

FIGURE 16: DISTURBED SOIL AND DENUDED VEGETATION AT LEK SITE, OAK WOODLAND-PASTURE INTERFACE



Species and Habitats of Management Concern

The U.S. Fish and Wildlife Service (USFWS) and/or the State of California list many of the plant and wildlife species, and habitats present in the project area. The Marine Mammal Protection Act and the Migratory Bird Treaty Act afford additional protection.

Species of Management Concern

The study area supports 47 listed animal species – 14 are federally listed as endangered, 8 as threatened, and 24 as Species of Concern. Among these listed species are the endangered brown pelican (*Pelecanus occidentalis*) and Myrtle’s silverspot butterfly (*Speyeria zerene myrtleae*). Federally threatened species include Northern spotted owl (*Strix occidentalis caurina*), Western snowy plover (*Charadrius alexandrinus nivosus*), and red-legged frog (*Rana aurora draytoni*). Nineteen federally listed plant species (seven of which also are state listed) and an additional 25 species are listed or proposed for listing by the California Native Plant Society and have been documented in the study area. For purposes of this document, all of these species are considered as “Species of Management Concern.” The Species of Management Concern that may be affected by implementation of the Non-Native Deer Management Plan are discussed below.

Northern Spotted Owl (*Strix occidentalis caurina*) – Federal Threatened Species

Habitat within the project area supports one of the densest populations of Northern spotted owl in the world. In Marin County, the owls live in second growth Douglas fir (*Pseudotsuga menziesii*), bishop pine (*Pinus muricata*), coast redwood (*Sequoia sempervirens*), mixed conifer-hardwood, and evergreen hardwood forests as well as remnant old-growth stands of coast redwood and Douglas fir. The habitat types for the northern spotted owl are defined as multi-layered, multi-species with >60% total canopy cover for nesting/roosting with large overstory trees, large amounts of down woody debris, presence of trees with defects or signs of decadence in the stand.

Preliminary pellet analyses indicate that spotted owls in Marin forage primarily on dusky-footed woodrats (*Neotoma fuscipes*) as well as other small mammals and forest-dwelling birds (Chow 1998). The Northern Spotted Owl is found throughout Olema Valley and the western and southern wilderness areas of the Seashore.

The Northern spotted owl was federally listed as threatened in 1992 (USFWS 1993). A ¼-mile radius buffer zone must be protected around active nest sites to protect the birds from the impacts of noise. The park contains approximately 35,000 acres of potential northern spotted owl habitat. Extensive surveys of habitat use, distribution, and abundance have been conducted since 1993 by the NPS and these surveys will continue. A recent census estimated a population of approximately 49 owl activity centers (Chow 1998; Fehring and Adams 2001; NPS 2002b). The park initiated a demographic study of owls in 1998 and has been banding owls annually under permit from the USFWS (Permit # 842449). The overall population trend is unknown, but is believed to be stable because the number of activity centers has been similar among years since 1998 when an inventory of the park was completed.

Western Snowy Plover (*Charadrius alexandrinus nivosus*) – Threatened

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 1980s 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. Although it had historically been used as nesting habitat by plovers, erosion has affected Limantour Spit and it no nests have been seen since 2000. In 2001 and 2002, all snowy plover nests observed were located on the northern portion of the Great Beach.

Monitoring of nesting snowy plovers in 1986-1989 and 1995-2002 indicates a decline in the number of nesting birds through 1996, followed by a gradual rebound. The Point Reyes Bird Observatory 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%.

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

The California red-legged frog (*Rana aurora draytonii*) is federally listed as threatened. This subspecies of red-legged frog occurs from sea level to elevations of about 1,500 meters (5,200 feet). It has been extirpated from 70 percent of its former range and now is found primarily in coastal drainages of central California, from Marin County, California, south to northern Baja California, Mexico. Potential threats to

the species include elimination or degradation of habitat from land development and land use activities and habitat invasion by non-native aquatic species.

The California red-legged frog is threatened by human activities, many of which operate synergistically and cumulatively with each other and with natural disturbances (i.e., droughts or floods). Factors associated with declining populations of the frog include degradation and loss of its habitat through agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, non-native plants, impoundments, water diversions, degraded water quality, use of pesticides, and introduced predators. The reason for decline and degree of threats vary by geographic location. California red-legged frog populations are threatened by more than one factor in most streams.

PRNS and GGNRA support one of the largest known populations of California red-legged frogs. This frog frequents marshes, slow parts of streams, lakes, stock ponds, and other usually permanent waters. The frog is generally found near water but disperses during rain events and after breeding season to non-breeding habitat adjacent to water bodies. The non-breeding habitat is usually a moist area with some cover such as a willow or blackberry thicket.

The U.S. Geological Survey Biological Resources Division has conducted surveys of aquatic habitats in PRNS and GGNRA since 1993 under the direction of Dr. Gary Fellers. 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 the California red-legged frog; sites have been mapped in a geographically related database. Approximately 76 sites are located on ranch lands, with a large proportion located at stock ponds. Several new breeding sites have recently been found along tributaries of Olema Creek. Several large bodies of water, are expected to yield new sites during a planned boat survey, which would 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. 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.

Coho Salmon (*Oncorhynchus kisutch*) – Endangered [state endangered]; Steelhead Trout (*Oncorhynchus mykiss*) – Threatened; and Chinook Salmon (*Oncorhynchus tshawytscha*) – Threatened

Central California coast coho salmon, Central California coast Chinook salmon and Central California steelhead (hereafter referred to as coho, Chinook and steelhead) occur in several creeks on the Point Reyes peninsula and in the Lagunitas Creek watershed that drains portions of PRNS and GGNRA. Coho salmon and steelhead trout occur in the Olema, Lagunitas, and Pine Gulch Creek watersheds. Steelhead trout also occur in the Tomales Bay, Drakes Bay, and Bolinas watersheds. Chinook salmon occur in the Lagunitas Creek watershed.

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 Peter's Dam on the mainstem of Lagunitas Creek and Seeger Dam on Nicasio Creek (NOAA Fisheries 1996). Although critical habitat has not been established for central California steelhead or Chinook salmon, it is likely to be the same as that for coho in Marin County.

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. On its 1996 federal listing, the Lagunitas watershed, including Olema Creek, was documented to support 10% of the Central California Coast coho population (Brown et al. 1994; NOAA Fisheries 1996). In their 2001 Status Review, NOAA-Fisheries acknowledged that within the Central California Coast Evolutionarily Significant Unit, the decision to list coho salmon as threatened may have been overly optimistic, concluding that the evolutionary significant unit population was presently endangered of extinction (NMFS 2001). As a result of these and further findings, NOAA-Fisheries completed a rulemaking process in June 28, 2005, which downgraded the coho status (upgraded listing protection) in the evolutionary significant unit to Endangered (Federal Register 2005a).

Adult Chinook salmon have been observed within Lagunitas Creek in increasing numbers since 2000 (MMWD 2003). The increasing frequency of Chinook salmon within Lagunitas Creek may indicate the development of a self-sustaining population, but whether this would persist is unclear (NOAA Fisheries 2004). Because of the proximity of these fish to the southern boundary of the evolutionary significant unit, NOAA Fisheries has treated this watershed population as part of the California Coastal listed population for the purposes of other consultations on the lands of Point Reyes National Seashore and Golden Gate National Recreation Area (NMFS 2004).

Historic and current data on coho and steelhead populations for Lagunitas, Olema, and Pine Gulch Creek watersheds have been gathered as part of the PRNS coho salmon and steelhead trout restoration program and the Marin Municipal Water District monitoring programs. Through the program, the NPS has established a detailed fisheries monitoring program that is carried out through support from the Natural Resource Challenge Inventory and Monitoring Program, as well as monitoring support through California Department of Fish and Game managed grant programs.

For most drainages, monitoring has focused on coho salmon, but includes equivalent information for steelhead trout. Differences between steelhead trout and coho salmon life cycles are pertinent to conservation efforts. While virtually all coho in project 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 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 would also be met.

Chinook salmon typically enter watersheds from October through December. Chinook are typically big river fish, with adults spawning in the mainstem, and are more likely than coho to stray from their natal watershed. Chinook fry emerge from the gravels in early spring and begin growing. They smolt the same year as they emerge and head to estuarine and marine waters in May and June. Their presence in Lagunitas Creek is indicative of offshore productivity and is likely opportunistic.

Salmonid species on the west coast, including coho salmon, steelhead trout, and Chinook salmon have experienced dramatic declines in abundance during the past several decades as a result of human-induced and natural factors. There is no single factor solely responsible for this decline. Factors that threaten these species include water storage, withdrawal, conveyance, and diversions for various purposes. Modification of natural flow regimes have resulted in increased water temperatures, changes in fish community structures, depleted flows necessary for migration, spawning, rearing, flushing of sediments from spawning gravels, gravel recruitment and transport of large woody debris. Natural resource use and extraction leading to habitat modification can have major direct and indirect impacts to salmon populations. Direct and indirect effects of land use activities associated with logging, road construction, urban development, mining, agriculture, and recreation have substantially altered fish habitat quantity and quality. Other factors contributing to the decline of salmonids in the Pacific include commercial fishing, introduction of non-native species and modification of habitat, and long-term operation of production hatcheries.

California Freshwater Shrimp (*Syncaris pacifica*) – Federal Endangered Species

The California freshwater shrimp was listed by the USFWS as endangered (55 FR 43884) in 1988. The shrimp is endemic to 17 coastal streams in Marin, Sonoma, and Napa counties north of San Francisco Bay, California (Fong 1999). This species is the only extant member of the genus (Fong 1999). The shrimp is found in low elevation (less than 116 m), low-gradient (generally less than 1% slope) perennial freshwater streams where banks are structurally diverse with undercut banks, exposed roots, overhanging woody debris, or overhanging vegetation (Fong 1999). As its name would suggest, California freshwater shrimp is believed to occur only in freshwater conditions (less than 0.5 ppt) within streams in the watershed, although it may be able to temporarily tolerate increases in salinity of up to 16 to 17 ppt (USFWS 1998).

Threats to existing populations of freshwater shrimp include “introduced fish, deterioration and loss of habitat resulting from water diversion, impoundments, livestock and dairy activities, agricultural activities and developments, flood control activities, gravel mining, timber harvesting, migration barriers, and water pollution” (USFWS 1998). All of these threats have historically occurred along Lagunitas and Olema Creeks.

A study was recently conducted in PRNS and GGNRA to determine the distribution of California freshwater shrimp within streams in the parks, to evaluate the effectiveness of three survey methods for the shrimp, and to provide recommendations for survey techniques for long-term monitoring (LoBianco and Fong 2003). These shrimp reside in the Lagunitas and Olema Watersheds and depend on overhanging vegetation along the creek’s banks for habitat. The shade provided by this vegetation is also important to the protection of rare fish species.

The current range of the shrimp within Lagunitas Creek extends from Shafter Bridge in Samuel P. Taylor Park to roughly 1.6 km. below the confluence with Nicasio Creek (Serpa 1991). Shrimp habitat along the main stem of Lagunitas Creek within the Parks is generally protected from agricultural activities occurring within the watershed. Small numbers of shrimp were collected in 1996 and 1997 near the confluence of Olema and Lagunitas creeks (Fong 1999).

California Freshwater shrimp surveys detected small numbers in lower Olema Creek in 2001. The USGS–Biological Resources Division Dixon Field Station is conducting investigations of California freshwater shrimp habitat, survival, and predation within lower Olema and Lagunitas Creeks. This three-year investigation is looking at habitat and flow characteristics supporting the species and has found that native

sculpin are a major predator of the shrimp. Shrimp have not been found in the lower Olema Creek sections during this USGS investigation (LoBianco and Fong 2002).

Myrtle’s Silverspot Butterfly (*Speyeria zerene myrtleae*) – Endangered

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). It was federally listed as endangered in 1992. Its historic distribution is believed to have extended from near Fort Ross south to Punta Ano Nuevo. By the 1970s populations south of the Golden Gate were believed to be extinct and populations of the butterfly were believed to exist only within PRNS. Reasons for this decline include urban and agricultural development, changes in natural fire patterns, successional changes in plant communities which have reduced availability of host plants, invasive non-native plants, livestock grazing, over collecting, and other human impacts.

Following discovery of a population near the Estero de San Antonio in the early 1990s, 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 population sizes. 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. Survey work in 1998 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 parklands around the Estero de San Antonio were estimated at 2,000-5,000 individuals in 1991. Other nearby areas with potentially suitable habitat was not surveyed. Together with those found at PRNS, 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 curly-leaved monardella (*Monardella undulata*), yellow sand verbena (*Abronia latifolia*), seaside daisy (*Erigeron glaucus*), bull thistle (*Cirsium vulgare*), gum plant (*Grindelia* spp.), and mule ears (*Wyethia* spp.).

Populations of *Speyeria* butterflies experience large population fluctuations, and population increases of tenfold or more in a single year has 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 among 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 1990s, it is not known if the silverspot has declined at Point Reyes.

Habitats of Management Concern

Numerous habitat types are afforded protection under various laws and regulations within the project area. Through the 1997 Magnuson-Stevens Act, the National Marine Fisheries Service (NMFS) has designated Essential Fish Habitat supporting a variety of species. Within the project area, the Essential Fish Habitat designation applies to all streams within NPS lands. The USFWS has designated critical

habitat for the protection of the California red-legged frog, which includes nearly all of the land within the project area.

Human Health and Safety

In a national park, wild animals can potentially cause disease transmission, vehicular accidents, or bodily injury to visitors or staff that come in direct contact with them. These risks are present whether or not wildlife is actively managed or not. Existing deer management activities are confined to disease research and population studies, occasionally with the use of aircraft.

Deer management proposals analyzed in this document include the use of firearms, aircraft, and chemical sterilant drugs, all of which can affect health and safety of visitors and staff. Existing regulations including the NPS *Management Policies* 2001 and several Director's Orders address the above activities (see NPS *Management Policies* 2001, Policies and Regulations, sec. 4.5.6) and would be implemented to ensure human health and safety during project implementation. Among other things, these policies and regulations contain specific language regarding how to ensure public health and safety within areas of NPS jurisdiction and specify when appropriate certifications related to it are required (e.g., use of firearms and aviation).

Visitor Experience

The project area is unique not only in its assemblage of natural and cultural features, but also in its proximity to a major urban population. This juxtaposition makes the PRNS resources and recreational opportunities readily accessible to a large number of people, and enhances the importance of the special qualities for which it was set aside. PRNS is one of the 30 most visited parks in the National Park System and is visited by over 2.3 million people annually. Seventy percent of these visitors came from the 9 San Francisco Bay Area counties, with the remaining 30% traveling from across the state, the country, and around the world (Sonoma State University 1998). The park is a destination park for national and international visitors and a regularly visited resource for the 5 million residents of the 9 counties of the greater San Francisco Bay Area. In 2002, over 700,000 visitors went to the 3 park visitor centers (PRNS visitor use data 2002). Yearly, over 70,000 visitors have extended contacts with park interpretive staff through ranger-led programs.

Visitor facilities and recreational opportunities include 4 backcountry campgrounds, 147 miles of trails, numerous beaches, 3 visitor centers, and 2 environmental education centers. Activities include hiking, water sports, horseback riding, fishing, camping, wildlife viewing, and interpretive opportunities. The highest visitation occurs during the months of July – October and is primarily on weekends (National Park Service, Monthly Public Use Reports). A survey conducted in 2005 indicated that 100% of visitors were “satisfied overall with appropriate facilities, services, and recreational opportunities” (University of Idaho Cooperative Parks Studies Unit for the National Park Service, Department of the Interior, 2005).

Hiking is primarily a day-use activity. Approximately 50 trails are designated throughout the Seashore, and they encompass a range of habitat types from wooded mountains to sandy beaches. Overnight accommodation is available at hike-in campgrounds or local hotels and inns. Dozens of visitors bring horses to ride on designated horse trails, and hundreds rent horses every week from commercial stables.

Water sports include kayaking, canoeing, boating, and swimming. The majority of paddle crafts use Tomales Bay as it provides protection from the Pacific waves and surf, while power boaters more freely use the ocean. Surfers have been known to use the waters off the Seashore, but most surf south of the Seashore closer to population centers with better beach access.

Nature study and wildlife viewing, including the viewing of exotic deer species, are important activities at Point Reyes. Park visitors have been observing wildlife in the Seashore since its inception. Visitors commonly comment to NPS staff on the park deer, including fallow and axis deer. Most often, the comments relate to the white color variants of the fallow deer. Typically, the average park visitor does not distinguish fallow deer from native black-tailed deer (John Dell'Osso, NPS, personal communication). Visitors often confuse fallow deer with “elk,” “moose,” and “albino deer.” Winter whale migrations off the coast bring many visitors and commercial whale watching operations into the area. Sea lions, tule elk, shorebirds, and spring wildflowers all attract their share of observers.

The NPS gathers standardized annual surveys for each park unit to determine the percent of visitor satisfaction based on park facilities, visitor services, and recreational opportunities. Sonoma State University conducted visitor surveys in 1997 and 1998 (Sonoma State University 1998). Results showed that park visitors spend an average of 2-6 hours at the seashore in a variety of seasonal activities. Those activities range from whale watching and kayaking to hiking and bird watching.

In 2003, the Point Reyes National Seashore Association, a non-profit organization, funded a telephone survey of 418 residents within Marin, Sonoma, San Francisco, Alameda, and Contra Costa counties (Responsive Management 2003). Respondents were asked questions on general management, recreation, and the founding principles for the Seashore. They were also given a brief overview of the history of non-native deer in the park and asked to respond to a number of questions concerning deer management. Sampling error was ± 4.8 percentage points. Survey results, as they relate to management of non-native deer, are as follows:

Almost all respondents (97%) felt that preserving native ecosystems was a very or somewhat important reason to have a National Park.

Most respondents (77%) said they would support reducing numbers of non-native deer if they were determined to be causing damage to native wildlife, vegetation, or other natural resources.

53% of respondents opposed (41% strongly and 12% moderately) the use of lethal methods to reduce numbers of non-native deer while 35% supported (14% strongly and 21% moderately) lethal control. Respondents who had not visited the park were slightly more likely than visitors to oppose lethal control.

65% of respondents supported (37% strongly and 28% moderately) the use of “an injection that would cause permanent sterilization and not allow them to produce any further offspring.” Twenty percent of respondents opposed sterilization (14% strongly and 6% moderately). Respondents who had visited the Seashore were more likely to support sterilization than non-visitors.

61% of respondents who had visited PRNS and 87% of non-visitors felt they knew nothing about the non-native deer in the park before the survey.

As park staff continues to educate and inform visitors of native versus non-native species issues and the impacts that non-native species can cause, park visitors would have greater appreciation for preserving native ecosystems. A pilot survey conducted by Sonoma State University in 2002 (Sonoma State University 2003) showed respondents didn't think the park should ignore detrimental impacts of non-native species to native species. Restoration of native ecosystems in the Seashore would provide high quality visitor experiences to those members of the public seeking a view of what coastal California fauna once was.

Social Values

Social values, a part of the visitor experience, include general public attitudes toward wildlife management and issues of humaneness as it relates to proposed actions (lethal removal and contraception). The interpretation of what constitutes harm or suffering to an animal varies from person to person, with different people perceiving the humaneness of any given action differently (USDA 1997). Kellert (1976) identified a number of distinct attitudes toward wildlife including naturalistic, ecological, humanistic, moralistic, scientific, aesthetic, utilitarian, dominionistic, and negativistic (see Table 5 for definitions). As with wilderness values, while people typically possess more than one view of animals, most people hold a predominant view.

TABLE 5: PERCEPTIONS OF ANIMALS IN AMERICAN SOCIETY

Attitude	Key Identifying Terms	Highly Correlated With	Most Antagonistic Toward
Naturalistic	Wildlife exposure, contact with nature	Ecologistic, humanistic	Negativistic
Ecological	Ecosystem, species interdependence	Naturalistic, scientific	Negativistic
Humanistic	Pets, love for animals	Moralistic	Negativistic
Moralistic	Ethical concern for animal welfare	Humanistic	Utilitarian, dominionistic, scientific, aesthetic, negativistic
Scientific	Curiosity, study, knowledge	Ecologistic	None
Aesthetic	Artistic character and display	Naturalistic	Negativistic
Utilitarian	Practicality, usefulness	Dominionistic	Moralistic
Dominionistic	Mastery, superiority	Utilitarian, negativistic	Moralistic
Negativistic	Avoidance, dislike, indifference, fear	Dominionistic, utilitarian	Moralistic, humanistic, naturalistic

SOURCE: S. Kellert (1976)

At the Seashore and other park units, objections have been raised by some individuals and interest groups to certain of the management techniques proposed by NPS units for management of non-native wildlife, notably lethal control (Sellars 1997). A number of animal rights and welfare organizations and private individuals also raised a range of issues during public scoping for this document (see Chapter 5, Consultation and Coordination). These objections were presumably raised on moralistic or humanistic grounds, e.g., that inflicting of pain and/or death to animals is unethical.

Animal welfare advocates promote the minimization of pain and suffering to animals and their organizations promote the well-being and quality of life of individual animals, irrespective of the animals’ role in an ecosystem. In contrast to the animal welfare movement, the animal rights movement is premised on the equality of humans and animals. The proposed equality exists because of the capacity for suffering in both humans and non-human animals. Singer states: “No matter what the nature of the being, the principle of equality requires that its suffering be counted equally with the like suffering – in so far as rough comparisons can be made – of any other being” (Regan and Singer 1989). Because of the deemed equivalent capacity for suffering, the killing of animals, whether for meat production or for sport, as well as the use of animals in scientific research, are considered as offensive as such practices would be if they were conducted on humans. The moral focus of the animal rights viewpoint is, as with animal welfare, the individual animal. As Warren states: “the needs and interests of individual beings (are) the ultimate basis for conclusions about right and wrong” (Warren 1992). Regan describes the animal rights view of wildlife management as: “In general the (animal) rights view’s position is to let wildlife be. Wildlife management

ought to be designed to protect wild animals against hunters, trappers, and other moral agents (human beings)” (Regan 1983).

Other visitors to the Seashore are perhaps more naturalistic or aesthetic in their attitudes about non-native deer. As noted in other sections of the document, as visitors are educated on the natural ecosystem of the Seashore and the impact fallow and axis deer have on it, their attitudes sometimes shift more to the ecological described on Table 5 above.

There are no specific federal directives for NPS in regards to animal welfare or animal rights. NPS management of wildlife, as described in the NPS *Management Policies* 2001, is based on a biocentric ethic and not on single animals. In addition, NEPA does not consider animal rights or animal welfare to be an environmental issue or resource element. However, animal welfare issues were raised during public scoping. As an ethic held by a certain segment of the public, belief in animal rights and animal welfare can be considered part of the human environment and are therefore discussed as a part of the visitor experience.

In addition, as a matter of general policy in all wildlife management activities, Seashore managers always endeavor to minimize animal suffering, eliminate unnecessary pain to every extent possible and comply with the recommendations of the American Veterinary Medical Association (see Actions Common to All Alternatives). For a detailed description of these recommendations, consult the American Veterinary Medical Association website: www.avma.org/resources/euthanasia.pdf.

Wilderness

The Wilderness Act

The Wilderness Act, passed on September 3, 1964, “provides a degree of protection to the resources of the National Park System that the NPS Organic Act does not.” The House Report accompanying the act, which helps to clarify congressional intent in passing legislation, states that its purpose is to establish a National Wilderness Preservation System made up of designated wilderness areas “because of the undeveloped character of their lands and the need to protect and manage them in order to preserve, as far as possible, the natural conditions that now prevail” (House Report No. 1538, 88th Congress, 2nd session, July 2, 1964).

The Wilderness Act includes a lengthy definition of wilderness, including phrases such as:

- An area where earth and its community of life are untrammelled by man
- An area where man himself is a visitor who does not remain
- An area of underdeveloped land retaining its primeval character and influence
- An area protected and managed to preserve its natural conditions
- An area that generally appears to have been affected primarily by the forces of nature
- An area with the imprint of man’s work substantially unnoticeable
- An area with outstanding opportunities for solitude or a primitive and unconfined type of recreation

What the Wilderness Act apparently did not anticipate was a condition where lands were either not in a natural state when they were designated as wilderness or where large-scale changes in environmental conditions (invasion of exotic species, acid rainfall, etc.) occurred such that the natural state was altered. When either of these conditions occur, intervention in the form of “intentional control or manipulation” may be required. Although this is perhaps “trammeling” in that human, rather than “natural” activities are

conducted, it also returns the wilderness to an “untrammeled” or “natural” pre-impact state in the long-term.

Wilderness Character

NPS policies indicate that environmental impact statements should evaluate wilderness character and values, including the primeval untrammeled character and influence of the wilderness; the preservation of natural conditions (including the lack of man-made noise); and assurances that there would be outstanding opportunities for solitude and the public would be provided with a primitive and unconfined type of recreational experience.

Wilderness character has multiple components, including naturalness, wildness, the lack of man-made noise, and conditions for a specific kind of visitor experience where people are able to find solitude, a primitive and unconfined environment, and an escape from the modern day world. For the most part, visitors to the backcountry in PRNS can usually expect few encounters with other visitors and natural quiet.

Like most wilderness areas in the National Wilderness Preservation System, the Point Reyes National Seashore Wilderness was not pristine when it was designated due to the history of Euro-American land use practices described in the Park Management Zoning section of this chapter. These practices include agricultural use, introduction of non-native ungulates, and fire suppression over the past century. As a result, “unnatural” conditions exist today. Because scientific evidence indicates adverse ecological impacts are occurring, these conditions would continue to reduce the park’s biological productivity without human intervention. In other words, the requirement of the Act to “preserve natural conditions” is unattainable without overt management.

Wilderness Values

People who use wilderness, as well as those that do not, all have opinions about why it is valuable. These perceptions about the benefits of wilderness are referred to as “wilderness values” and change from person to person and from wilderness to wilderness. No surveys of wilderness users at PRNS have been conducted, therefore it is unknown what particular values visitors ascribe to Seashore wilderness. Instead, this section describes values users have placed on wilderness in general.

The values applied to wilderness are wide-ranging, and have been grouped into biocentric and anthropocentric categories. The biocentric includes the existence of natural, ecologic conditions. These include protecting natural ecological processes, wildlife habitat, habitat for rare and endangered or unique plants and animals, protecting watersheds and water quality, and protecting air quality.

Anthropocentric values include experiential benefits from recreating in wilderness, educational values, generating tourism revenue for adjacent or nearby gateway communities, aesthetic and spiritual values, the knowledge that wilderness areas exist and would exist in the future, and intrinsic or symbolic values.

Agencies, academics, recreational users and the general public may also hold strong and varying opinions about whether intervention in a wilderness to restore its naturalness is warranted or advisable. The literature suggests that most people typically hold more than one attitude towards an issue and react differently in different situations. Nonetheless, it is possible to identify in most people predominant characteristics of a primary attitude toward an issue. For example, ranchers tend to have a utilitarian attitude towards the environment (value measured in terms of usefulness), while conservationists may have an ecological or preservationist view (Kellert 1976).

Park Operations

Currently the park has about 90 permanent, 23 term and 47 temporary employees working on a variety of projects and programs. This represents about 116 FTE (full time equivalents). During the peak visitation (summer) months, the park staff increases to about 160 employees, including Youth Conservation Corps enrollees. The year-round work force is supplemented by 20,000 hours of Volunteers-in-Parks service, three Student Conservation Assistants, and AmeriCorps volunteer work groups and special project and program funds distributed by the NPS regional and Washington offices.

Financial resources available to achieve the park's annual goals include a base-operating budget of approximately \$5.6 million. In addition, the park receives supplemental support for fire operations, cyclic maintenance, special natural resource projects, and repair and rehabilitation of structures.

The park expects to receive fees revenues and special national park funding of about \$1.6 million in a one-time funding round this year for cyclic maintenance of historic structures and other natural resource projects. The park would also receive about \$625,000 in fee revenues for other maintenance projects and operation of the whale shuttle system and campground reservation system. As part of the San Francisco Bay Network, the National Seashore would have access to approximately \$810,000 for natural resource challenge inventory and monitoring funds. The park receives approximately \$1,000,000 in FirePro and Wildland Interface funding for hazardous fuel reduction and fire prevention activities.

The operating budget for the PRNS deer management program in FY 2002 was \$113,000. An additional \$100,000 was made available through fee funds and grants earmarked for specific management projects. Staffing for the deer management program is 3.0 FTE's.

Until 1994, the Seashore maintained the populations of the two non-native deer species under guidance received by the Point Reyes National Seashore and Golden Gate National Recreation Area Citizen's Advisory Commission. This recommendation called for controlling the herds of axis and fallow deer at a population level of 350 animals each through direct ranger culling. A research program of collection and necropsy to study animal nutrition, health, parasite loads and disease was conducted between 1976 and 1979. Beginning in 1980, the Seashore implemented a management program to control population size at the stipulated herd size. Between 1984 and 1994, 1412 fallow and axis deer were removed at a total cost of \$30,200 (including personnel costs, ammunition costs and vehicle mileage) at an average cost of \$21.39 per animal (NPS unpublished data ((h)). These costs do not include administrative, training, interpretive or equipment costs. An estimate of all costs associated with this reduction program average \$20,736 per year (Wates 2003). Since the end of the direct management program in 1994, the axis deer population has rebounded to 1973 levels. Fallow deer numbers have grown considerably, and now exceed any previously recorded numbers (NPS 2002a).

PRNS (including GGNRA North District) maintains the necessary infrastructure to support an annual park visitation of 2.25 million people, provide offices, support structures and provide limited housing for the permanent and seasonal park staff. Park structures include:

- 3 visitor centers
- 2 environmental education centers
- 30 restroom complexes
- 4 backcountry campgrounds
- 17 water systems
- 147 miles of trails
- Over 100 miles of roads
- Over 100 public and administrative structures

- 27 sewage treatment systems

PRNS also manages and protects park cultural resources including:

- 297 historic structures
- 127 recorded archaeological sites
- 11 identified cultural landscapes
- 498,000 museum objects

Regional Economy (Socioeconomics)

Marin County has a \$450 million annual tourist industry. It is estimated that PRNS contributes over \$150 million to the regional economy with visitor expenditures on dining, fuel, gifts, groceries and lodging (National Parks Conservation Association 2002). According to a visitor survey conducted by Sonoma State University (1998), 74% of visitors travel to the Seashore as their main destination, 30% of visitors remain in the park overnight, and 40% of visitation comes from Marin, Sonoma, and San Francisco Counties (16.5% comes from outside of California).

Point Reyes National Seashore received 2.3 million visitors in 2001. The average visitor party spent \$95 per party per night in the local area. This spending from visitors from outside the local region generated \$83.6 million in sales for local businesses, yielding \$39.3 million in personal income and supporting 2,000 jobs (NPCA 2002). Each dollar of tourism spending yielded another \$0.63 in sales through the circulation of spending within the local economy. Including these secondary effects, the total economic impact was \$113 million in sales, \$42 million in wages and salaries, and 1,800 jobs (Michigan State University 2001).

The 165,000 acres of Marin County farmland produced olives, hay and silage, wine grapes, and organic produce earning in excess of \$4 million in 2001 (Marin Agricultural Land Trust data 2003). Dairy and beef cattle produced about \$40 million. Twenty percent of the Bay Area's milk supply is produced in Marin dairy farms. Countywide, two hundred farms and ranches employ 1,400 people.

Commercial Operations within the Pastoral (Agricultural) Zone

Commercial, agricultural, and aquaculture production occurs within the Seashore, including the following:

- 7 dairies
- 19 beef cattle ranches
- Silage production on approximately 1,000 acres of land
- Oyster production in Drakes Estero
- Water supply to Bolinas Community

PRNS contains approximately 18,900 acres currently used for traditional agriculture, including the 17,040-acre Pastoral Zone and other lands on which ranching takes place. PRNS-administered GGNRA lands include approximately 10,000 acres currently in ranching use. 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 under one of two arrangements. They could retain a Reservation of Possession, 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 Permit agreements of up to five years with NPS. Some sellers retained a Reservation of Possession on part of

their land, and entered into Special Use Permit agreements for the rest, while others have entered into more than one Special Use Permit agreement with NPS.

The 24 ranchers currently operating within the project area hold 11 Reservations of Possession and 30 Special Use Permits. Most of the Reservations of Possession expire in the next decade. It has been the policy of PRNS in the past to allow ranchers whose Reservation of Possession terms expire to continue ranching operations under Special Use Permits. Together these permittees and Reservation of Possession holders support approximately 6,013 cattle on a year-round basis.

Current impacts to those ranchers who see non-native deer year-round include:

- Fence repair costs. Ranchers report that non-native deer damage fences by passing under them repeatedly in large numbers. Bucks have also been reported to break fence wires with their antlers.
- Cost of lost pasture forage. A number of ranchers indicated that loss of pasture forage, through consumption by non-native deer, was causing a major reduction in the number of cattle that could be supported on leased pastures. It is estimated that there are about 250 axis and 860 fallow deer in the park. Their total food intake on the ranches is unknown but the average deer consumes approximately 3% of its body weight in forage per day, or between 3 and 6 lb. per adult doe or buck.
- Cost of lost supplemental feed put out for livestock. One rancher indicated that non-native deer, at a substantial cost to the rancher, were eating supplemental feed put out for livestock during the dry summer season.
- Cost of reseeding pastures. One rancher indicated that in recent years, non-native deer have overgrazed fallow (ungrazed) fields. These pastures are seasonally removed from livestock grazing by the rancher in order to allow natural grass reseeding. Because of heavy grazing of the new seed heads by non-native deer, purchase of seed was required.
- Veterinary costs. One rancher attributed an increase in “moon blindness” in ranch horses to increased densities of fallow deer in recent years. Ranch horses also tested positive for exposure to leptospirosis, a bacterial disease, which can cause ophthalmic disease and abortions in livestock. The disease can be carried by a number of mammalian species, including rodents, skunks, raccoons and deer. Two of 16 non-native deer culled and necropsied for disease testing in 2000 showed serological evidence of exposure to leptospirosis (NPS unpublished data (g)). On the advice of a veterinarian, the rancher has subsequently vaccinated all the ranch livestock for the disease. Animals affected by the ophthalmic form of the disease (“moon blindness”) were treated by a veterinarian.

The following table lists approximate numbers of Seashore ranches in which various impacts, attributable to non-native deer in the past 3 years, have been observed. Cost estimates are approximate and encompass only those directly attributed to non-native deer by the ranchers themselves. Information in this table was collected through conversations with ranchers in April, 2003.

TABLE 6: CURRENT ECONOMIC COSTS OF NON-NATIVE DEER TO SEASHORE RANCHERS

Cost Category	Number of Ranches Reporting	Approximate Cost per Rancher (2002)
1. Increased fence repairs	4	\$500 - \$1,000 per year
2. Loss of pasture forage to non-native deer	4	unknown
3. Loss of supplemental feed (hay or grain) to non-native deer	1	unknown
4. Required reseeding of pastures due to non-native deer	1	\$9,000 per year
5. Increased veterinary costs	1	\$1,200 in 2001

Cattle ranchers outside the park boundaries have also experienced damages from similar impacts caused by non-native deer estimated at approximately \$3,500-4,000 per year. An organic produce farmer outside NPS boundaries has experienced noticeable depredation of planted vegetables during the fall from fallow deer migrating out of the Seashore. In addition, damage to ornamental plants/gardens in neighboring private gardens has also been attributed to fallow deer.