and the McFadden ranches. The portions of these ranches adjacent to Lagunitas Creek are steep east-facing slopes largely covered by woodland and not used for grazing (they are included in the Olema Creek Table 9.3-7).

#### **Olema Creek Watershed**

Olema Creek could be affected by grazing on several ranches on GGNRA (Table 9.3-7). All are beef ranches except the Robert Giacomini tract, on which dairy heifers are grazed in a manner similar to that on beef ranches. Cattle are also grazed on the privately held Vedanta property, which borders the Olema Creek mainstem.

Table 9.3-7. PRNS-managed grazing lands in the Olema Creek watershed.

<b>Ranch</b>	<b>Total Acres</b>	<b>Grazed Acres</b>	<b>Number of Animal Units</b>	<b>Relation to Olema Creek</b>
Genazzi Ranch	438	361	55	Watershed
Ralph Giacomini Ranch	1,832	810	95	Watershed, bordering habitat tributary
Robert Giacomini SUP	320	229	35	Watershed
Lupton Ranch	834	442	75	Watershed
McFadden Ranch	341	250	42	Watershed, floodplain
C. Rogers Ranch	229	217	31	Watershed
Stewart / Olema SUP	295	295	63	Floodplain
Stewart horse stables	18	16	30	Bordering
Stewart Ranch	885	784	50	Bordering
Truttman Ranch	1,128	873	140	Bordering

The Genazzi, Robert Giacomini, and C. Rogers ranches do not border Olema Creek. Cattle on the Lupton Ranch were fenced out of the creek in 1998. The McFadden Ranch has six acres on the Olema Creek floodplain north of the town of Olema. The bulk of the grazing lands on the floodplain are part of the Stewart/Olema grazing permit. Potential effects of grazing under this

permit, and of operations on the Stewart, Truttman, and Ralph Giacomini ranches will be discussed in Section 9.3.2.2.

### **Point Reyes Peninsula**

Four ranches border or are in the watershed of two creeks within the ranching zone in which steelhead juveniles have been observed (Table 9.3-8). The lower 1.8 km of the west fork of Schooner Creek, between Drakes Estero and the dam which likely blocks further upstream movement of fish, is bordered by three ranches. G Ranch extends along the west bank for 1.1 km, above which the M Ranch extends to the pond and further upstream. The D. Rogers Ranch extends along the entire east bank. Cattle have been fenced out of the creek's floodplain and banks on the G ranch and the Rogers Ranch in the last three years. Cattle have access to the creek on the M Ranch, although the adjacent land is brushy and steeply sloping and receives little cattle use.

Table 9.3-8. PRNS-managed grazing lands in Point Reyes peninsula salmonid creek watersheds.

<b>Ranch</b>	<b>Total Acres</b>	<b>Grazed Acres</b>	<b>Number of Animal Units</b>	<b>Relation to Point Reyes salmonid creeks</b>
G Ranch	1,151	665	95	Bordering
H Ranch	1,104	856	285	Watershed
M Ranch	1,193	986	175	Bordering
D. Rogers Ranch	398	342	66	Bordering
Home Ranch	3,065	2,360	318	Bordering

Cattle also have access 2.5 km of the creek upstream of the dam, on the M and H Ranches. Watershed effects on downstream salmonid habitat, such as sedimentation and pollution, are muted to some extent by the presence of the large pond on the creek below most of this upstream area.

The lower 2 km section of Home Ranch Creek is bounded by Home Ranch. This section contains almost all of the suitable low gradient salmonid habitat along the creek. Several pastures along the creek are used to hold bulls from spring through fall, and these animals have direct access to the creek.

### **9.3.2.2 Potential Adverse Effects of Livestock on Coho and Steelhead**

The following section uses generally accepted information on adverse impacts of cattle on anadromous fish and their habitats to analyze potential effects of PRNS-managed grazing on coho and steelhead in PRNS and GGNRA.

#### **Direct disturbance of spawning beds or rearing areas and alteration of channel form and loss of pools by trampling.**

Direct access by cattle to spawning gravel can destroys redds or adversely affect invertebrate food sources for juvenile salmonids. Access to creeks can also result in caving in of banks and a general alteration of channels from a deep, narrow form to a wide, shallow one. Such a change

produces a loss of pools, which provide cool thermal conditions and cover for juvenile fish. It also leads to a decrease of instream cover from predators and increases the likelihood that affected stream sections will dry up over the summer.

With the recent fencing of parts of Blueline, Cheda, and Schooner creeks, most of the known spawning areas have been excluded from direct access by cattle. Construction of 700 meters of fence on the Lupton Ranch and Vedanta property has brought the effort to exclude cattle from the mainstem of Olema Creek to near completion. However, several stream sections of potential value as salmonid habitat, Blueline and Home Ranch creeks, are still accessible to cattle.

The entire drainage of the perennial Blueline Creek lies on the Ralph Giacomini Ranch. A cattle exclosure on 1 km of the creek has been in place for several years, and a fish passage structure was built downstream from the exclosure and from a culvert under Highway 1 last year. Last winter, numbers of coho salmon observed in Blueline Creek increased sharply over numbers seen in previous years. A 0.5 kilometer section of Blueline Creek upstream of the exclosure appears to be suitable habitat for anadromous fish. Currently cattle have access to this section of creek. If increased steelhead use of Blueline Creek continues, future observations will help determine if cattle access is adversely affecting potential spawning habitat.

Cattle have access to a 2 km section of Home Ranch Creek from several adjoining pastures for watering purposes. While these pastures are not used during the winter spawning season, cattle access may affect the quality of summer habitat for juvenile salmonids. More intensive monitoring of habitat conditions in this creek will help determine if such impacts are taking place.

#### **Excessive Sedimentation from Erosion in the Watershed**

Sheet erosion from excessive grazing of vegetation and gullying from trailing or ranching related activities (e.g., roads) can increase sedimentation to creeks. As a result, coarse sediment can fill pools, adversely affecting summering habitat for juvenile fish. Fine sediments can fill interstices between spawning gravels, causing developing fish embryos to receive insufficient oxygen and reduce the flushing of metabolic wastes. High levels of sediment in the water column reduces egg development to the fry stage and increases fry mortality. Sediment can produce a reduction of stream invertebrate productivity.

Water quality monitoring is conducted at a number of locations within PRNS/GGNRA, and includes sampling of Total Suspended Sediments (TSS), which gives a partial measure of erosion taking place in drainages. By sampling upstream and downstream of suspected erosion sites, monitors can isolate sources of high sediment loading. High TSS levels have been recorded downstream from several ranches, usually associated with intensive use of land adjoining creeks by cattle or horses.

Several of the most serious erosion sites are located at dairies, where cows are held in small pastures or lots near the milking parlor, which results in these areas having little vegetation cover. Elevated sediment has been found in Kehoe Creek downstream from the J and L ranches, and at Abbotts Lagoon, which receives runoff from I Ranch. While these waters do not support

anadromous fish, measures are currently being taken to reduce high intensity cattle use and consequent erosion from these sites.

Another source of sediment in spawning areas is erosion in tributaries to which cattle have access. This concern is most serious in the Olema Valley and along Lagunitas Creek, where a number of steep gradient intermittent creeks drain grazing lands. South of the town of Olema and along Lagunitas Creek, the upper reaches of many of these tributaries lie within deep wooded canyons and are well buffered from cattle grazing areas on the adjoining ridges. The lower end of these tributaries, however, are typically accessible to cattle.

Erosion is minimized on PRNS-administered ranch lands by the requirement that adequate levels of plant cover be maintained. The 1,200 lb/acre standard for RDM required by PRNS was developed by the U. C. Cooperative Extension to minimize erosion on grazing lands in coastal regions of California. Monitoring of RDM has been conducted during August-September since 1987 on all PRNS-administered ranches to insure that this standard is met. Typically, the required residue levels have been exceeded on most ranches. On ranches where excessive grazing has caused vegetation cover to fall below this standard, allowed number of cattle has been reduced.

Several measures have been taken by ranchers to reduce erosion on PRNS/GGNRA grazing lands. On the Truttman and Stewart ranches, which are managed as one unit by a single permittee, cattle are rotated to upslope pastures during the winter and are brought downslope only after lowland pastures have dried out. This rancher also has installed an extensive stock watering system on ridgelines to keep cattle from using creeks. On the Tocaloma and Cheda ranches, upland water has been provided through development of springs that are common on Bolinas and Nicasio ridges. Currently a fence to permit dry-season only grazing of an area containing two creeks on the Ralph Giacomini Ranch is under construction.

All ranches in this area typically provide winter feed to cattle in upland areas. While this is done because of better vehicle access to these areas and to promote more even grazing of pastures, it also results in reduction of cattle loafing in creeks.

PRNS has undertaken a number of projects to repair erosion sites on ranchlands. Between 1985 and 1988, over 20 erosion control and riparian protection projects were completed within PRNS and GGNRA, including fencing cattle out of sensitive wetland habitats. Some of these projects have resulted in stabilization of erosion and substantial restoration of riparian plant cover. Another survey of erosion sites was conducted in 1997, and over 20 sites on ranchlands were identified. Ongoing repair of these sites is being carried out through cooperative efforts between ranchers and PRNS or the NRCS. Despite these measures, sediment is observed in creeks used by anadromous fish, typically as flushes lasting several days after high rainfall events. The extent to which this is related to cattle grazing, as opposed to channel instability related to historical alterations of the watersheds or erosion caused by highway culverts, is not known.

#### **Inadequate Riparian Cover**

Lack of streamside vegetation can result in reduced shading of watercourses and increased water temperatures. Fish survival is significantly reduced when temperatures are in excess of 65



degrees Fahrenheit. Elevated temperatures can induce stress, which increases the likelihood of disease and impedes growth and migration of young fish. Vegetation supports invertebrates that are washed into creeks to become food for fish.

Streamside vegetation also is critical to maintain channel form and stability, and to the character of instream habitat available to fish. Plant roots hold banks, reducing erosion from bank-cutting and inducing scour of pools. Consequently, reduction of vegetation may lead to increased sedimentation of streams. Streamside trees that fall into the streambed, called "large woody debris", are an important element in fish habitat. Aside from providing cover and shade, rootwads, trunks, and branches affect hydrological characteristics of streams in ways beneficial to fish. Direct destruction or reduced recruitment of riparian shrubs and trees due to livestock can reduce shade, soil protection, and woody debris along a stream over time.

Cattle are largely excluded from riparian areas known to support anadromous fish on PRNS-managed grazing lands. However, there are several areas where riparian cover may be subject to livestock impacts and where modifications in riparian fencing or grazing regimes in adjoining pastures are being considered.

- **Stewart/Olema (Olema Creek floodplain):** The creek channel downstream from Olema was straightened during the 1920's and has been grazed since at least that time. Currently, part of the floodplain is closed to grazing and the rest is grazed on a rotational basis, with cattle removed during the winter. The channel is fenced off from cattle, and is lined with a narrow but dense growth of willows and alders. Much of the floodplain is inundated for periods of a week or more during most winters. Flooding has been increasing in recent years as gravel carried from upstream erosion sites has been deposited in the stream channel. Olema Creek is establishing a new channel in the area excluded from grazing, and will likely continue to do so as deposition in the channel continues. This dynamic situation will be monitored and the grazing regime modified as necessary to protect anadromous fish habitat in this portion of Olema Creek.
- **Truttman Ranch:** This ranch and the Stewart Ranch are the only two ranches in the Olema Valley that have pastures west of Highway 1, bordering Olema Creek. The pasture on the Truttman Ranch adjoins a highly unstable section of Olema Creek, which appears to be the "knick point" for downcutting of Olema Creek produced by historic disruptions of the watershed (e.g., logging). The creek has incised more than seven meters below the adjacent flats, where grazing takes place. Cattle impacts to Olema Creek appear minor, but their presence may be inhibiting riparian growth along a tributary, Quarry Gulch. Although the channel was rerouted approximately 50 years ago and badly downcut by a culvert under Highway 1, coho have been observed in this creek. It is currently unstable, providing significant sediment to the mainstem, and lacks riparian vegetation along part of its length. While one side of this creek is fenced off from cattle, they have access to the other. Currently, a seasonal grazing regime limiting cattle access to the unfenced side of the creek to a short time period is being developed to promote establishment of riparian vegetation along the channel.

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- **Stewart Ranch:** This ranch operates a horse boarding stables and has three pastures adjacent to Olema Creek. Due to intensive use, the horse paddocks have much bare ground, although runoff is buffered by riparian vegetation and dense weedy growth along the adjacent section of Olema Creek. Upstream of the stables, a large pasture is fenced off from the creek, but the riparian zone adjoining it is narrow, and in places little recruitment of streamside trees is taking place. A proposal to move the fence farther back from the creek channel is currently under consideration. A second pasture, downstream from the stables, also crowds the riparian zone and may be retired from grazing use. The third pasture, near Five Brooks, is used as a horse pasture. It has no riparian fence and is accessed by a creek crossing that produces significant sediment. Improvement of the crossing is under consideration. Further study is needed to determine if the riparian zone is being affected by horses using the pasture.
- **Giacomini Ranch:** As discussed above, a 0.5 km section of Blueline Creek on this ranch that appears to be suitable habitat for anadromous fish is currently accessible to cattle. While riparian cover in this area appears to be good, comparison with the downstream fenced portion of Blueline Creek over the next several years will indicate whether or not cover could be improved through exclusion of cattle.
- **Home Ranch:** Home Ranch Creek flows through the flats above and below the ranch and is closely bounded by a series of small pastures which leave only a narrow band of willows along the creek. Fencing to increase the width of the riparian corridor is being considered to improve salmonid rearing habitat.

### **Pollution by Livestock Wastes and Possible Pathogens**

High fecal coliform counts have been associated with concentrations of livestock in riparian areas. While such bacteria have not been shown to adversely affect anadromous fish directly, the associated degradation of water quality by organic nutrient and sediment pollutants can alter stream microinvertebrate populations so that they support less fish. It is also possible that pathogenic agents introduced in cattle wastes may affect fish.

Water quality monitoring conducted by PRNS biologists during rainfall events over the 2000-2001 winter recorded elevated levels of fecal coliform in several creeks that support anadromous fish. In January, 2001, a finding of high fecal coliform levels in Olema Creek was followed up by further sampling by PRNS biologists, leading to identification of the pollution source on one of the tributaries of the creek. Relocation of horses out of a pasture bordering this tributary is expected to reduce fecal coliform levels entering Olema Creek. Cheda and Home Ranch creeks also had high readings for fecal coliform. A cattle exclosure on Cheda Creek completed recently may reduce pollutant levels. Continued monitoring of Home Ranch Creek to determine if fecal coliform pollution is an ongoing problem is planned.

### **9.3.3 Cumulative Effects**

As discussed in the Cumulative Effects section for red-legged frogs (Section 9.1.3), lands outside of PRNS and GGNRA receive a relatively high degree of protection from alteration that would adversely effect coho and steelhead populations. Much of the Lagunitas Creek drainage, including its entire mainstem, is within Samuel P. Taylor State Park or MMWD watershed land. The most significant portion of the watershed outside of public ownership, San Geronimo Creek,

is protected by County zoning that limits development in western Marin, and County environmental ordinances that protect riparian areas from development-related impacts. A ranch occupying much of the eastern end of San Geronimo Valley has sold development rights to MALT.

To mitigate the effects of reservoirs on Lagunitas Creek fish populations, the MMWD is implementing a comprehensive, long-term plan to reduce sediment entering the creek and to enhance fish habitat. Under the plan, MMWD has undertaken erosion control projects and placed large woody debris in the mainstem. Habitat restoration on San Geronimo Creek is being carried out by a private organization, the Salmon Protection and Watershed Network (SPAWN).

#### **9.3.4 Conclusion and Determination**

Cattle are largely excluded from direct access to coho salmon and steelhead trout habitats, including the mainstems of the two most significant anadromous fish streams within PRNS/GGNRA, Lagunitas and Olema creeks. Continued efforts to identify and mitigate potential cattle impacts on anadromous fish habitat in recent years have resulted in exclusion of cattle from portions of Cheda, Blueline, and Schooner creeks. While coho and steelhead populations have experienced long term declines, recent data suggest that they are stable and are responding to habitat improvements at Blueline and Cheda creeks. Given the current level of protection of anadromous fish from potential adverse impacts from cattle it is determined that renewal of ranching permits may affect, is not likely to adversely affect coho and steelhead on PRNS-administered grazing lands.

#### 9.4 Western snowy plover (*Charadrius alexandrinus nivosus*) - Threatened

##### 9.4.1 Status of the Species in the Action Area

Western snowy plovers use the Point Reyes peninsula as both wintering and nesting habitat. Wintering birds occur around Drake's Estero and Abbott's Lagoon, and along Limantour Spit and the Great Beach. During the 1980's nesting took place along the entire Great Beach, Drake's Beach, and at Limantour Spit. In recent years, erosion along the southern portion of the Great Beach has diminished the upper beach area such that the entire beach can be washed by waves. Nesting is occurring on the northern portion of this beach, between the North Beach parking area and Kehoe Beach, which is backed by extensive dunes. Snowy plovers also nest along the western edge of Abbott's Lagoon. Erosion has also affected Limantour Spit, but it continues to be used as nesting habitat by plovers (Figure 9.4-1). In 2000, 25 of the 28 snowy plover nests observed were located on the northern portion of the Great Beach, with the remaining three nests found at Limantour Spit.

Monitoring of nesting snowy plovers in 1986-1989 and 1995-2000 indicates a decline in the number of nesting birds through 1996, followed by a gradual rebound (Table 9.4-1). Point Reyes

Table 9.4-1. Snowy plover nesting at PRNS (Ruhlen and Abbott 2000).

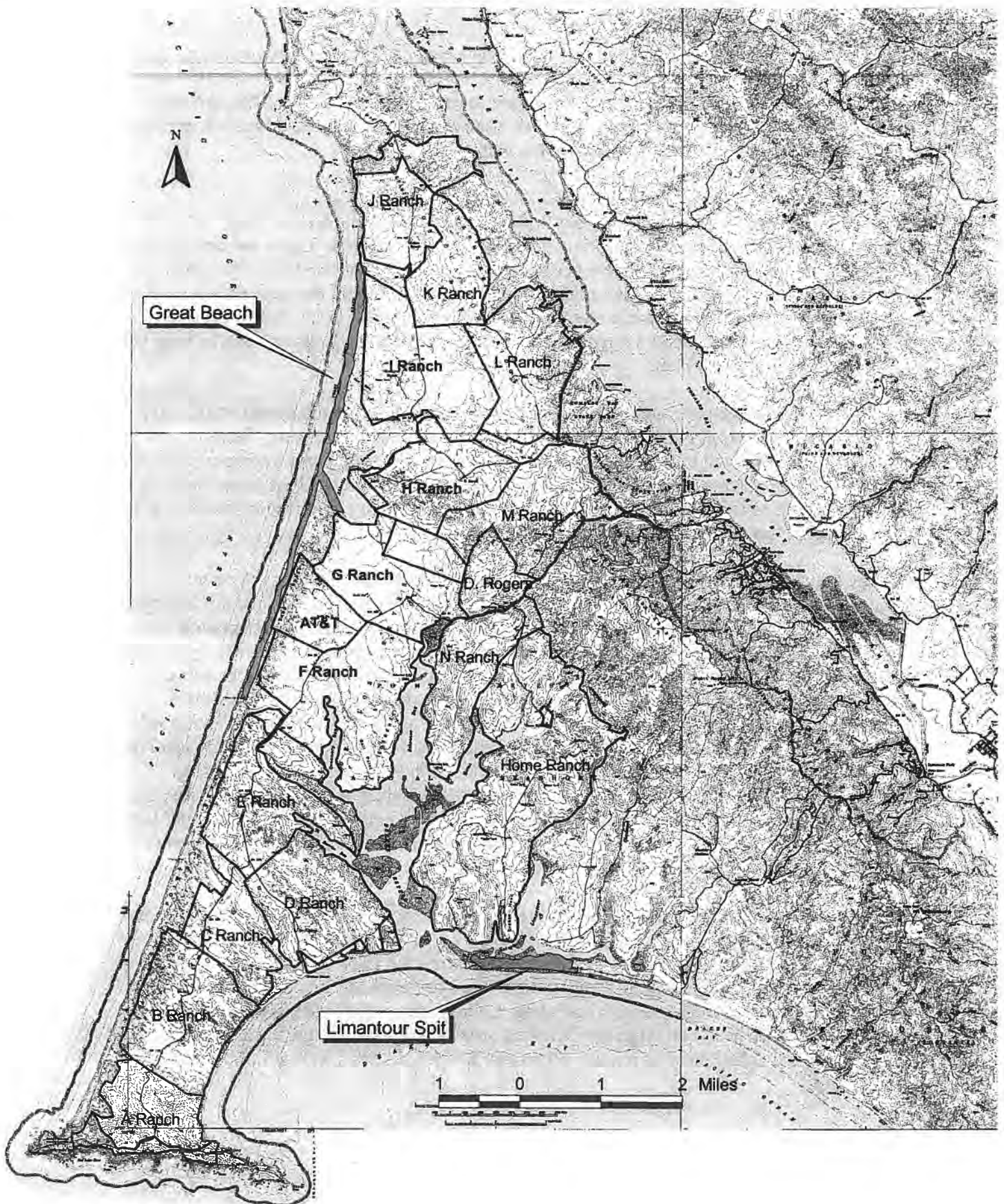
Year	Number of nests	Number of nesting birds	Number of chicks fledged	Percent chicks fledged per egg laid
1986	41	41-44	5	5
1987	74	50-54	15	7
1988	63	40-42	5	3
1989	60	34-37	1	1
1995	20	12	4	7
1996	9	10-11	15	58
1997	25	25	25	45
1998	14	16	23	58
1999	21	20	24	47
2000	28	31-37	14	19-20

Bird Observatory (PRBO) monitored individual nests at all nesting areas during this period. On the Great Beach, where most nesting took place, the number of chicks fledged per egg laid during 1986-89 and 1995 ranged from 1%-7%.

In 1996 a program to increase snowy plover nesting success was initiated, and this program continues to the present. Several nesting areas, including Limantour Spit and sections of the Great Beach accessed by the Abbott's Lagoon and Kehoe Beach trails, experience regular visitor use. Observers found a higher rate of snowy plover chick loss in these areas on weekends, when disturbance by human visitors and dogs is more likely. In response, PRNS ropes off sensitive habitat and posts signs to divert visitor traffic. Visitors are advised to avoid walking on upper beach areas used by plovers, and dogs are prohibited from nesting areas. Another aspect of the



Figure 9.4-1. Snowy plover nesting areas, PRNS.





program is placement of exclosures over nests to reduce avian and mammalian predation. Since the program began, the rate of chicks fledged per egg has increased to 20%-58% (Ruhlen and Abbott 2000), and between one and three chicks per female have fledged. In 2000, although egg-laying remained high, fledging rate declined. Causes for the decline could include predation by ravens, falcons, and disturbance by visitors or cattle.

#### **9.4.2 Effects of the Action**

The portion of Great Beach between the North Beach parking area and Kehoe Beach is bordered by the F, G, and I Ranches and by the privately-owned AT&T property. Cattle are fenced off the Great Beach on these lands. Cattle have been excluded from the dunes on the north side of Abbott's Lagoon adjoining I Ranch since the 1970's. On the G Ranch, the dune habitat south of the lagoon and along the Great Beach was fenced to exclude cattle in 1989. While occasional trespass by cattle into the Abbott's Lagoon area takes place, the risk that snowy plover nests will be trampled by cattle is minimal.

A greater risk to plovers associated with ranching is predation by common ravens, which may occur in higher numbers at PRNS than would occur in the absence of ranching. Raven populations are subsidized by feeds provided to cattle, cattle afterbirths, and improperly disposed of carcasses. Five ranches on the peninsula raise silage crops annually. Rodents and birds are killed when silage is cut, and large numbers of ravens are commonly seen feeding on these kills during silage harvest (R. Stallcup, pers. comm.).

A survey of the density of common ravens in 18 areas scattered around the Bay Area was conducted between March and June, 1999, by counting birds seen during repeated driving trips along pre-established routes (Kelly and Etienne 1999). The survey found the density per kilometer of common ravens at Point Reyes to be more than twice as high as that along any other route surveyed, including two others located in coastal areas and five located in more interior portions of Marin County. The survey route was largely located on the outer Point Reyes peninsula, extending from the junction of Pierce Point Road and Sir Francis Drake Boulevard to the A Ranch and passing through three dairies. An earlier survey conducted by a PRNS biologist identified A and B ranch feeding bins as areas where the highest concentrations of ravens occurred (S. Allen, unpublished data). Concentrations were highest in the winter. Observations over the last 20 years supports the finding that ravens are more common on the outer Point Reyes peninsula than in more interior areas of PRNS/GGNRA and Marin County (R. Stallcup, pers. comm.).

A radio tracking study of common ravens on the PRNS peninsula has followed the movements of nine radio-tagged ravens from February, 1999 to the present (Roth et al. 1999). Ravens spent most of their foraging time at dairies, where grazed pastures and cattle feeding areas were the most commonly frequented foraging areas. The chief diet of tracked birds was small animals, including birds, rodents and reptiles, followed by calf carcasses, afterbirths, and grain. Based on counts taken at raven roosts on Point Reyes and Christmas Bird Count data, the raven population on the peninsula was estimated at roughly 300 birds, which includes a large proportion of non-breeding birds.

Raven predation accounted for 38 %-65% of failed snowy plover egg clutches between 1986 and 1995 (Hickey et al. 1995). Following introduction of nest protection efforts, raven predation rates declined somewhat, but remain high. In the period between March 24 and May 25, 2001, seventeen snowy plover nests failed. Nine (53%) of these were attributed to predation of nesting plovers by ravens (Abbott and Peterlein 2001).

Several ranches and certain ranching activities may be contributing to the high raven population density at PRNS (Table 9.4-2). It is important to note, however, that raven numbers may also be

Table 9.4-2. Ranching activities associated with high densities of common ravens.

Ranch	Authorized Animals	Type	Cattle feeding	Cattle breeding	Silage acreage	Winter housing (dairies)
A	480	Dairy	All year	All year	None	Yes
B	850	Dairy	All year	All year	None	Yes
C	430	Dairy	All year	All year	None	No
E	188	Mixed <sup>a</sup>	All year	Seasonal	230	
G	95	Beef	Seasonal	Seasonal	190	
H	285	Beef	Seasonal	Seasonal	100	
I	976	Dairy	All year	All year	554	Planned
J	836	Dairy	All year	All year	136	Yes
L	430	Dairy	All year	All year	None	No

a/ Rangeland beef cattle and dairy heifers in feeding area.

high due to presence of Park visitors, litter, garbage cans, and increased numbers of calving seals and tule elk. The dairies have the largest numbers of cattle and provide high nutrient feeds to milk cows, giving them the greatest potential to support ravens. Cows are typically fed twice daily following milking. Ravens have less access to livestock feed on dairies that have barns in which cows are fed all year after milking, and in which cows live during the winter. The A, B, and J ranches currently have barns capable of housing roughly two-thirds of the cows on these dairies. A proposal by the operator of I Ranch to build a similar barn is currently undergoing environmental review. A barn at C Ranch is used for feeding, but is not large enough to house cows during the winter. The L Ranch has no facilities for indoor feeding or housing.

Roughly one-third of cattle on PRNS dairies are “dry” cows that are not in the milking string or heifers that will replace current milk cows. These animals are typically kept and fed in outdoor paddocks, so that some feed is available to ravens even where milking string cows are fed indoors.

Dairies breed cows year round to keep them cycling into the milking string. Calving usually takes place outdoors in paddocks near the dairy. While PRNS requires that afterbirths be disposed of promptly, ravens typically congregate at calf-birthing areas and consume afterbirths. Carcasses can serve as raven food if they are opened up by other scavengers. Stillborn calves are fairly common on dairies.

Silage production takes place on E, G, H, I, and J ranches. Rodents and nesting birds killed during the harvest provide a seasonal food source for ravens.

Beef ranches provide fewer feeding opportunities for ravens. Cattle numbers are lower, feeding takes place seasonally rather than year round, and feeds are not as nutritious as those provided dairy cows. Calves are born in the fall so that afterbirths are available for only a limited period each year. For these reasons, high numbers of ravens have not been regularly observed on PRNS peninsula beef ranches that don't have silage production, nor in the GGNRA North District, where all ranches raise beef cattle.

#### **9.4.3 Cumulative Effects**

Along the California coast, western snowy plovers have been extirpated from 33 of 53 nesting sites since 1970, and now number approximately 1,400 birds (USFWS 1993). Although it is not one of the eight areas that support 78 percent of the California coastal breeding population, PRNS is 1 of only 20 remaining plover breeding areas in coastal California (USFWS 1993). The Point Reyes peninsula is one of the largest relatively undisturbed beach habitats on the California coast, providing a large area of potential snowy plover habitat free of threats that have impaired habitat elsewhere, such as development, ORV use, and heavy visitor use.

Fledging rates for snowy plovers before nest protection began were insufficient to maintain the species at PRNS, as indicated by declining numbers of nests and nesting adults in the period 1986-1995. Continuation of such low nest success rates could have resulted in loss of the PRNS breeding population of snowy plover. The current nest protection program has raised nest success rates to levels similar to those at other coastal California locations (USFWS 1999), but would be costly to maintain indefinitely.

#### **9.4.4 Conclusion and Determination**

Given the evidence that the ranches identified in Table 9.4-2 may support elevated numbers of common ravens that are significant causes of snowy plover mortality and nest failure, renewal of permits for these ranches may affect, is likely to adversely affect the western snowy plover. Renewal of permits for ranches not identified in Table 9.4-2 is not expected to adversely affect the species.

The following measures to reduce raven numbers at PRNS have been recommended by PRBO:

- a) Limit raven access to cattle feeds. Where possible, cover or remove cattle feeding troughs. Place them in structures, which ravens do not typically enter. Clean up waste grain around troughs.
- b) Dispose of cattle afterbirths as quickly as possible. Alternately, move calving indoors, so that afterbirths are not available to ravens. This could be more easily done on dairy ranches, where calving is usually done close to the dairy complex.
- c) Enforce current requirements that cattle carcasses be picked up quickly and disposed of outside of PRNS. A disposal site is available in Petaluma.
- d) Insure that ravens do not have access to stored grain or to garbage disposal areas.
- e) Move the timing of silage cutting back one or two weeks. This may allow completion of spring nesting in silage fields and substantially reduce the availability of kills at harvest time.

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