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North Ranch Managed Access:

Comprehensive Baseline Inventory

Prepared By
Pacific Gas and Electric Company
Diablo Canyon Power Plant

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1.0 Background

In December of 2004, Pacific Gas & Electric Company (PG&E) received from the California Coastal Commission (CCC) a Coastal Development Permit (CDP) for construction of a spent fuel storage facilty at Diablo Canyon Power Plant (DCPP). Under Special Condition 3 of this permit, PG&E is required to prepare a managed access plan for public use of Diablo Canyon lands north of the power plant, referred to herein as the North Ranch Study Area (NRSA).

The CDP also called for the formation of a task force (DTF) composed of resource management professionals to review existing baseline data and recommend additional data or studies necessary to ensure the comprehensiveness of the baseline inventory. The purpose of the inventory was to inform the process of developing a managed public access plan as well as a plan for monitoring access effects.

PG&E, at the direction of the CCC, prepared and submitted a Preliminary Environmental Baseline (PEB) for the NRSA in March of 2005. The PEB was assembled from a broad assortment of existing PG&E report documents containing information on the natural and cultural resources of the NRSA and the adjacent coastline. Electronic copies of these documents were arranged by subject categories and placed on two compact discs (CDs). In addition each set of CDs contained an annotated bibliography of the entire collection of documents. These electronic files (including 34 separate documents spanning the period 1975 through 2005) were distributed to the Coastal Commission staff and each of the DTF members. Table 1.0-1 identifies the general make-up of the PEB.

During a June 2005 DTF meeting, written comments on the PEB submitted earlier to PG&E by DTF members were summarized and presented for discussion. Gaps or other weaknesses identified in the PEB were largely addressed by supplemental field studies arranged for by PG&E and in progress at that time. PG&E agreed to implement some changes in the scope of studies to respond to specific issues raised by the DTF. An additional study on cultural resources requested by the DTF was agreed to as well. A summary of comments received on the PEB and actions taken by PG&E in response to these comments is presented in Appendix A.

2.0 Introduction

This report documents the results of focused natural and cultural resource surveys conducted by PG&E in 2005 and 2006. The goal of the surveys was to update and strengthen the PEB data for use in development of the access and access monitoring plans, particularly in the following areas:

Table 1.0-1. Summary of natural resources and land use references identified (collectively) as the Preliminary Environmental Baseline (PEB).

Resource Category	CD Folder ID	No. of Documents	Time Span Covered	Resources Included
Marine Mammals	Folder 1	8	1991–1995	Sea otter, harbor seal, gray whale
Marine Intertidal	Folder 2	2	1995–2002	Beetles, marine algae, kelp, invertebrate animals, intertidal fishes
Managed Grazing	Folder 3	6	1978–2005	Coastal prairie
Freshwater Ecology	Folder 4	3	1990–2003	Steelhead trout, riparian zone flora, Coon Creek, Tom's pond
Terrestrial Ecology	Folder 5	2	1992–1993	Comprehensive inventory of sensitive species (plant and animal; including invertebrates)
Geology and Erosion	Folder 6	3	1990–1991	Big Wash and Coon Creek
Comprehensive (addressing multiple resource categories)	Folder 7	5	1975–2001	Broad coverage representing all biological resource categories
Cultural Studies	Confidential; not currently available	5	1988–1992	(not included for reasons of confidentiality)
Total: 34				

- sensitive terrestrial habitats,
- sensitive terrestrial wildlife and plants,
- noxious weeds,
- sensitive marine birds and mammals,
- intertidal habitats and their associated sensitive marine invertebrates and plants,
- cultural resources,
- sustainable agricultural, and
- geology and soils.

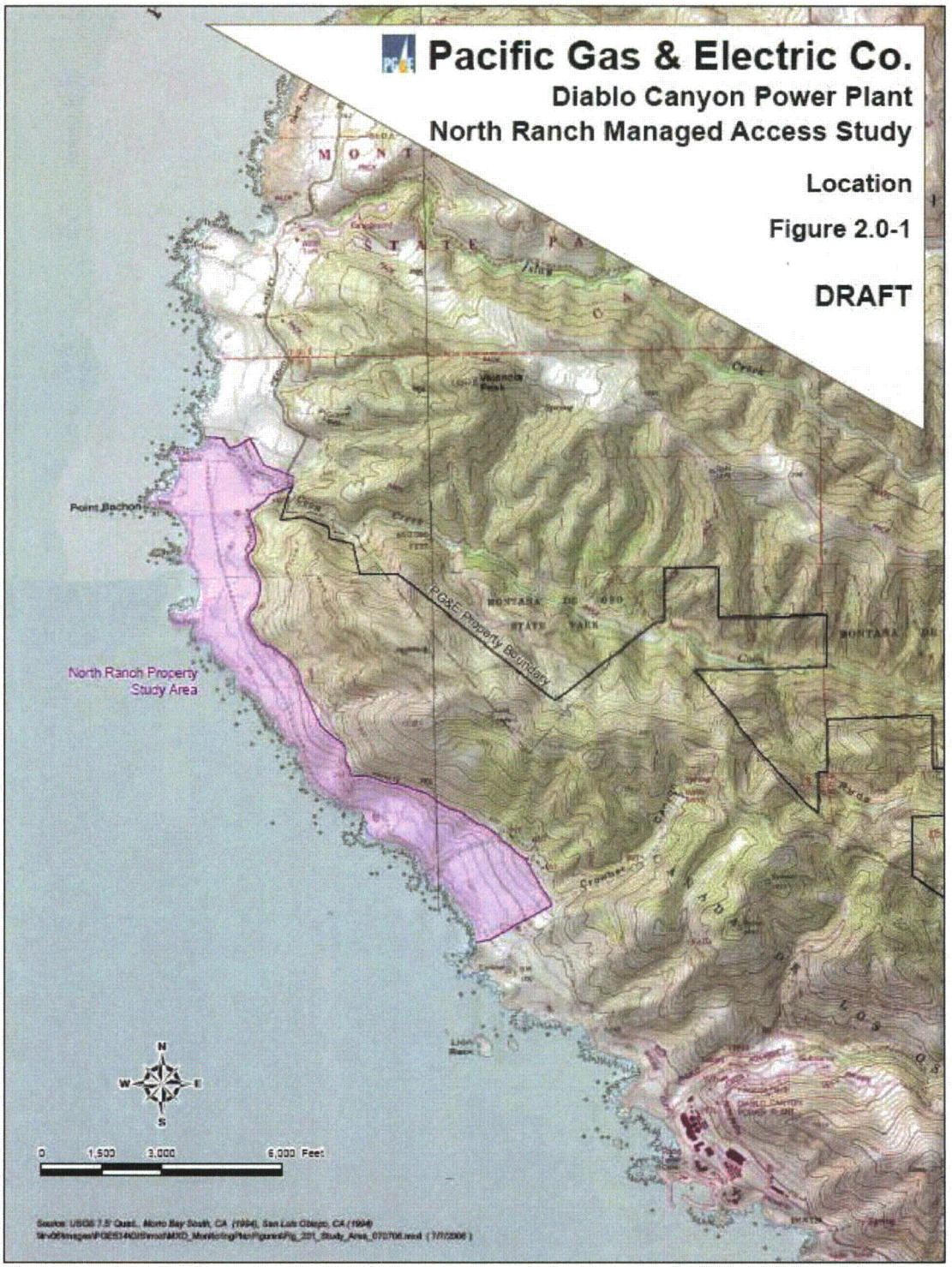
The additional survey results, when combined with the PEB data (incorporated here by reference), constitute the final Comprehensive Baseline Inventory (CBI).

The 500-acre NRSA is located in coastal San Luis Obispo County and is bordered by Montana de Oro State Park on the north, Crowbar Peak on the south, Pecho Valley Road (a private road) on the east, and the Pacific Ocean on the west (Figure 2.0-1). These lands are the property of PG&E, and are part of a more extensive (12,000 acre) security buffer surrounding the DCPP.

PG&E contracted with several consulting firms and individual environmental scientists to collect the additional baseline data. Surveys were conducted for sensitive species with known or potential occurrence in the NRSA. These studies were conducted from March 2005 through June of 2006. Certain studies, including botanical surveys and nesting bird surveys, were initiated prior to the receipt of all DTF comments on the PEB because they were considered necessary and time-critical.

The objectives of the surveys included: 1) gathering information to complement and update earlier studies, 2) building a baseline suitable for public access planning, particularly to assist in avoiding sensitive natural and cultural resources; and 3) collecting data needed to develop a monitoring program to assess the impacts of managed public access on natural and cultural resources. The bulk of this work was performed from March through December of 2005. Additional studies, primarily nesting upland bird surveys, were completed in June 2006.

Figure 2.0-1. North Ranch Study Area (NRSA).



3.0 Terrestrial Botanical Resources

3.1 Plant Communities

The NRSA contains five general plant communities (vegetation habitat types): coastal bluff scrub, Central Coast willow riparian scrub, freshwater marsh, coastal sage scrub, and non-native annual grassland. These five habitat types are fairly distinct throughout the NRSA, but locally may exhibit some gradual intergradation across transitional boundaries. The habitat descriptions presented below for all five habitats are based on the outlines provided in Sawyer and Keeler-Wolf (1995).

A comprehensive map showing the vegetation community types found throughout the Pecho Ranch is presented in Figure 3.1-1, taken from PEB document, PG&E (1992).

Non-native Annual Grassland

Non-native grassland occupies the majority (approximately) 85% of the NRSA. This habitat has been extensively altered by past agricultural activities (cultivation, irrigation and grazing). Historical data (see Section 7.1) shows that most of the marine terrace lands between the main ranch road and the coastal bluffs were at one time used for cultivated crop agriculture. These operations involved extensive tilling and irrigation practices, and may have contributed to the introduction of many of the non-native plant species that now characterize the grassland community type.

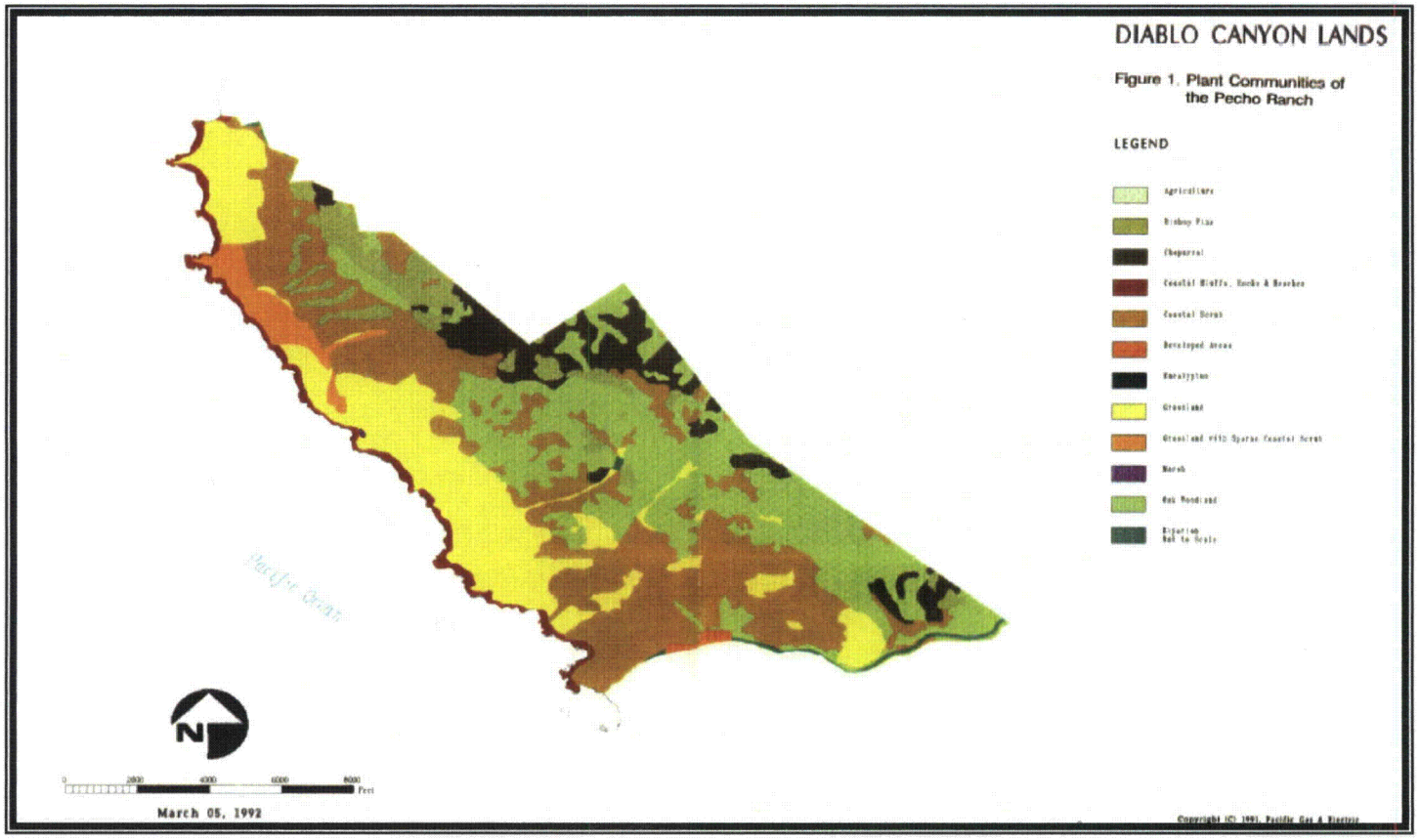
The end of row crop agriculture in the 1980's, and the subsequent shift from traditional year-round continuous grazing to the present high intensity-short duration (HISD) rotational grazing (see Section 7.3.1) likely has enhanced conditions for native grass and forb species in this area.

This community type is characterized by introduced species of annual grasses and forbs including ripgut (*Bromus daindrus*), bur clover (*Medicago hispidus*), bicolor lupine (*Lupinus bicolor*), rygrass (*Lolium multiflorum*), soft chess (*Bromus hordeaceus*), fiddleneck (*Amsinckia intermedia*), red brome (*Bromus madritensis rubens*), wild oats (*Avena spp.*), and wild radish (*Raphanus sativus*). Native grasses that occur broadly but in low numbers relative to annual species include purple needle grass (*Nesella pulchra*), California brome (*Bromus carinatus*), and wild rye (*Elymus glaucus*).

Coastal Sage Scrub Habitat

This common and often highly variable habitat type is most prevelant east of the NRSA on the lower slopes of the Irish Hills. Within the NRSA it occurs

Figure 3.1-1. Plant communities of the Pecho Ranch (taken from Diablo Canyon Land Stewardship Program, Pecho Ranch Grazing Capacity Report, PG&E 1992).[1]



[1] The figure shows vegetation community types throughout the Pecho Ranch. The NRSA generally coincides with the broad swath of grassland vegetation and grass with sparse coastal scrub shown immediately adjacent to the coastal bluffs.

in a narrow strip along the western shoulder of the Pecho Valley Road and in small patches elsewhere (e.g., Windy Point, Big Wash, and a raised area of land at the east end of Disney Point). Coastal sage scrub is dominated by California sagebrush (*Artemisia californica*), buckwheat (*Eriogonum parvifolium*), goldenbush (*Isocoma menziesii*), poison oak (*Toxicondendron diversilobum*), deer weed (*Lotus scoparius*), black sage (*Salvia mellifera*), coyote bush (*Bacharis pilularis*), bush money flower (*Mimulus aurantiacus*), and numerous herbaceous forbs and grasses common in the adjacent grasslands.

Within the Central Coast region, the absence of grazing and fire as a regular disturbance regime may allow coastal sage scrub to dominate areas of coastal terrace, preventing the greater development of grassland cover. This habitat continues to be influenced by agricultural practices in the NRSA, whereas adjacent upland areas on steeper slopes, where frequency and intensity of disturbance is low, are frequently covered by a dense, closed canopy assemblage of coastal sage scrub and other woody vegetation types (e.g., central maritime chaparral, Bishop pine forest, and oak woodland).

3.1.1 Sensitive and Unique Upland Habitats

Two of the five habitats are considered sensitive in California (Holland 1986; CDFG Natural Diversity Data Base 2006) and support unique plant and animal resources.

Central Coast Bluff Scrub

The coastal bluff scrub community type in the NRSA is a prostrate to low height scrub with scattered to somewhat continuous matted perennial shrubs, herbaceous perennials, and annuals. Most plants exhibit typical xerophytic or halophytic adaptations (e.g., succulence) to the prevalent winds with their high salt content (sea salt aerosols). The soils throughout are fairly shallow and often rocky. This habitat intergrades on its eastern (inland) boundary with non-native grasslands (exhibiting varying degrees of disturbance, from livestock) and coastal sage scrub.

The distribution of this habitat type in the NRSA is generally localized in a very narrow band along the immediate bluffs, offshore stacks, and headlands. Over this extent, its distribution is nearly continuous, with only occasional small breaks. Anthropogenic disturbance factors associated with agriculture have likely contributed to a reduction in the total area of this community type over the past 170 years (i.e., from the period following secularization of the California missions by Mexico in 1834). Other natural purturbations such as animal impact, bluff erosion, and ecological competition also affect the distribution of this type which is uniquely adapted to the harsh conditions found at the bluff edge.

The dominant perennial species characteristic of this habitat include seacliff buckwheat (*Eriogonum parvifolium*), seaside wooly sunflower (*Eriophyllum staechadifolium*), coast milk vetch (*Astragalus nuttallii* var. *nuttallii*), California saltbush (*Atriplex californica*), seaside daisy (*Erigeron glaucus*), goldenbush (*Isocoma menziesii*), and coastal goldfields

(*Lasthenia macrantha* ssp. *macrantha*). Other native perennial species found more sporadically include big-tooth goldenbush (*Hazardia squarrosa*), alkali heath (*Frankenia salina*), and live-forever (*Dudleya lanceolata*).

The dominant native annual species present during the 2005 field season included California goldfields (*Lasthenia californica*) and agoseris (*Agoseris heterophylla*). Several non-native annual species also occur interspersed throughout this habitat, especially in areas with higher levels of disturbance (e.g., near roads, trails, formerly farmed sites, sites more heavily affected by animal impact). The dominant annual non-native species observed in the 2005 field season included ripgut brome (*Bromus diandrus*), sow thistle (*Sonchus asper*), fiddleneck (*Amsinckia intermedia*), sweet clover (*Melilotus indicus*), wild radish (*Raphanus sativus*), and soft chess (*Bromus hordeaceus*).

Ecologically, the Central Coast region can be thought of as transitional in many respects between the broadly dissimilar ecologies of southern and northern California. So, it is not surprising that within the NRSA, coastal bluff scrub habitat exhibits some characteristics of both northern coastal bluff scrub and southern coastal bluff scrub, both of which are currently classified by the California Department of Fish and Game (CDFG) as sensitive habitats (Holland 1986; CDFG Natural Diversity Data Base 2006). However, there are also dissimilarities, having largely to do with the absence of certain key indicator species, which make our coastal bluff scrub habitat difficult to place within any of the contemporary treatments of California's natural community types (Sawyer and Keeler-Wolf 1995, Barbour and Major 1988, and Holland 1986). Therefore, we based the mapping of this habitat on the following consistently applied field estimated criteria:

> *Within the NRSA, the criteria for mapping of coastal bluff scrub was targeted at a perennial cover canopy composed of at least four of the above perennial indicator species, and a combined canopy cover of 30% or greater.*

These descriptive criteria recognize that past agricultural land use and current animal impact from livestock, burrowing animals, concentrated seabird roosting, and natural bluff erosion has reduced and fragmented the coastal bluff scrub in some locations while other locations remain largely pristine.

In mapping the distribution of coastal bluff scrub within the NRSA we began by using high-resolution digital (1-square-foot-pixel) aerial imagery and ArcPad™ GIS software to describe continuous polygons of this habitat type throughout the project area. Once completed, this coverage was used in the field with a GPS receiver to guide ground truthing of 100% of the mapped area. Editing of the shape-file was done both in the field and later in the office from notes taken in the field. On completion of the map work PG&E asked Dr. David Keil (Biological Sciences Department, Cal Poly, San Luis Obispo) to visit the NRSA with us and review both the map criteria and the interpretive work on the ground. It was Dr. Keil's opinion that the criteria and methods used were appropriate and that the results obtained were technically sound.

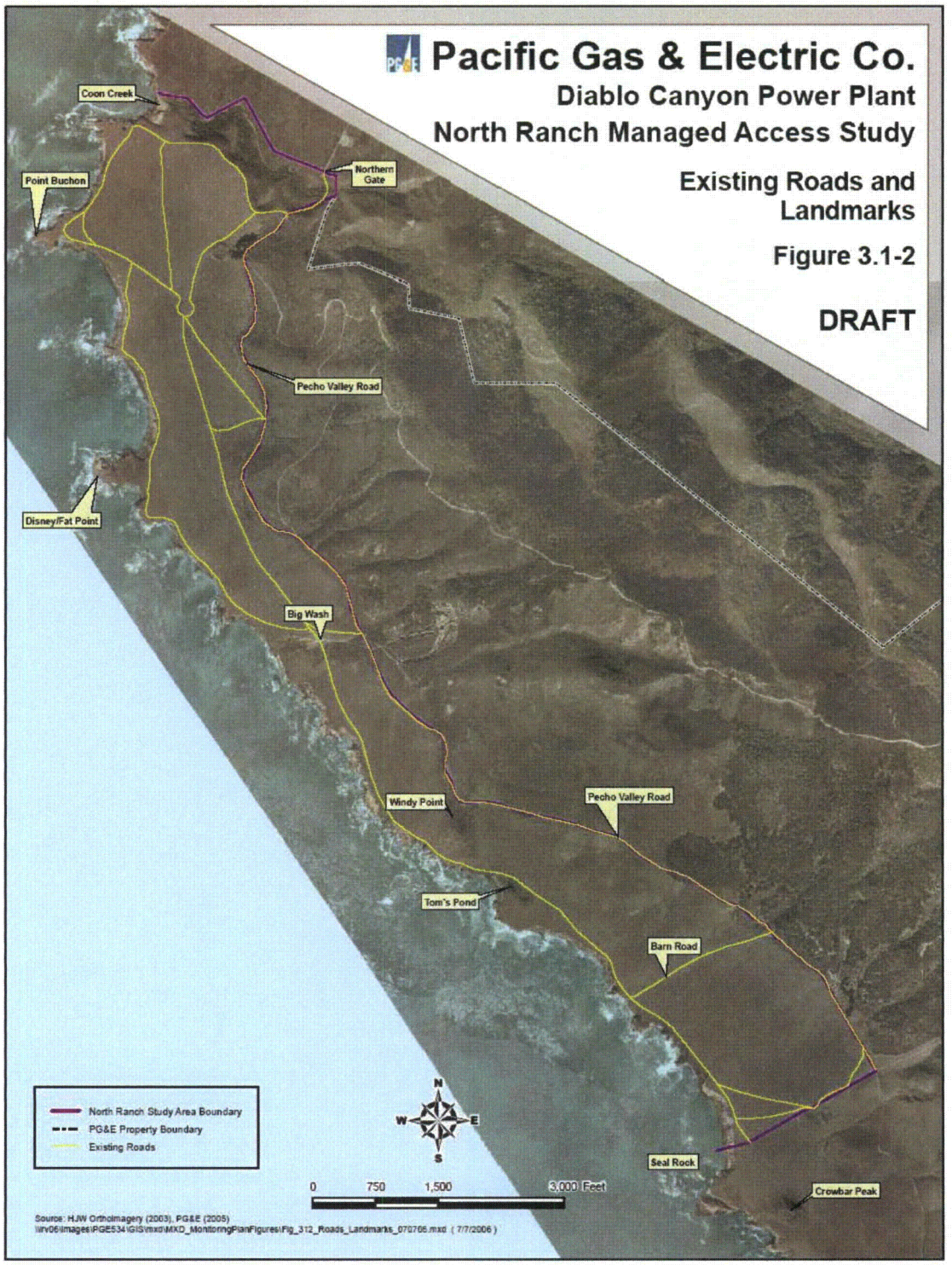
Central Coast Willow Riparian Scrub
This sensitive plant community is the predominant riparian zone vegetation type along Coon Creek, located in the extreme northern part of the NRSA (see Figure 3.1-2). Within the NRSA this habitat extends up to 50 meters on either side of the creek.

The dominant plant species associated with this habitat include two willows (*Salix lasiolepis* and *S. lasiandra*), creek dogwood (*Cornus stolonifera*), creeping honeysuckle (*Lonicera involucrata*), poison oak (*Toxicodendron diversilobum*), elderberry (*Sambucus mexicana*), sedges (*Carex* spp. and *Cyperus* spp.), rushes (*Juncus* spp.), willow herb (*Epilobium brachycarpum*), monkey flower (*Mimulus guttatus*), hedge nettle (*Stachys bullata*), poison hemlock (*Conium maculatum*), wild blackberry (*Rubus ursinus*), wild cucumber (*Marah fabaceus*), vervain (*Verbena lasiostachys*), harding grass (*Phalaris tuberosa*), and many other annual grasses and forbs.

Freshwater Marsh
Freshwater habitats, particularly ones characterized by emergent wetland vegetation, are uncommon on the Diablo lands and contribute significantly to the properties overall biodiversity. They are considered locally unique and important. This community type is represented in the NRSA by one man-made pond located near Windy Point. Tom's Pond derives its water from a spring found immediately south of the empoundment (Figure 3.1-2). Vegetation at the pond consists of both freshwater emergent forms and wet meadow/riparian species including arroyo willows (*Salix lasiolepis*), narrow-leaved cattails (*Typha angustifolia*), bulrush (*Scirpus californicus*), sour dock (*Rumex crispus*), rush (*Juncus capitatus*), water parsnip (*Berula erecta*), brass buttons (*Cotula coronopifolia*), salt grass (*Distichlis spicata*), water cress (*Rorripa nasturtium-aquaticum*), water milfoil (*Myriophyllum aquaticum*), spiny cocklebur (*Xanthium spinosum*), and white pond lily (*Nymphaea odorata*).

Livestock currently have access to the pond area for feeding and for water a few days out of the year.

Figure 3.1-2. Existing roads and landmarks on the NRSA.



3.2 Special Status Plants

3.2.1 Study Sites

Floristic botanical surveys were conducted for sensitive plant species over the entire NRSA. Based on pre-field research it was determined that the special status plants most likely to occur in the NRSA would be found in the coastal bluff scrub plant community. Therefore, surveys were more concentrated in these areas. For more on survey methods see Section 3.2.3.

3.2.2 Species Accounts

A total of 16 special status (sensitive) plant species were determined to potentially occur in the project area, these are summarized in Table 3.2-1.

Arroyo De La Cruz Manzanita (*Arctostaphylos cruzensis*)

This manzanita is an evergreen shrub, with bright green leaves, and is found only in sandy soils of the central California coast. There are twenty major known locations in northwest San Luis Obispo County and the Morro Bay region. The species is threatened from altered fire regimes and urbanization along the coastline. Common associates are *Ceanothus maritimus, Salvia mellifera, Rhamnus crocea, R. californica,* and *Toxicodendron diversilobum.*

The California Native Plant Society (CNPS) recently updated the species to List 1B.2, a rare endemic in California (CNPS 2006). *A. cruzensis* was found in the Irish Hills on PG&E property just south of Coon Creek in 1993 according to the California Natural Diversity Database (CNDDB) (CDFG 2005a). The species was not observed during the field surveys in the NRSA in 2005, and the specific habitat is not present there.

Morro Manzanita (*Arctostaphylos morroensis*)

An evergreen shrub having dark shiny-green leaves, with gray-tomentose twigs containing long white bristles. The plant was once fairly common in the Morro Bay area. The shrub is currently known from nine locations covering 350 acres in this historic range (CDFG 2005a). The species is a CNPS List 1B.1, seriously endangered endemic of California (CNPS 2006). It is threatened by urbanization and alteration of fire regimes, and possibly by competition from non-native plants. Regional planning efforts are ongoing to enhance the habitat. It was not present in the NRSA in 2005.

Table 3.2-1. Sensitive plant species potentially occurring and found in the NRSA.

Species	Common Name	F/S/CNPS	Habitat	Results
Arctostaphylos cruzensis	Arroyo de la Cruz manzanita	SC/-/1B	Sandy coastal bluffs	Not found, habitat poor
Arctostaphylos morroensis	Morro manzanita	T/-/1B	Sand dunes	Not found, habitat absent
Arctostaphylos pechoensis	Pecho manzanita	SC/-/1B	Coastal scrub – shale	Not found, occurs nearby, habitat poor
Arctostaphylos Wellsii	Wells' manzanita	-/-/1B	Sandstone chaparral	Not found, habitat lacking
Atriplex coulteri	Coulter's saltbush	-/-/1B	Coastal bluffs, clay soils	Not found, habitat present
Astragalus nuttallii nuttallii	Nuttall's milk-vetch	-/-/4	Coastal bluffs, clay soils	Found both seasons on coastal bluffs and points
Calochortus obispoensis	San Luis mariposa lily		Chap. grassland, serpentine	Not found, habitat lacking
Calystegia subacaulis episcopalism	Cambria morning glory	-/-/1B	Chaparral, woodland	Not found, habitat lacking
Carex obispoensis	San Luis sedge	-/-/1B	Serpentine springs	Not found, habitat absent
Castilleja densiflora obispoensis	Obispo indian paintbrush	-/-/1B	Coastal grassland	Not found, habitat present
Chorizanthe breweri	Brewer's spineflower	-/-/1B	Coastal scrub, serpentine	Not found, habitat marginal
Cirsium occidentale compactum	Compact cobwebby thistle	-/-/1B	Coastal prairie scrub, chaparral	Not found, habitat present
Eridictyon altissimum	Indian knob mountain balm	-/-/1B	Chaparral, sandstone	Not found, occurs nearby, habitat lacking
Lasthenia macrantha macrantha **	Gold fields	-/-/1B	Coastal bluffs	Found, occurs on bluffs; sensitive habitat type
Layia jonesii	Jones' layia	-/-/1B	Chaparral, grassland, serp.	Not found, habitat marginal
Suaeda californica	California suaeda	E/-/1B	Coastal salt marsh	Not found, habitat absent

Notes: California Native Plant Society (**CNPS**) ranks are: **1A** = plant presumed extinct in California, based on 2000 inventory; **1B** = plants rare and endangered in California and elsewhere; **4** = plants of limited distribution in California. California Department of Fish and Game (**S** or **CDFG**) ranks are: **E** = endangered; **T** = threatened; **R** = rare. U.S. Fish and Wildlife Service (**F** or **USFWS**) ranks are: **E** = endangered; **T** = Threatened; **PE** = proposed for endangered status; **PT** = proposed for threatened status; **SC** = Species of Concern

* Based upon spring (2005 and 2006) and summer (2005) field surveys performed at approximately 21 day intervals in the NRSA. Taxa that are known to occur in unique or specialized habitats (e.g. vernal pools) that are not present on the property were not specifically targeted although all species observed were inventoried (see Appendix B).

** This taxon may be a new species or subspecies (Pers. Communication, D. Keil, Cal Poly, SLO). Investigation presently ongoing with R. Chan (UCBerkeley).

Pecho Manzanita (*Arctostaphylos pechoensis*)
This evergreen shrub is known from only one location in the Pecho Hills area of San Luis Obispo County, and is threatened by urbanization (CNPS 2006). This manzanita has conspicuous clasping leaves that turn reddish with age. The plant is found in shale outcrops, in the closed cone coniferous forest (*Pinus bishopii*) and in maritime chaparral habitats with underlying shale substrates. The plant is CNPS List 1B.2 (CNPS 2006), and has been located atop the northern ridgeline of the Pecho Ranch in a substantial population (CDFG 2005a). Neither the plant nor its preferred habitat was present in the NRSA in 2005.

Wells' Manzanita (*Arctostaphylos wellsii*)
This is an "uncommon" manzanita possessing tomentose twigs that are densely bristled, and narrowly elliptic leaves with a red tinge (Hickman 2003). The inflorescence is considerably showier than most urn-shaped manzanitas and the flowers are bright red-pink and irregular. This manzanita occurs on sandstone outcrops and chaparral hillsides. The plant is a CNPS List 1B.1 species (CNPS 2006), with populations concentrated in undeveloped hills of southeastern San Luis Obispo County (CDFG 2005a). It was not present in the NRSA in 2005.

Coulter's Saltbush (*Atriplex coulteri*)
This perennial herb has more than thirty known locations south of San Luis Obispo County, including six known populations on Santa Catalina Island (CNPS 2006). The plant contains many prostrate to slightly ascending branches, and is identified by very distinctive small bracts that are fused to the pistillate inflorescence. This saltbush occurs within alkaline/clay soils in open coastal bluff scrub, but has likely never been authoritatively documented within San Luis Obispo County. *Atriplex coulteri* is a CNPS List 1B.2 species, but still occurs locally in high numbers in southern coastal scrub (CNPS 2006, CDFG 2005a). In 1993 *A. coulteri* was reported at one location within coastal scrub habitat on the NRSA near Crowbar Peak. No specimens were taken and preserved at that time. Thorough field surveys in 2005 found no individuals of this species anywhere in the NRSA. The possibility exists that one of the two other species of saltbush that occur commonly in the NRSA today was mistaken during the earlier study for *A. coulteri.*

Nuttall's Milk Vetch (*Astragalus nuttallii* var. *nuttallii*)
This is a perennial herb with historic known locations from as far north as Alameda and San Francisco counties, now likely extirpated in those areas due to urbanization (CNPS 2006). This milk vetch or "locoweed" is found throughout most of the rocky/sandy coastal bluffs of the central and southern coast to Santa Barbara County. The plant is easily identified by its densely tangled bipinnate leaves, and large, bladdery, papery fruits which when mature contain 14-38 seeds (Hickman 2003). The plant is a list 4.2 B, fairly rare with limited distribution in California (CNPS 2006). This taxon occurres extensively in coastal bluff scrub habitat of the NRSA.

San Luis Mariposa Lily (*Calochortus obispoensis*)
This a localized endemic species of San Luis Obispo County, found only within dry serpentine chaparral (Hickman 2003). This bulbiferous herb contains yellow to deep orange petals that are coarsely hairy inside. There is one extant location in northern San Luis Obispo County, with the majority of locations in central to southern San Luis Obispo County (CDFG 2005a). The lily is a CNPS List 1B.2 and is threatened by grazing, development, road construction, recreation, and potentially by mining (CNPS 2006). Neither the plant nor its preferred habitat were present in the NRSA in 2005.

San Luis Obispo County Morning-Glory (*Calystegia subacaulis* ssp. *episcopalism*)
This plant is a rhizomatous herb known to occur only in dry open scrub/woodland borders, along the San Luis Obispo County coast (CNPS 2006). This decumbent, mat-forming morning-glory is identified from the related *C. subcaulis*, by a lack of hairs on the stems. It blooms from April to July with large showy white flowers (Hickman 2003). This taxon is rated 1B.2, endemic to San Luis Obispo County (CNPS 2006). It was not present in the NRSA in 2005.

San Luis Sedge (*Carex obispoensis*)
This cespitose, rhizomatous herb is found within springs, streamsides, and serpentine seeps within San Luis Obispo County (CNPS 2006). The plant is identified by wide white margins on the pistillate flowers and also by the perigynia (sac-like structures surrounding the ovary and achene) which is necessary for positive identification of most sedge species. This sedge is rated as CNPS List 1B.2, and was reported by Hickman (2006) to occur only in San Luis Obispo County. Nevertheless, three locations have been reported in Monterey County (CDFG 2005a). It was not present in the NRSA in 2005.

Obispo Indian Paintbrush (*Castilleja densiflora* ssp. *obispoensis*)
This annual herb has white to pale yellow bracts that almost appear to be petals. The plant is endemic to San Luis Obispo County, occurring within grassland seeps, mostly on serpentine soils (CNPS 2006). The plant is rated 1B.2 by CNPS (2006), and is threatened by development and grazing in some areas. It was not present in the NRSA in 2005.

Brewer's Spineflower (*Chorizanthe breweri*)
This annual herb is known from twenty occurrences along the central and southern coast of San Luis Obispo County where it is associated with coastal scrub and chaparral plant communities. The plant is identified by thin decumbent, reddish stems with white to red perianths (calyx and corolla) (Hickman 2003). The plant may also occur in serpentine-gravelly/rocky substrate (CNPS 2006). This spineflower is a CNPS List 1B.3, not very endangered in California, and is endemic to San Luis Obispo County (CNPS 2006). It likely integrades with *C. staticoides*. It was not present in the NRSA in 2005.

Compact Cobwebby Thistle (*Cirsium occidentale* var. *compactum*)
This perennial herb has densely white hairs along stems and phyllaries, with dark rose-purple flowers blooming from April to June (Hickman 2003). The plant is often associated with *Astragalus nuttallii var. nuttallii*, within coastal bluff habitats of San Luis Obispo County. This species formerly occurred within the San Francisco Bay area, but has since been extirpated due to development (Hickman 2003). The species is rated CNPS List 1B.2, and is threatened by grazing, development, and continued insect predation (CNPS 2006). This distinct compact thistle is decreasing in population abundance and distribution within its range. It was not present in the NRSA in 2005.

Indian Knob Mountain Balm (*Eriodictyon altissimum*)
This rare state-endangered evergreen shrub species is identifiable by sticky glabrous stems and large lavender flowers that have densely hairy corollas (Hickman 2003). The plant is currently known by six occurrences in the Irish Hills and at Indian Knob in San Luis Obispo County. The plant grows on sandstone ridges with intermixed chaparral (Hickman 2003). The plant is rated CNPS List 1B.1, with populations threatened by urbanization, energy development, off road vehicles, alteration of fire regimes, and non-native invasive species (CNPS 2006). It was not present in the NRSA in 2005.

Perennial Goldfields (*Lasthenia macrantha* ssp. *macrantha*)
This perennial herb is most commonly found within the immediate north coast dunes, coastal scrub, and grasslands, from Mendocino County to Marin County (CNPS 2006). There are fewer occurrences farther south (one in San Mateo and one in San Luis Obispo County near Cambria). The plant has simple or branched, hairy stems with yellow disk and ray flowers (Hickman 2003). Subspecies reportedly integrade within overlapping ranges. The plant is listed CNPS 1B.2 (CNPS 2006). A plant generally matching the description of *L. m.* ssp. *macrantha* was found in several locations within the sensitive coastal bluff scrub habitat of the NRSA in 2005. Specimens sent to Dr. David Keil at Cal Poly, San Luis Obispo, for identification were later referred to Dr. R. Chan at the University of California, Berkeley, who is a recognized authority on this genus. It is possible that this plant may prove to be a new species not previously known or described.

Jones' Layia (*Layia jonesii*)
This plant is an annual herb endemic to San Luis Obispo County, found on clay or serpentine slopes (Hickman 2003). The basal margins of this plant's phyllaries bulge out and are interlocked by cottony hairs. The ray flowers are conspicuously yellow with white tips, making it easily identifiable during the blooming periods of March-May. *L. jonesii* is a CNPS List 1B.2. Current distribution information is lacking and more data is necessary to discern the actual rarity status (CNPS 2006). It was not present in the NRSA in 2005.

California Sea-Blite (*Suaeda californica*)
This short evergreen shrub has many gray to greenish-red stems with horned or wing-margined flowers of various dull membranous colors (Hickman 2003). It was formerly

known from the San Francisco Bay area, where it was extirpated by development and now it is extant only in the vicinity of Morro Bay and near Cayucos Point (CNPS 2006). The plant is threatened by recreation, erosion, and alteration of marsh habitat. It is often confused with *S. esteroa* and *S. taxifolia* in southern California, but it does not occur there. The plant is listed as CNPS List 1B.1. It was not present in the NRSA in 2005.

3.2.3 Survey Methods

Pre-field research was performed to provide data on the special status plant species that could potentially occur in the project area. This work was performed consistent with the guidelines of the CNPS, the CDFG, and the U.S. Fish and Wildlife Service (USFWS). The investigation consisted of the following:

1. A review of the available botanical literature and related technical reports to compile a list of the above plant species known to potentially occur in the NRSA.
2. A review of the herbaria records, appropriate maps and files of the Califorbia Natural Diversity Data Base (CNDDB) and USFWS records to obtain any relevant information concerning the above species and their habitats.
3. Consultation with local botanists and academics who are familiar with the flora of San Luis Obispo County.
4. Sequential field surveys to identify species, verify habitats, and to document resources were performed in 2005 (March-October) and 2006 (February-May). The two person surveys were timed to coincide with the flowering periods of the "target plants" in the NRSA at approximately biweekly intervals. The surveys were performed at approximately 50 meter intervals over the project area. All data gathered in this manner were immediately recorded using global positioning system receivers (GPS), topographic maps, and field survey forms.

3.2.4 Survey Results

Two special status plant species were identified in the project area, Nuttall's milk vetch (*Astragalus nuttallii*) and coastal gold fields (*Lasthenia macrantha* ssp. *macrantha).* The later species has been referred to a taxonomic authority at the University of California, Berkeley as a possible new species or subspecies (see species account, Section 3.2.2).

These species are present at numerous locations throughout the coastal bluff scrub habitat (see Figure 3.1-1 for habitat distribution), and are almost exclusively associated with it. Occasionally, individuals were also found in transitional areas between bluff scrub and grassland habitats.

3.3 Noxious Weeds

Noxious weeds are of increasing concern to wildland managers and to local, state and federal agencies. These species compete with ecologically significant native species and cause serious problems for many types of agricultural operations. Sources consulted during pre-field research included the California Department of Food and Agriculture

(CDFA) noxious weed list for San Luis Obispo County, and the California Invasive Plant Council list of noxious weeds in California wildlands (CalIPC 2006).

3.3.1 Study Sites

Weed surveys were conducted over the entire 500-acre NRSA, with greater attention given to disturbed areas and other high-suitability weed habitats including roadsides, fencelines, excavated areas, corrals, stock watering sites, and other areas of surface disturbance or compaction. Distribution of mapped weed populations is shown in Figure 3.3-1.

3.3.2 Species Accounts

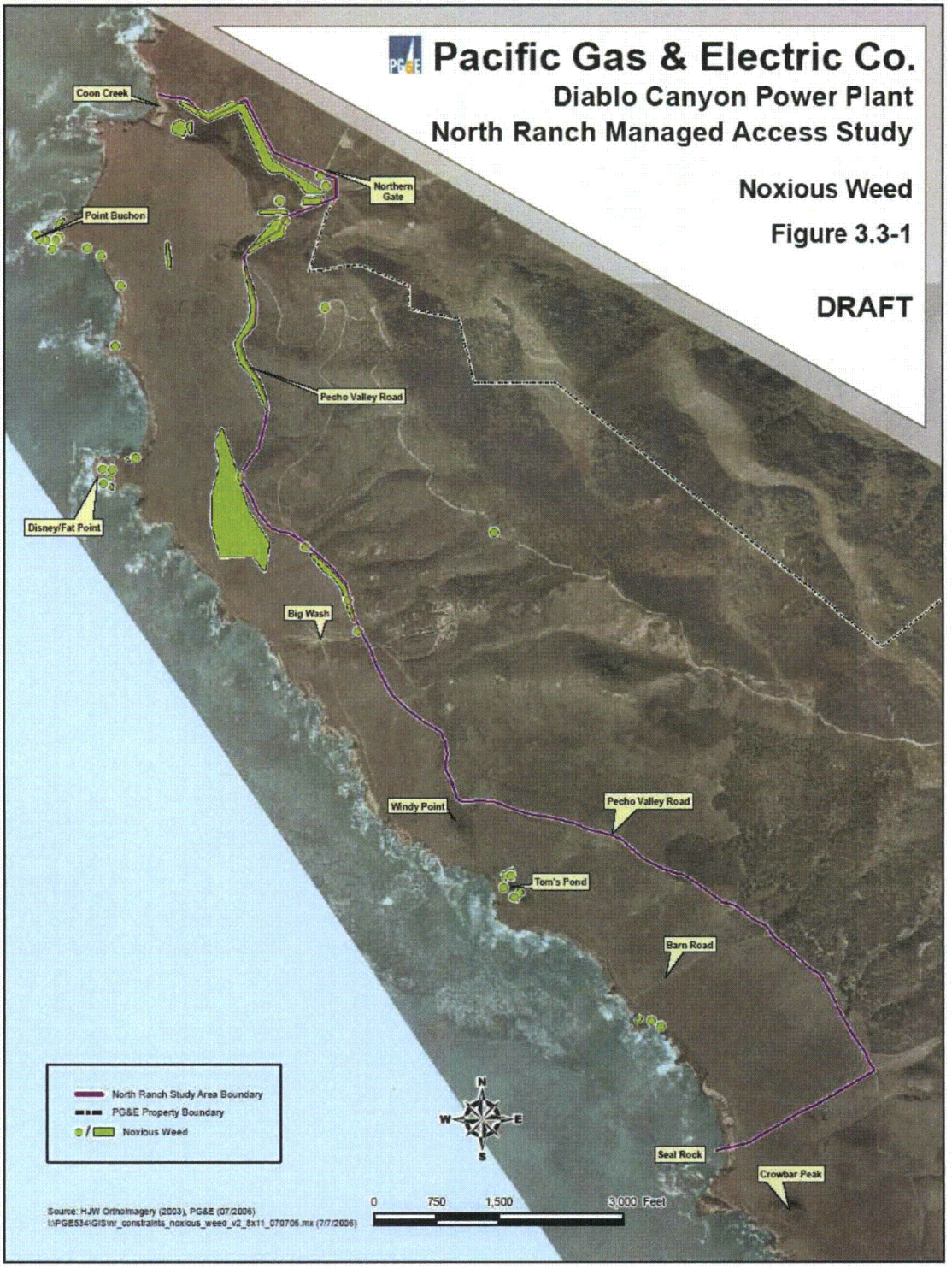
Spiny Cocklebur (*Xanthium spinosum*)

This exceedingly aggressive plant is tall and stout stemmed, with large auxiliary spines covering both stems and leaves. The flowers are translucent and difficult to discern, with male flowers on top of female flowers hidden in the axils (Hickman 2003). The genus is made up of two species, which are known to occur worldwide. The transport of this species throughout California by boats has created an explosion in its populations, which thrive upon disturbed or wetter areas such as reservoir shorelines. The spiny cocklebur is not listed as a noxious weed by the California Invasive Plant Council (Cal-IPC), but is described as having the ability to "rapidly out-compete other native wetland plant species" (Cal-IPC 2006). Cocklebur is toxic to mammals, and its burs lower the value of wool (University of California-Integrated Pest Management). It was present in the NRSA in 2005 near Tom's Pond.

Puncture Vine (*Tribulus terrestris*)

This invasive weed is a warm season, mat-forming annual weed that contains an extensive root system. This species thrives in open dry or disturbed areas. Puncture vine has much divided leaves and bright yellow flowers within the leaf axils that only open on sunny mornings during blooming periods. Puncture vine presently has not been assigned a noxious weed rating, but is toxic to livestock in its vegetative state and causes mechanical equipment damage due to the spiny fruit it produces. A small population of this species was found in 2005, along a secondary ranch road in the northern portion of the NRSA (PF 6 paddock). These plants were removed by hand under supervision by the Diablo Land Stewardship Committee (LSC).

Figure 3.3-1. Known noxious weed populations within the NRSA.



English Ivy (*Hedera helix*)
This introduced species is an "A" rated weed (Cal-IPC 2006), with creeping woody stems (vine-like), simple evergreen leaves and dark black berry-fruits. The plant is a cultivated ornamental in regions of California with mild winters (Hickman 2003), but has spread aggressively throughout riparian and other mesic areas, especially on the coast. The juices from berries are known to cause dermatitis, and the berries and leaves are toxic when eaten (Hickman 2003). This species was not found in the NRSA in 2005.

Castor Bean (*Ricinus communis*)
This European native has established itself throughout the coastal foothills in the Central Coast, down into southern California (Hickman 2003). This very distinctive large bush or small tree has large palmate leaves, plumose red flowers, and spiny fruit (Hickman 2003). *R. communis* has naturalized below 1,000 feet in the southern San Joaquin Valley, central to southern coast, Trinity County, and the San Francisco Bay area. It is rated "C" (Cal-IPC 2006), and was not seen in 2005 in the NRSA.

Greater Periwinkle (*Vinca major*)
V. major is found throughout low elevation California and is commonly used as an ornamental in landscaping. Cal-IPC rates this species as "B"; however, the species is rapidly spreading into riparian areas (Cal-IPC 2006). The species is readily identifiable by its sprawling nature in waterways and cool wooded areas, and its bright lavender-white flowers that bloom for months. This species was found in 2005 at one location within the Coon Creek riparian area.

Bluegum (*Eucalyptus* spp.)
There are at least nine different Eucalyptus species known to occur throughout California, all of which are non-native. Although abundant within Montana de Oro State Park, just north of the project area, no eucalyptus were documented within the NRSA in 2005. Eucalyptus species vary in growth form from shrubs to large trees, and are characterized by shedding bark, large plumose flowers, and lanceolate leaves (Hickman 2003). *E. camaldulensis* is rated "B" by Cal-IPC (2006) noxious weed inventory. Most species create a monoculture over time where introduced, probably due to their allelopathic properties and ability to form a closed canopy, significantly reducing the amount of light reaching the understory.

Jubata Grass (*Cortaderia cubata*)
This dioecious grass species is an "A" rated perennial weed with densely clumped bases and erect stems (Hickman 2003). The species is documented from many coastal areas, and is spreading into interior areas following disturbance (Cal-IPC 2006). *C. jubata* is similar in habit to *C. selloana* (below), in that both have large spikelets and sheathing leaves. Both species are capable of sprouting vegetatively from pieces of broken tissue, increasing the ease with which they are spread or transferred from one site to another. This species was not found in the NRSA in 2005.

Pampas Grass (*Cortaderia selloana*)
C. selloana is an "A" rated noxious weed species from coastal California (Cal-IPC 2006). This aggressive grass invades coastal dunes, coastal bluffs, coastline road cuts, and continues to spread throughout California in the milder inland climate areas. This species was found in the NRSA in 2005 near Coon Creek and was referred for treatment to a certified pest control operator. Active management of this weed will continue under direction of the LSC.

Purple Starthistle (*Centaurea calcitrapa*)
This weed is a "B" rated pest and forms a dense seed mat for up to three years in infested areas (Cal-IPC 2006). This annual to perennial weed looks similar to *C. solstitialis* in that the main phyllaries are spiny, yet *C. calcitrapa* has identifiable resin dotted leaves and bright purple flowers and purplish spiny fringed bases (Hickman 2003). The species was not found on the NRSA in 2005, but is known from populations to the north near Baywood.

Italian Thistle (*Carduus pycnocepahlus*)
This plant is Cal-IPC "B" rated with impacts that are considered to be "locally variable" depending upon the immediate land use (Cal-IPC 2006). The large spine-winged stems and phyllaries impact wildlife movement when the weed is allowed to form large stands. This annual thistle is equipped to spread a large amount of seed via wind. *C. pycnocephalus* was found and mapped at several locations in the NRSA in 2005, and was referred for treatment to a certified pest control operator.

Artichoke Thistle (*Cynara cardunculus*)
This "B" rated noxious weed is known to be an aggressive invader of central and southern California open space areas. This thick-stalked and spiny perennial thistle, actively overtakes grasslands where introduced (Cal-IPC 2006) and is capable of forming large monotypic stands. Identified by blue-purplish flowers, this weed can reach population densities of 22,000 plants per acre. The plant is considered to be spreading in riparian areas, as well as disturbed or abandoned agricultural fields along the coast. This species was not located in the NRSA in 2005.

Salt Cedar (*Tamarix* spp.)
This green-stemmed tree, with five white to reddish petals and small overlapping leaves, stands out in native canopy dominated landscapes. There are five described "species", which may hybridize in areas of overlap (Hickman 2003). The species is continually removed in desert washes of California and Arizona, where extensive *Tamarix* populations have a major impact on the amount of water for municipal or wildlife use. A single plant was found in the NRSA, growing on the face of the coastal bluff in 2005. Subsequent site visits failed to relocate the plant, which was likely removed by wave action.

Tocalote (*Centaurea melitensis*)
This species, also known as "Malta starthistle," is similar in appearance to purple starthistle or yellow starthistle, except the flowers are yellow with purplish appendages to the phyllaries (Hickman 2003). This annual species forms dense seed banks which can remain viable for many years. *C. melitensis* may be increasing along the California coast (Cal-IPC 2006). One population was found along a secondary ranch road east of Disney Point in 2005 and was referred for treatment to a certified pest control operator.

White Horsenettle (*Solanum elaeagnifollum*)
This "B" rated weed is an escaped agricultural species known by numerous common names such as silverleaf nightshade, white weed, and desert nightshade, depending on locality (Cal-IPC 2006). A deep-rooted perennial, it has gray-green seed leaves and bright purplish fused flowers with dull yellow fruiting berries. The species was not found in the NRSA in 2005.

European Beachgrass (*Ammophilla arenaria*)
This "A" rated (Cal-IPC 2006) perennial grass species has clumped stems and large, slender spikelets, which rapidly form monocultures in dunes and bluffs throughout coastal areas of California (Hickman 2003). The species was introduced in California for use in dune stabilization and soon formed dense rhizomatous monocultures. *A. arenaria* seeds are spread via wind and sea; vegetative spread also occurs below ground via the rhizomatous root structure. It was not found in the NRSA in 2005.

Medusahead (*Taeniatherum caput-medusae*)
This is an "A" rated (Cal-IPC 2006) annual grass found throughout cismontane California. Medusahead is reported to be the most threatening annual invasive grass of California, Oregon, and Idaho rangelands. The plant has poor forage properties for livestock and wildlife, and tends to out-compete native grass species for soil moisture in the fall months. This weed was not found on the NRSA in 2005, but it is spreading in the general region north near Morro Bay.

Hoary Cress (*Cardaria* spp.)
There are three known *Cardaria* species in California (Hickman 2003). All species are perennials, strongly rhizomatous, and produce white flowers. Depending on which species, hoary cress is rated either "B" or "C" (Cal-IPC 2006). The fruits (silicles) are conspicuously heart-shaped and help to distinguish the species. All species require high moisture to become established and tend to create monotypic stands. This weed was not found within the NRSA in 2005.

Spanish Broom (*Spartium junceum*)
This "A" rated (Cal-IPC 2006) noxious weed is common along roadsides and disturbed areas throughout coastal California. *S. juceum* is a small to large shrub with simple leaves that appear palmate, with bright yellow flowers characteristic of the pea family. The weed is a serious threat to many plant communities for its ability to alter soil

nitrogen levels while forming dense inaccessible and unpalatable stands. *S. juceum* is found in association with disturbed areas such as roadsides, managed rights-of-way, and abandoned fields of the Central Coast. It was found at several locations in the northern portion of the NRSA in 2005 and referred for treatment to a certified pest control operator.

Cape or German Ivy (*Delairea odorata*)
The species is an "A" rated noxious weed that infests riparian areas and other moist habitats in California (Cal-IPC 2006). The large twining vines and palmate dark-green leaves clearly identify this species. Cape ivy quickly overtakes canopies blocking sunlight, killing trees and under story shrubs, while leaching toxic alkaloids into water systems (Cal-IPC 2006). This species was not found in the NRSA in 2005.

Giant Reed (*Arundo donax*)
This species is an "A" rated noxious weed resembling large bamboo with long sheathing leaves (Cal-IPC 2006). It rapidly forms dense monotypic stands in disturbed or artificial wetland areas, and colonizes downstream areas via vegetative fragments. The monotypic stands greatly decrease water temperature, negatively affect nesting habitat for riparian birds, and increase damage during fire. No populations of giant reed were found in the NRSA in 2005; however, "fragments" of this plant were observed on the beach at the mouth of Coon Creek, apparently transported from elsewhere.

Poison Hemlock (*Conium maculatum*)
This "B" rated invasive species is able to establish itself in large monotypic stands in areas where water saturation is high throughout the growing season (Cal-IPC 2006). The species is identifiable by its large hollow stems with purple surface blotches and large white umbel flowers (Hickman 2003). The species is highly toxic to animals and humans. Several populations were mapped along Pecho Valley Road and throughout the riparian zone of Coon Creek in 2005.

Wild Fennel (*Foeniculum vulgare*)
This "A" rated perennial weed contains a large taproot and highly dissected licorice scented leaves and stems (Cal-IPC 2006). The flowers of this species are in umbels and are distinctively white tipped (Hickman 2003). The plant establishes in many types of disturbed habitats and then eventually excludes other vegetation, while increasing fuel loads in the late summer due to its volatile oil content. Fennel was located and mapped in areas adjacent to the active channel of Coon Creek in 2005.

Tree of Heaven (*Ailanthus altissima*)
This aggressive "B" rated noxious weed was likely introduced to the United States as an ornamental tree from Asia during the 1800's (Cal-IPC 2006). The species is a large tree with pinnately compound leaves, and inconspicuous flowers that resemble the larger leaves. The species spreads rapidly by vegetative reproduction in disturbed open space

areas, and is highly toxic to humans and wildlife. *Ailanthus* was not found in the NRSA in 2005.

Yellow Starthistle (*Centaurea solstitialis*)
Yellow starthistle is a warm season annual or biennial weed. Seedlings are dull green. The seed leaves are oblong, round at the tip, with smooth edges. The bright yellow flowers have long stiff spines at their base. This "A" rated noxious weed is very difficult to eradicate (Cal-IPC 2006). Yellow starthistle was not found in the NRSA in 2005.

Wooly Distaff Thistle (*Carthamus lanatus*)
This thistle is an "A" rated noxious weed (Cal-IPC 2006). The Cal-IPC inventory has also placed an alert on this species, in order to decrease spread via early detection and eradication. This annual thistle is composed of "wooly" stems and leaves, yellow flowers, and possesses some of the largest spines in the genus (Hickman 2003). The plant forms dense basal rosettes and vegetative stands in disturbed pasture areas. In 2005 12 to 15 small occurrences of this species were identified between Disney Point and Pecho Valley Road, straddling a secondary ranch road. The area containing these plants was mapped as one large polygon feature in the GIS to facilitate future monitoring for control of this species. All plants found here in 2005 were removed by hand and properly disposed of.

Russian Thistle (*Salsola tragus*)
Russian thistle, a common annual broadleaved weed in the goosefoot family, is found in saline coastal and inland valley areas throughout California. It also occurs throughout the western states, more often in drier areas. The early growth of the plant resembles pine species; however the plant quickly grows into a "tumbleweed." The familiar tumbleweed eventually dehisces (breaks away) at ground level allowing the spherical-shaped plant to be carried along the ground by wind, dispersing seeds as it goes. This "C" rated noxious weed (Cal-IPC 2006) was not found in the NRSA in 2005.

Bull Thistle (*Cirsium vulgare*)
This "B" rated noxious weed is located throughout California, from the coast to at least 8,000 feet in the Sierra Nevada Mountains (Cal-IPC 2006). The thistle has a dark purple flower, tightly enclosed by spiny phyllaries, and contains winged/spiny appendages throughout the leaves and stems. The species is widely dispersed via humans and livestock, and is able to form monotypic stands. Three populations of this plant were identified and mapped in the NRSA.

Skeleton Weed (*Chondrilla juncea*)
This species is a highly aggressive biennial "A" rated weed, with milky sap (Cal-IPC 2006). The multi-branched stems, many small yellow-ligulate flowers, and stand-replacing habit, characterize this species (Hickman 2003). This species was not found during 2005 surveys of the NRSA.

Purple Veldt Grass (*Ehrharta calycina*)
This perennial "A" rated noxious weed is often used for erosion control projects despite its known invasiveness (Cal-IPC 2006). It has large purplish stems and a large showy panicle inflorescence. This grass is considered a "serious threat" to native plants, due to its ability to replace and convert entire stands of native vegetation rapidly. This grass can build a significant reserve of seed in the soil and is highly palatable to livestock. It is common in the Baywood and Montana de Oro areas, north of the NRSA. This species was found in the NRSA in 2005 at one location near the State Park gate. Efforts to eradicate this population by manual techniques have thus far, not been successful.

Barbed Goatgrass (*Aegilops triuncialis*)
This highly invasive "A" rated weed is another "alert" species (Cal-IPC 2006). The weed is an annual with generally erect stems that are bent at the base, with thick/stiff glumes that give the grass the appearance of spiny appendages (Hickman 2003). The grass is reportedly able to take over entire pastures in less than twenty years. The grass was not found in the NRSA.

Ice Plant (*Carpobrotus edulis*)
This "B" rated noxious weed has been introduced to coastal areas throughout California (Cal-IPC 2006). Ice plant is a succulent with reddish-green leaves and showy white to pink flowers. This species, sometimes called "sea-fig" forms dense fibrous root systems along coastal dunes, beaches, and bluffs. State Parks along the coast have attempted to eradicate this species; however plant populations seem to be increasing (Cal-IPC 2006). This plant was found and mapped in the NRSA at several locations in 2005.

Perennial Pepperweed (*Lepidium latifolium*)
This plant is a highly invasive "A" rated alert species, inhabiting and expanding in saline soils throughout the United States (Cal-IPC 2006). This perennial contains grayish-glabrous stems, and small white petals. *L. latifolium* is known to act as a "salt pump", by concentrating salt and encouraging monospecific stands that prevent the growth of native annuals (Cal-IPC 2006). This weed was not located in the NRSA in 2005.

French Broom (*Genista monspessulana*)
French broom is a large shrub that forms dense stands where it becomes established. This "A" rated, high alert weed is widespread in disturbed coastal areas of California (Cal-IPC 2006, Hickman 2003). The plant has silky-hairy leaves, and large yellow pea shaped flowers (Hickman 2003). *G. monospessulana* is able to thrive in infertile soil conditions, quickly replacing rare-endemic natives. This species was not located in the NRSA in 2005.

Russian Knapweed (*Acroptilon repens*)
Russian knapweed is a widely distributed perennial "B" rated noxious weed (Cal-IPC 2006). The seedlings are ovate and covered with bran-like scales underneath. The mature, thistle-shaped plants are 1 to 3 feet (30 - 90 cm) tall, erect and have many branches. Leafy branches have rosy-pink to lavender colored terminal flower heads. This weed reproduces through seeds and from deep, dark underground rootstocks. Rooting from rhizomes, knapweed forms dense patches that infest orchards, vineyards, and roadsides. It is reported to be toxic to sheep, cattle, and horses and is a. It was not found in the NRSA in 2005.

3.3.3 Survey Methods
The same survey methods described in Section 3.2.3 for sensitive species were also used for noxious weed species.

3.3.4 Survey Results
Information presented in Table 3.3-1 summarizes the results of noxious weed surveys performed in 2005. For those species found in the NRSA, information is presented on location, and control actions (if any) taken to date. Table 3.3-1 identifies forteen noxious weed species present in the NRSA during the 2005 survey period. Immediate control methods were employed on some species. The Diablo Canyon LSC directs efforts to control noxious weed populations on the Diablo Lands.

3.4 Discussion
The data presented in Tables 3.2-1 and 3.3-1 update and expand information on sensitive species contained in the preliminary baseline, and provide new noxious weed information not previously available for the Diablo Lands. Two sensitive plants and forteen noxious weed species were identified and mapped in the NRSA during the 2005 survey period. Both of the sensitive plant species were associated with coastal bluff scrub habitat; itself designated sensitive in California. A complete and accurate mapping of coastal bluff scrub and Central Coast willow riparian scrub habitats was performed and included in the mobile GIS platform to aid trail planning and future monitoring.

These efforts respond directly to comments received from the DTF following its review of the preliminary baseline. PG&E believes that the botanical resources portion of the baseline inventory is suitably complete and that it will adequately inform the process of planning a trail route and monitoring program.

Table 3.3-1. Noxious weed species potentially occurring or known to occur in the NRSA.*

Name and Status	Presence	Specific Location	Actions Taken if Any
Spiny cocklebur - (*Xanthium spinosum*)	Present	Tom's Pond	About 200 plants. Hand removed in 2005
Puncture vine C (*Tribulus terrestris*)	Present	Ranch Access Rd., south of corral in PF- 6 paddock	26 plants. Hand removed.
English ivy (*Hedera helix*)	Not Present	Not Found	No action taken
Castor bean C (*Ricinis communis*)	Not Present	Not Found	No action taken
Periwinkle B (*Vinca major*)	Present	Coon Creek	No action taken
Bluegum B (*Eucalyptus*)	Not Present	Not Found	No action taken
Jubata grass A (*Cortaderia jubata*)	Not Present	Not Found	No action taken
Pampassgrass A (*Cortaderia selloana*)	Present	Main rd. near Coon Creek	1 clump chemically treated 2005
Purple starthistle B (*Centaurea calcitrapa*)	Not Present	Not Found	No action taken
Italian thistle B (*Carduus pycnocephalus*)	Present	Several locations along N. Ranch roads	No action taken
Artichoke thistle B (*Cynara cardunculus*)	Not Present	Not Found	No action taken
Saltcedar C (*Tamarix* spp.)	Present	1 plant, lower bluff	No action taken (plant removed by wave action)
Tocalote B (*Centaurea melitensis*)	Present	One location associated with wooly distaff thistle, east of Disney Pt.	Chemically treated in 2005
White horsenettle B (*Solanum elaeagnifollum*)	Not present	Not Found	No action taken
European beachgrass A (*Ammophilla arenaria*)	Not Present	Not Found	No action taken
Medusahead C (*Taeniatherum caput-medusae*)	Not Present	Not Found	No action taken
Hoary cress B (*Cardaria* spp)	Not Present	Not Found	No action taken
Spanish broom A (*Spartium junceum*)	Present	Several locations near roads, north end	Some chemical controls in 05, more needed
Cape ivy A (*Delairea odorata*)	Not Present	Not Found	No action taken
Giant reed A (*Arundo donax*)	Not Present	Not Found	No action taken
Poison hemlock B (*Conium maculatum*)	Present	Wet areas, Coon Creek & access road	No action recommended
Wild fennel - (*Foeniculum vulgare*)	Present	Disturbed sites near Coon Creek	No action recommended.

Tree of heaven (*Ailanthus* spp)	-	Not Present	Not Found	No action taken
Yellow starthistle (Centaurea solstitialis)	B	Not Present	Not Found	No action taken
Wooly distaff thistle (*Carthamus lanatus*)	A	Present	200 + plants 8-05 east of Disney Point	Mech. removal 8-05 Revisited 7-06
Russian thistle (*Salsole tragus*)	C	Not Present	Not Found	No action taken
Bull thistle (*Cirsium vulgare*)	B	Present	Several locations near roads, Coon Creek	No action taken
Skeleton weed (*Chondrilla juncea*)	A	Not Present	Not Found	No action taken
Veldt grass (*Ehrharta calycina*)	A	Present	One location near north gate entrance	Hand Removal 6-05, 8-05, 4-06; still present 7-06
Barbed goatgrass (*Aegilops triuncialis*)	-	Not Present	Not Found	No action taken
Ice plant (*Carpobrotus edulis*)	B	Present	Several locations along bluffs	No action taken
Perennial pepperweed (*Lepidium latifolium*)	B	Not Present	Not Found	No action taken
French broom (*Genista monspessulana*)	C	Not Present	Not Found	No action taken
Russian knapweed (*Acroptilon repens*)	B	Not Present	Not Found	No action taken

*Based upon spring and summer 2005 survey results. Status rating based upon California Invasive Plant Council (Cal-IPC) and San Luis Obispo County CDFA rated Weed Lists.

4.0 Terrestrial Wildlife

This section includes information on special-status invertebrates, amphibians and reptiles, upland and riparian birds, and mammals. This information consists of a combination of new species data not contained in the PEB, and updates to information developed when these lands were first comprehensively surveyed in the early 1990s (Biosystems Analysis, Inc. 1995). Detailed information on previously known sensitive species occurrences within the NRSA is located in Vol. 2: Folder 5 of the PEB (BioSystems Analysis Inc. 1995). Surveys were again conducted for these species by Garcia and Associates in 2005. Further focused surveys for sensitive grassland nesting bird species were performed during the spring breeding season 2006.

4.1 Invertebrates

4.1.1 Study Sites

A site assessment survey was conducted throughout the NRSA in early 2005 to determine the potential for occurrence of special status invertebrate species based on presence of suitable habitat conditions.

These surveys focused on the federally endangered Morro shoulderband snail (*Helminthoglypta walkeriana)*, overwintering sites for the monarch butterfly (*Danaus plexippus*) and the California Species of Special Concern Morro blue butterfly (*Icaricia icaroides morroensis*). In addition, surveys were conducted for the Smith's blue butterfly (*Euphilotes enoptes smithi*) (Federally Endangered), San Emigdio blue butterfly (*Plebulina emigdioensis*) and unsilvered fritillary (*Speyeria adiaste clemencei*) (California Species of Special Concern).

4.1.2 Species Accounts

Morro Shoulderband Snail (*Helminthoglypta walkeriana*)

This species was listed as endangered under the ESA on 15 December 1994 (50 FR 64613–64623). Six species of shoulderband snails in two subgenera occur in the San Luis Obispo vicinity (Pilsbry 1939; Roth and Sadeghian 2003). The Morro shoulderband snail is reported from the Los Osos Valley to the coast, south to Montaña de Oro, and north along Morro Bay to Toro Creek. Although little is known about the habitat requirements of Morro shoulderband snail (Hill 1974, Roth 1985, Roth and Tupen 2004), this species appears to be restricted to relict dune soils that support coastal scrub, particularly in association with mock heather (*Ericameria ericoides*), dune buckwheat (*Eriogonum parvifolium*), California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), and dune lupine (*Lupinus chamissonis*) (Roth 1985). However, Adams et al. (2000) and Reeves et al. (2000) concluded that Morro shoulderbands inhabit prostrate vegetation with sufficient typical dune scrub leaf litter duff substrate to maintain moisture refugia for the snails.

Typically, the Morro shoulderband snail utilizes habitats where these shrubs provide dense cover and there is substantial leaf litter. Morro shoulderband snails live in the leaf litter of the coastal scrub, typically where the branches of the shrubs come into contact with the soil. During or after rain or heavy fog events, the snails emerge at night and during the early morning and disperse to new habitats, wandering at random until they encounter new suitable habitat. Morro shoulderband snail may also use ice plant (*Carpobrotus* sp.) as cover; however, ice plant is a non-native invasive weed that excludes native plants and can alter desirable habitats.

Morro Bay Blue (*Plebejus icarioides moroensis*)
Considered a Species of Special Concern by CDFG, this species is not listed under state or federal endangered species acts. The Morro Bay blue is reported from the Morro Bay coast in San Luis Obispo County south through coastal dune and relict dune habitats dominated by coastal dune scrub in western Santa Barbara County. It may have occurred in Los Angeles County at one time (Emmel and Emmel 1973). The highest density populations occur at the Oso Flaco Dunes, about 40 miles south of the NRSA. This univoltine subspecies of blue butterfly uses the dune lupine (*Lupinus chamissonis*) as a host plant for the larvae, but visits a variety of flowers for nectar. The flight period is June to August. One of the larger blues, this subspecies has drab gray buff upper wings, with light blue markings.

Monarch Butterfly (*Danaus plexippus*)
The monarch butterfly is not listed under the Federal or California endangered species acts. However, CDFG and local municipalities occasionally require protection of monarch overwintering sites. Most monarch butterflies west of the Rocky Mountains overwinter along the southern coast of California. Overwintering sites are typically stands of Monterey cypress (*Cupressus macrocarpa*), Monterey pine (*Pinus radiata*), Torrey pines (*Pinus torreyana*), or gum trees (*Eucalyptus* spp.), that provide suitable microclimate conditions (such as humidity and temperature) as well as some shelter from weather (Frey and Schaffner 2004, Leong et al. 2004). Monarchs typically form overwintering aggregations in November, and mate and disperse in February and March.

Smith's Blue (*Euphilotes enoptes smithi*)
A typical blue, this subspecies was federally listed as endangered on 1 June 1976 (FR 41:22044). Smith's blue occurs in the fog belt of coastal Monterey County, as far south as Point Gorda, inhabiting coastal scrub and grassland on dunes and serpentine soils, particularly adjacent to cliffs, steep slopes and road cuts (Arnold 1977, 1983, New 1993). Individuals tend to stay on or near host plants, which are various species of buckwheat (*Eriogonum* sp.), with the males actively searching for the females (Arnold 1977, 1983, New 1993). The adults are active for approximately a week during the flowering period of the buckwheat, from mid-June to early August (Arnold 1977, 1983). This species is univoltine (Arnold 1977) and is not known from San Luis Obispo County, although habitat that could potentially support it does occur in that county.

San Emigdio Blue (*Plebeius emigdionis*)
The San Emigdio blue is a California Species of Special Concern. An inland species from the Mojave Desert and the San Joaquin Valley, the San Emigdio blue is not known from San Luis Obispo County (Emmel 1998). This species occurs in desert washes and arroyos in Chenopod scrub habitat, with its host plant shadscale (*Atriplex confertifolia*), where it has at least three generations per year (Grinnell 1905, Emmel and Emmel 1973, Garth and Tilden 1986).

Clemence's Unsilvered Fritillary (*Speyeria adiaste clemencei*)
Clemence's unsilvered fritillary is a California Species of Special Concern. Clemence's unsilvered fritillary is the most widespread subspecies of unsilvered fritillary, ranging through the Coast Range from Monterey County to San Luis Obispo County (Emmel and Emmel 1973). This subspecies is found in clearings in oak woodlands and chaparral in hills and mountains, where the host plants (*Viola* sp.) occur (Emmel and Emmel 1973, Garth and Tilden 1986).

4.1.3 Survey Methods

The Morro shoulderband snail surveys were conducted in accordance with USFWS guidelines by invertebrate ecologist D. Christopher Rogers, under Section 10(A) 1(a) permit PRT-796284. On May 13, 2005, Dr. Rogers notified the Ventura Field Office of USFWS that surveys would be conducted at the NRSA. The surveys were conducted on May 16 and 17, July 12 and 13, August 10, and September 9 and 23, 2005 during or after rains or summer fog events. Dr. Rogers walked the entire site and recorded all pertinent vegetation and existing conditions pertaining to the target invertebrate taxa.

Butterfly surveys (for those species identified above) were conducted concurrent with Morro shoulderband snail surveys. Surveys focused in and around suitable habitat for each of the target butterfly taxa. Butterflies were first visually examined without capture to determine whether they were the federally endangered Smith's blue. Those identified as non-Smith's blue butterflies were either captured with a sweep net, or visually examined without capture for further identification.

4.1.4 Survey Results

The only special status invertebrate species observed during the surveys was the monarch butterfly, which was observed on two occasions (May 17 and July 13) at the northern end of the NRSA between Coon Creek and the care-takers house. Similar results and observations were made in the BioSystems (1995) report (see PEB, Vol. 2: Folder 5).

Potential overwintering sites for monarch butterflies occur associated with a grove of Monterey pine surrounding the caretaker's house at the north end of the NRSA. Other suitable groves may occur outside the NRSA in the Irish Hills (see Figure 3.1-2).

No habitat was present for the San Emigdio blue or the unsilvered fritillary. Common butterfly taxa that were observed include: buckeye (*Junonia coenia*), painted lady

(*Vanessa cardui*), California sister (*Adelpha bredowii californica*), alfalfa butterfly or orange sulphur (*Colias eurtheme*), common white (*Pontia protodice*), and cabbage white (*Artogeia rapae*).

No potential habitat for the Morro shoulderband snail was found in the NRSA. The substrates observed were entirely clay with a large proportion of shale, while typical habitat for the Morro shoulderband snail is flandrian and preflandrian type I and type II dunes. The Morro shoulderband snail has been reported from Point Buchon at the northern end of the NRSA. This is the southernmost recorded locality for the snail; however, no dune habitat occurs there. Instead, the site has a large rock outcropping. The habitat is more typical of the closely allied Chorro shoulderband snail (*Helminthoglypta morroensis*). In 2005 the site supported some mostly dead California sage and coyote brush, all overgrown with dense vetch (*Vicia* sp.), Italian rye grass (*Lolium multiflorum*), slender wild oats (*Avena barbata*), and bindweed (*Convolvulus arvensis*).

Only two terrestrial mollusk species were encountered during the surveys. The non-native invasive slug (*Deroceras reticulates*) was found in holes in the road cut (Pecho Valley Road) near the south end, and along Coon Creek as well as near the caretaker's house at the north end of the NRSA. The native Big Sur shoulderband snail (*Helminthoglypta umbilicata*) was observed in leaf litter along Coon Creek.

Potential habitat for the Smith's blue butterfly and Morro blue butterfly occurs along the deeply incised channel that runs transversely across the middle of the site (Big Wash), and on the slope just north of the stock tank at that location; both sites are west of the main road. As noted above, Smith's blue is not known from San Luis Obispo County. Neither species was observed, but the lupine blue (*Icaricia lupini*) and the western pygmy blue (*Brephidium exile*) were abundant. The lupine blue butterflies were extremely common among the buckwheat and lupines, and the pygmy blue butterflies were observed scattered throughout the NRSA.

4.2 Amphibians and Reptiles

4.2.1 Study Sites

The NRSA includes few freshwater aquatic habitats for amphibian surveys. The two main water bodies are Coon Creek and Tom's Pond. Coon Creek is a perennial small-sized creek located at the northern part of the NRSA (see Figure 4.2-1). The reach of Coon Creek within the NRSA is approximately 1,500 feet in length. Common riparian species along the creek include arroyo willow (*Salix lasiolepis*) and yellow willow (*Salix lasiandra*). Tom's Pond is a deep, 0.15-acre perennial pond with dense emergent vegetation along the shoreline.

The NRSA includes small localized areas of sandy or very friable soil that could be used by fossorial reptiles. The most suitable sandy area is located at the mouth of Coon Creek; potential silvery legless lizard habitat. Colluvial deposits west of the Pecho Valley Road

at Big Wash provide friable soil conditions; potential habitat for coast horned lizard (Figures 4.2-1 and 4.2-2).

4.2.2 Species Accounts

California Red-Legged Frog (*Rana draytonii*)

The California red-legged frog is a federally-listed threatened species, and a California Species of Special Concern (CDFG 2005b). Historically, California red-legged frog populations were found from Shasta County to Baja California, Mexico, along both the Coast Ranges and the west slope of the Sierra Nevada at elevations generally below 1,500 meters (Jennings and Hayes 1994). The current range is greatly reduced, with a few highly restricted populations in the Sierra Nevada and most remaining populations occurring along the coast from Marin County to Ventura County.

California red-legged frogs occur primarily in perennial ponds or pools and perennial or intermittent streams where water persists long enough for breeding and development of young. Habitats with the highest densities of frogs contain dense emergent or shoreline riparian vegetation closely associated with shallow to deep (>0.5 m) still or slow-moving water (Jennings and Hayes 1994). The types of riparian and emergent vegetation that seem to be most structurally suitable are willows (*Salix* spp.), cattails (*Typha* spp.), and bulrushes (*Scirpus* spp.). Another key habitat indicator for California red-legged frogs is the absence or near-absence of introduced predators such as bullfrogs (*Rana catesbeiana*) and predatory fish, particularly centrarchid fishes (i.e., fish in the Centrarchidae family, such as sunfish and bass), which may feed on the larvae more frequently than naturally co-evolved predatory species (Jennings and Hayes 1994). Emergent vegetation, undercut banks, and semi-submerged rootballs afford shelter from these predators (USFWS 1997).

California red-legged frogs lay their eggs from late November to late April in ponds or in backwater pools of creeks, attaching them to emergent vegetation such as cattails and bulrushes. Larvae remain in these aquatic habitats until metamorphosis occurs. Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. The California red-legged frog may disperse upstream, downstream, or upslope of their breeding habitat to forage and seek sheltering habitat. They may take shelter in small mammal burrows and other refugia 100 feet or more from the water any time of the year (Jennings and Hayes 1994). During wet periods, California red-legged frogs can move long distances between aquatic habitats, traversing upland habitats or ephemeral drainages up to a mile from the nearest known frog populations. Seeps and springs in

Figure 4.2-1. Amphibian and reptile survey locations in the NRSA (northern section).

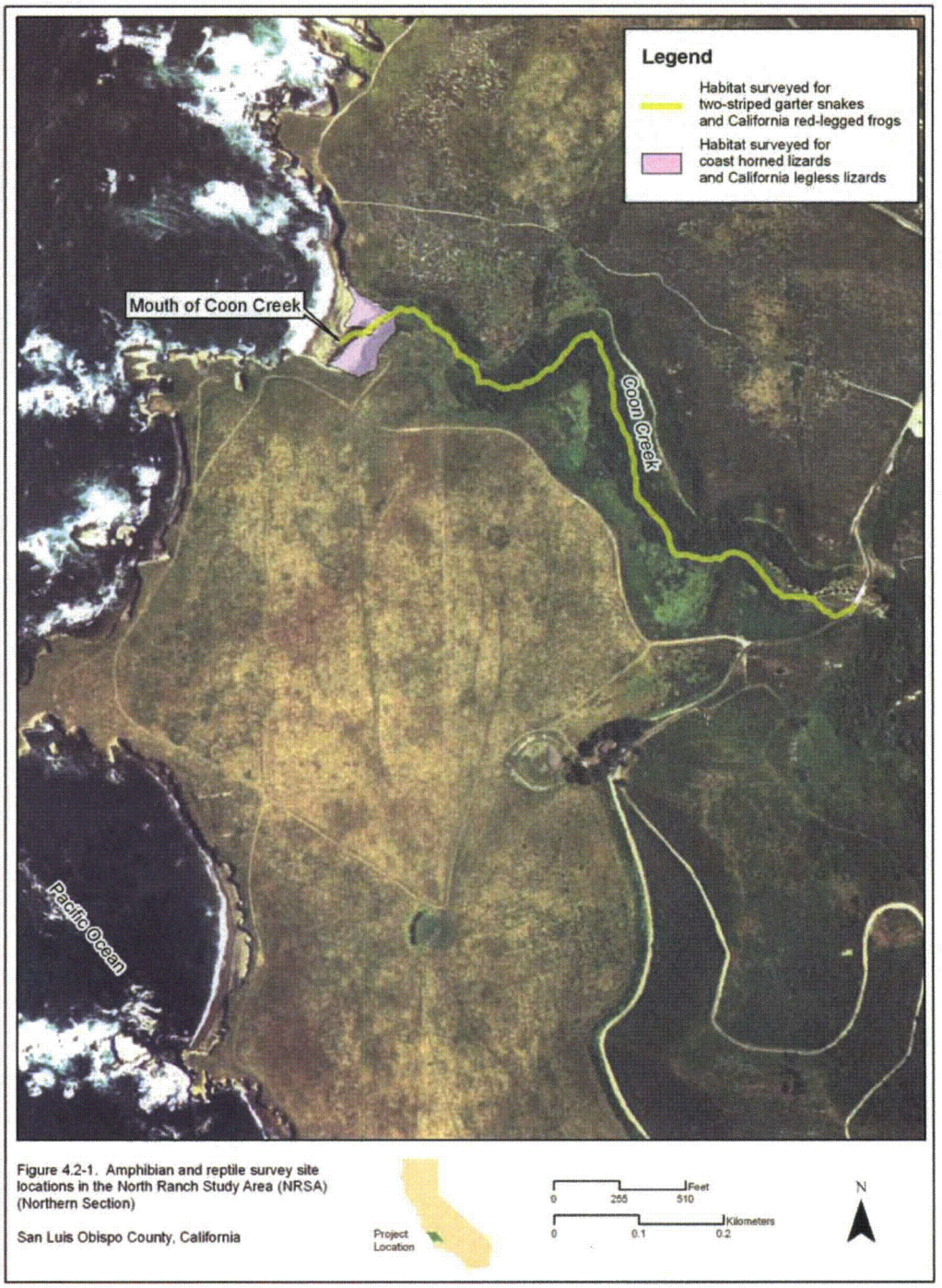


Figure 4.2-2. Amphibian and reptile survey locations in the NRSA (southern section).

open grasslands can function as foraging habitat or refugia for wandering frogs (Jennings and Hayes 1994).

Multiple factors may be responsible for the decline of California red-legged frog populations. While habitat destruction from urbanization is a primary cause, other factors such as increased exposure to ultraviolet (UV-B) radiation, wind-borne agrochemicals, diseases, and introduced species (e.g., bullfrog, sunfish, mosquitofish) could contribute to their decline (Davidson et al. 2001).

California Legless Lizards (*Anniella pulchra* spp.)

The silvery legless lizard (*A. pulchra pulchra*), a subspecies of California legless lizard, is a California Species of Special Concern (CDFG 2005b). Its range extends from Contra Costa County, California to Baja California. Populations of silvery legless lizards are known to occur in the coastal dunes of San Luis Obispo County north and south of the NRSA (Hunt 1983). Legless lizards are fossorial reptiles that live in burrows constructed in loose soil with a high percentage of sand. They inhabit areas with sparse vegetation, such as beaches, chaparral, or pine-oak woodland. They are mostly diurnal with peak activity during morning and evening. Legless lizards feed primarily on larval insects, adult beetles, termites, and spiders. They appear to breed between early spring and July. Main threats to the legless lizard include habitat alteration and destruction.

There are two subspecies of California legless lizard, including the black legless lizard (*Anniella pulchra nigra*) and the silvery legless lizard. Although the CNDDB (CDFG 2005a) has records of black legless lizard in the vicinity of the NRSA, it is likely that those sightings were of silvery legless lizards. Black legless lizards are not known to occur south of Carmel (Hunt 2005, Collins 2005).

Coast Horned Lizards (*Phrynosoma coronatum* spp.)

The coast horned lizard occurs along the Pacific coast of California, and southward across the peninsula of Baja California in Mexico. Coast horned lizards occupy a variety of habitats including chaparral, oak woodland, and coniferous forest from sea level to 2,000 meters. The coast horned lizard is usually active between April and October. During periods of inactivity they find refuge in small mammal burrows or burrow themselves into loose soils under surface objects. Their prey consists mostly of beetles and ants. Habitat destruction and the introduction of aggressive exotic ants have resulted in the decline of the coast horned lizard.

There are two subspecies of coast horned lizard, including San Diego horned lizard (*Phrynosoma coronatum blainvillii*) and the California horned lizard (*Phrynosoma coronatum frontale*). Both species are California Species of Special Concern. The subspecies with potential to occur on the NRSA is the California horned lizard.

Two-Striped Garter Snake (*Thamnophis hammondii*)
The two-striped garter snake is a California Species of Special Concern (CDFG 2005b). It occurs through the south coast and peninsular ranges west of the San Joaquin Valley and desert from Monterey County, California south to Baja California, Mexico. The two-striped garter snake inhabits streams, rivers, and ponds. This garter snake is a highly aquatic species. Neonates are usually observed between August and November. Juveniles and adults prey on fish and larvae of amphibian species. The two-striped garter snake has disappeared from approximately 40 percent of its range in California. Threats to the two–striped garter snake include habitat modification and loss of the prey food base.

Western Pond Turtles (*Emys marmorata* spp.)
The western pond turtle is a California Species of Special Concern (CDFG 2005b). There are two subspecies, the northwestern pond turtle (*Emys marmorata marmorata*) and the southwestern pond turtle (*Emys marmorata pallida*); both are Federal species of concern (CDFG 2005b). The subspecies with potential to occur in the NRSA is the southwestern pond turtle.

The western pond turtle occurs from sea level to approximately 1,800 meters from British Columbia south to northwestern Baja California, principally west of the Sierra-Cascade Crest. Pond turtle habitat includes slow-moving or stagnant aquatic habitat that forms pools at least one meter deep and one meter in diameter. Pond turtles are uncommon in high gradient streams (Holland 1991). An important habitat feature for turtles is suitable aquatic basking sites, such as mats of emergent or aquatic vegetation, exposed logs, rocks, or mud banks. Hatchlings and juveniles require shallow water habitat with relatively dense submergent or short emergent vegetation in which to forage. Populations also require adjacent suitable upland habitat for overwintering and nesting. Suitable oviposition (egg-laying) sites appear to share the following features: exposed, south-facing slopes, open scrub or open grassland vegetation, and dense soils, which apparently provide the high temperature and low water potential required for successful egg development (Holland 1991, Rathbun et al. 1992). Slopes up to 60 degrees have been used for nesting, but most nests have been found on slopes of less than 25 degrees.

Mating typically occurs in April or May. Females migrate from the aquatic site to an upland location as far as 500 meters from the aquatic site, however most nesting occurs within 200 meters of the aquatic site (Holland 1991, Rathbun et al. 1992). Movements away from water can be common (Holland 1991). Furthermore, movements within a stream course are highly variable and can exceed 2.5 km (Holland 1991). Females may lay more than one clutch in a year (Rathbun et al. 1992), and most egg-laying occurs during May and June. Incubation lasts about 100 days and hatchlings usually overwinter in the nest. Most hatchlings move to aquatic habitats in the spring, where they feed on zooplankton. Growth in hatchling and juvenile turtles can be rapid, however reproductive maturity normally does not occur until turtles are between seven and 11

years old (Holland 1991). This species is long-lived, with a large proportion of adults in a healthy population being 20 or more years old.

The western pond turtle has experienced population declines throughout most of its geographical range (Holland 1991, Jennings and Hayes 1994, Germano and Bury 2000). This species has suffered from habitat destruction or fragmentation and other human population growth impacts.

4.2.3 Survey Methods

Several information sources on California red-legged frog, silvery legless lizard, coast horned lizards, two-striped garter snake, and western pond turtle were reviewed, including the CNDDB (CDFG 2005a), *A Field Guide to Western Reptiles and Amphibians* (Stebbins 2003), and other studies on California amphibians (Jennings and Hayes 1994, Hayes and Jennings 1986). Additionally, museum collection databases from the California Academy of Sciences were consulted for voucher specimens collected in San Luis Obispo County. These surveys were conducted by Consulting herpetologist, Pierre Fidenci, with assistance from PG&E senior biologist Sally Krenn

California Red-Legged Frog Protocol Surveys

Protocol surveys for California red-legged frog (*Rana draytonii*) were conducted along Coon Creek and at Tom's Pond. The survey methodology for this project followed protocol guidelines established by the USFWS (1997). Two daytime and two nighttime surveys were performed along Coon Creek from the bridge to the mouth of the creek, and at Tom's Pond (see Figures 4.2-1 and 4.2-2).

Daytime surveys were conducted using binoculars to scan for frogs, and by slowly walking in the water or on adjacent banks to search for larvae and adults. The entire shore of the creek was visually scanned via pedestrian surveys.

Night surveys were conducted using binoculars and a 6-volt light. A combination of visual (eyeshine detection) and auditory methods were used to detect frogs. In cases where no view was available, the vegetation was parted to uncover hidden pools. Extreme care was used while walking to avoid disturbing sediment, vegetation, and potential amphibian larvae. Daytime surveys were conducted on July 25 and 27, 2005 between 12:45 and 18:35. Nighttime surveys were conducted on July 25 and 27, 2005 between 20:30 and 22:50.

Weather conditions (air temperature and wind speed), and water temperature at 5-cm depth were recorded. Fish presence was also recorded because of their potential indirect or direct impacts on California red-legged frog populations.

To reduce the spread of disease agents and parasites between study sites, the field crew followed the Code of Practice, as prepared by the Declining Amphibian Populations Task Force (DAPTF 1998). After surveying each site, field equipment, such as boots, was

rinsed with sterilized water and then scrubbed with 70 percent ethanol solution and rinsed clean with sterilized water.

Legless Lizard and Coast Horned Lizard Surveys
Legless lizard and coast horned lizard surveys were conducted on July 26 and September 27, 2005 at the mouth of Coon Creek and Big Wash (see Figure 4.2-1 and 4.2-2). Surveys for those species consisted of daytime visual searches in areas with sandy soils, carefully sifting through the soil and shrub leaf litter by hand and checking under shrubs and fallen objects. Weather conditions (air temperature at ground level and wind speed) were recorded.

Two-Striped Garter Snake Surveys
Two-striped garter snake surveys were conducted concurrently with the daytime surveys for California red-legged frog. Surveys occurred on July 25 and 27, 2005 along Coon Creek from the bridge over Pecho Crek to the mouth, and at Tom's Pond in the NRSA (see Figure 4.2-1 and 4.2-2). Surveys consisted of slowly walking along the creek while searching for basking or foraging garter snakes. The dry banks of the creek were also searched for garter snakes, including common species.

Western Pond Turtle Surveys
Western pond turtle surveys were conducted at Tom's Pond concurrently with the daytime surveys for California red-legged frog. Surveys occurred on July 25 and 27, 2005. The survey technique consisted of scanning for basking turtles and then slowly walking along the shoreline while visually searching for turtles in water. Scanning with binoculars occurred at least 10 meters distant from any basking sites.

4.2.4 Survey Results

California Red-Legged Frog
No previous occurrences of California red-legged frogs have been documented in the project vicinity (CDFG 2005a, BioSystems 1995), and no California red-legged frogs were observed during the protocol survey visits in 2005. Weather conditions were favorable for conducting California red-legged frog protocol surveys. During daytime surveys, air temperatures ranged from 18°C to 21°C; water temperatures at 5-cm depth ranged from 14.5°C to 26°C, with winds from 0 to 15 mph. During nighttime surveys, air temperatures ranged from 17°C to 18°C; water temperatures at 5-cm depth ranged from 14°C to 25°C, with winds from 0 to 15 mph. No rain occurred during or between the surveys.

In general, Coon Creak provides low potential for California red-legged frog presence. The creek within the NRSA is small (4-6 m wide, 0.1 to 1.2 m deep) and lacks natural suitable pools that could be used by California red-legged frogs for breeding, foraging, and refuge. The mouth of Coon Creek is probably the most suitable section since it has a large natural pool of about 0.5 meter depth. The recent creation of pools for steelhead has significantly increased the habitat suitability for the California red-legged frog.

Those pools are relatively large and deep providing suitable habitat for California red-legged frog. Due to the original characteristics of Coon Creek, it is unlikely that the California red-legged frog was previously found along its lower section where the NRSA occurs. Thus, although some of the NRSA currently contains good habitat for this species, red-legged frogs would likely need to colonize from other occupied habitats.

Tom's Pond provides potential habitat for the California red-legged frog. However, the presence of predatory fish such as mosquito fish (*Gambusia affinis*) reduces the opportunity for successful breeding. This artificial pond is isolated from any nearby suitable aquatic habitats. Further, no California red-legged frog populations are found within 1.6 km (one mile), which reduces the chance of successful natural colonization of Tom's Pond. Therefore, it is very unlikely that the California red-legged frog will occur there in the future.

Silvery Legless Lizard and California Horned Lizard

No silvery legless lizards or California horned lizards were observed during surveys. Populations of legless lizards occur in the coastal dunes of San Luis Obispo north and south of the NRSA (Hunt 1983). Tolman (BioSystems 1995) reported legless lizards at the mouth of Coon Creek in the late eighties. Since then however, no reliable confirmation of this occurrence has been made.

Weather conditions were favorable for conducting silvery legless lizard and California horned lizard surveys. Air temperatures at the ground level ranged from 22°C to 27°C, with winds from 0 to 15 mph. No rain occurred during or between the surveys.

Two-Striped Garter Snake

No two-striped garter snakes were observed during surveys along Coon Creek or at Tom's Pond. Weather conditions were favorable for conducting two-striped garter snake surveys. Coon Creek provides suitable habitat, including potential prey items such as treefrogs. Two-striped garter snakes could occur in Coon Creek and at Tom's Pond due to habitat suitability, but were not detected during the surveys because of low density. Furthermore, two-striped garter snakes could be present in the upper section of Coon Creek (upstream of the bridge) where surveys were not conducted.

Western Pond Turtle

No southwestern pond turtles were observed during surveys along Coon Creek or at Tom's Pond. Coon Creek generally does not provide potential habitat for southwestern pond turtles. The creek lacks large pools and sunny basking sites. Tom's Pond offers good suitable aquatic habitat including wind-protected shorelines. Emergent roots and dry cattails provide potential basking sites for all life stages. Upland habitat is mostly characterized by grassland, in which potential nesting sites are located in open, flat and sunny areas that would allow eggs to incubate successfully. However, it is very likely that southwestern pond turtles are absent from the NRSA. No southwestern pond turtle populations are known to occur within five kilometers of the NRSA. The steep terrain

and lack of nearby populations make natural colonization of Tom's Pond by this species in the future unlikely.

Common Herpetofauna Species

Several common amphibian and aquatic reptile species were detected during the surveys. Pacific treefrog (*Hyla = Pseudacris regilla*), western fence lizard (*Sceloporus occidentalis*), western rattlesnake (*Crotalus viridis*), racer (*Coluber constrictor*), and gopher snake (*Pituophis catenifer*) were observed along Coon Creek. The Pacific treefrog and western toad (*Bufo boreas*) were observed at Tom's Pond. The western fence lizard was observed along Big Wash.

4.3 Birds

4.3.1 Study Sites

Riparian bird surveys, emphasizing least Bell's vireo (LBVI) (*Vireo bellii pusillus*) and willow flycatcher (WIFL) (*Empidonax traillii extimus*), were conducted between April 22 and July 28, 2005 on the reach of Coon Creek located within the NRSA to assess its suitability as breeding habitat for special-status bird species. Specifically, the reach of Coon Creek surveyed extended from the Pecho Valley Road bridge to the mouth of Coon Creek. Stands of cattails along Coon Creek, especially at the mouth, were searched for tricolored blackbirds (*Agelaius tricolor*) during each survey. This species was also searched for at Tom's Pond during surveys for amphibians and aquatic reptiles. The western snowy plover (*Charadrius alexandrinus nivosus*), a Federal threatened species, was also surveyed in the section of sandy beach habitat at the mouth of Coon Creek. Surveys were also conducted for a variety of sensitive raptors (birds of prey) throughout the NRSA.

Incidental observations of the western grasshopper sparrow (*Ammodramus savannarum perpallidus*) and California horned lark (*Eremophila alpestris actia*) in 2005 suggested breeding populations of both species in upland habitats of the NRSA. Areas of suitable nesting habitat occur over approximately 85% of the NRSA in grassland areas. As a follow-up to the 2005 observations of horned lark and grasshopper sparrow, upland bird surveys were conducted in the spring and summer of 2006 to ascertain breeding status of these species. One survey each was conducted in April, May, and June. Surveys for upland birds took place throughout the upland habitats in the NRSA with an emphasis on grassland areas. During the upland bird surveys, the biologists also searched for possible nest sites of western burrowing owl (*Athene cunicularia hypugea*).

4.3.2 Sensitive Species Accounts

Cooper's Hawk (*Accipiter cooperi*)

The Cooper's hawk (COHA) is a California Species of Special Concern (CDFG 2005b). The species is widespread in suitable habitats of the United States and Central America, including deciduous woodlands and riparian areas. The COHA was once considered a common nesting species throughout California (Grinnell and Miller 1944) but

extirpations and declines in California breeding populations were noted in the 1950s and 1960s (Remsen 1978). In San Luis Obispo County, the COHA is uncommon during migration periods and winter, but is considered rare during the nesting season (Edell 1996).

Peregrine Falcon (*Falco peregrinus*)
The peregrine falcon is a state listed endangered bird and was delisted by the USFWS in 1999. The range of this species includes the coast of southern and central California. Typically peregrine falcons nest on ledges of large cliff faces. In some areas, there is substantial site tenacity; peregrines often re-use the same nest site for many years. Nesting and wintering habitats are varied, but are known to include wetlands, woodlands, forested habitats, cities, agricultural areas and coastal habitats. Pergrines have successfully nested on an off-shore rock near the DCPP for many years, as documented in the PEB.

Western Burrowing Owl (*Athene cunicularia hypugea*)
The western burrowing owl is a California and federal Species of Special Concern. This species is found year-round in open grasslands, deserts, agricultural areas, and scrublands with low growing vegetation. Suitable habitat may also include trees and shrubs if canopy cover is less than 30 percent. Burrowing owls typically nest in old burrows of ground squirrels and other fossorial mammals; they may also dig their own burrows in soft soils or nest in man-made structures such as small culverts, abandoned pipes, or debris piles.

The burrowing owl predominately eats insects and small mammals. Conversion of suitable habitat to intensive agricultural uses and eradication of ground squirrel colonies, a source of nesting burrows, have been the primary reasons for the decline of the western burrowing owl (Anderson and England 1987). Burrowing owls have been reported in grassland areas north and south of the DCPP, but nesting by this species has not been confirmed (personal communication, LSC). This species was documented just south of the NRSA (near Crowbar Peak) and in the Pea Field paddocks at the northern end of the NRSA during comprehensive surveys of sensitive species and habitats performed by PG&E in the early 1990s (BioSystems Analysis 1995).

Willow Flycatcher (*Empidonax traillii* ssp.)
All subspecies of willow flycatcher (WIFL) were granted state endangered status in California in 1991. The southwestern willow flycatcher (SWFL) received Federal endangered status in 1995 (Finch and Stoleson 2000). The WIFL was formerly a common summer resident throughout California in suitable habitat, primarily riparian willow thickets (Grinnell and Miller 1944). Loss and degradation of riparian habitat is cited as the principal reason for declines in all California subspecies, but brood parasitism by the brown-headed cowbird (*Molothrus ater)* may also play a role. The species has been virtually eliminated as a breeder from most of its former range in California with only small, scattered populations remaining in the Sierra Nevada and along the Kern,

Santa Margarita, San Luis Rey, and Santa Ynez rivers in southern California (Remsen 1978). The Santa Ynez River in Santa Barbara County is the northern limit for known coastal populations of SWFL. The survey area is thus north of the known breeding range for this species by approximately 65 miles.

California Horned Lark (*Eremophila alpestris actia*)
The California horned lark (HOLA), is a resident species of the coastal ranges and San Joaquin Valley south to Baja California, Mexico. Breeding Bird Survey (BBS) data indicate widespread population declines in HOLA throughout their range, beginning in the 1960s. The HOLA is a California Species of Special Concern, and, therefore, it is important to document observations of confirmed or probable breeding individuals or populations where they occur. The HOLA prefers open habitats, especially sparsely vegetated grassland, prairies, deserts and agricultural land. This species was documented within the NRSA during comprehensive surveys of sensitive species and habitats performed by PG&E in the early 1990s (BioSystems Analysis 1995).

Least Bell's Vireo (*Vireo bellii pusillus*)
The least Bell's vireo (LBVI) is a federal and state endangered species (CDFG 2005b, USFWS 2000). LBVI is a summer resident of cottonwood-willow forest, oak woodland, shrubby thickets, and dry, desert washes with willow thickets at the edges. Formerly, LBVI was known to breed from interior northern California south through the Sacramento and San Joaquin valleys and Sierra Nevada foothills and in the coastal ranges from Santa Clara County south into Baja California. The bird also nested historically in the Owens and Death valleys in Inyo County and at scattered oases and canyons throughout the Mojave Desert (Grinnell and Miller 1944). Habitat loss and degradation coupled with impacts of brood parasitism by the brown-headed cowbird have resulted in contraction of the former range of the LBVI and decreases in local population size (Brown 1993, Goldwasser et al. 1980). Currently, the breeding range of the LBVI is limited to Baja California, Mexico and southern California, where large populations remain in Riverside and San Diego counties. Smaller populations occur in Santa Barbara, Ventura, and San Diego counties. Coon Creek is generally north of the current (but not historic) breeding range for LBVI.

Yellow Warbler (*Dendroica petechia brewsteri*)
The Pacific coast subspecies of yellow warbler (YWAR) is a California Species of Special Concern (CDFG 2005b). The YWAR has an extensive breeding range in the United States; in California, it is chiefly associated with willow riparian habitat (Lowther et al. 1999). The YWAR was historically a common to locally abundant summer resident in riparian areas throughout California (Grinnell and Miller 1944). Loss of riparian habitat has resulted in population declines and extirpations in coastal southern California populations. Susceptibility to brood parasitism by brown-headed cowbirds may also be a factor in population declines in the southwest (Remsen 1978). This species was not documented within the NRSA during comprehensive surveys of sensitive species and

habitat performed by PG&E in the early 1990s, but was found south of the NRSA near the mouth of Diablo Creek (BioSystems Analysis 1995).

Western Grasshopper Sparrow (*Ammodramus savannarum perpallidus*)
Although populations of grasshopper sparrow (GRSP) appear to be stable throughout most of their historical range, the western subspecies, *A. s. perpallidus*, is considered locally rare by USFWS (Victor 2005) and is currently a CDFG Species of Special Concern (CDFG 2005b). It is also on the Audubon Society's Blue List, Partners in Flight's Watch List and is a USFWS Migratory Non-game Birds of Management Concern. As such, it is important to document observations of confirmed or probable breeding individuals/populations where they occur in California. The western GRSP occurs in native and non-native grasslands and prefers moderately open grasslands with bunch grasses and areas of bare ground (Vickery 1996).

Tricolored Blackbird *(Agelaius tricolor)*
The tricolored blackbird is a CDFG Species of Special Concern. Local populations fluctuate from year to year; however, overall this species has been declining. The decrease in population numbers may be due in part to conversion of marshlands which provide nesting habitat. Tricolored blackbirds nest in dense marsh habitat usually comprised of cattails and bulrushes. They are gregarious, colonial nesters with the number of pairs in a breeding location ranging from about 50 to thousands (Small 1994). Foraging normally occurs in nearby agricultural fields. In San Luis Obispo County, this species has an irregular distribution and rate of occurrence (Edell 1996). Similar to occurrence statewide, the number of tricolored blackbirds in the county can vary substantially among years. This species was documented within the NRSA at Coon Creek and at Tom's Pond during comprehensive surveys of sensitive species and habitats performed by PG&E in the early 1990s (BioSystems Analysis 1995).

4.3.3 Survey Methods

Riparian Survey
The riparian vegetation of Coon Creek west of the Coon Creek Bridge was assessed to evaluate habitat "quality" for LBVI and SWFL. Dominant vegetation, canopy height, and percent species cover were recorded. The depth and width of the creek were estimated and recorded for the survey period. Existing impacts to riparian birds including predator presence (sightings, tracks or scat) and human disturbance were recorded during each survey.

Surveys for the two listed riparian bird species (LBVI and WIFL), followed agency approved survey protocols (USFWS 2001, Sogge et al. 1997). During the protocol surveys, other sensitive-status riparian species were also surveyed, including Cooper's hawk and yellow warbler, both California Species of Special Concern (CDFG 2005). Additional description of the methodology is included below.

The survey transect included approximately one kilometer of Coon Creek between the road crossing and the mouth of the creek. Sampling was conducted for presence and any breeding attempts for the WIFL and LBVI. In addition, beach habitat at the mouth of Coon Creek was surveyed for western snowy plover, a federal threatened species. Observations were made at a series of points along Coon Creek (Table 4.3-1).

Protocol surveys using taped playback calls and songs were used to obtain presence data for LBVI and WIFL along lower Coon Creek. A general census of the overall bird community was also conducted with emphasis on determining the abundance and breeding status of birds within or adjacent to the survey transect. Breeding territories (based on the presence of territorial males, pairs, or known nests) were mapped during each survey to clarify breeding status of territorial birds; a list of all birds observed can be found in Appendix C.

Eight surveys were conducted for LBVI between April 23 and July 28, 2005. Surveys were spaced at least 10 days apart as directed by the approved protocol. Six surveys were conducted for WIFL between May 17 and July 28, 2005. One survey for WIFL was conducted during Period 1 (May 15 to 31), one during Period 2 (June 1 to 21), and three during Period 3 (June 22 to July 17) as recommended for project-related surveys (Sogge 2000).

Survey efforts for the two species were combined whenever possible (Table 4.3-2). Surveys were performed between 0530 and 0930. Taped songs and calls were used every 40 meters along the survey transect. Taped vocalizations were played for approximately 20 seconds with 3-minute listening periods between taped broadcasts to allow for birds to approach and respond.

Table 4.3-1. Observation coordinates, Coon Creek riparian bird surveys, 2005.

Point	Northing	Easting
0	10 S 0692129	3903511
1	10 S 0692034	3903515
2	10 S 0692083	3903556
3	10 S 0692014	3903547
6	10 S 0692074	3903537
7	10 S 0692060	3903559
8	10 S 0692038	3903579
9	10 S 0691976	3903596
10	10 S 0691935	3903593
11	10 S 0691919	3903623
11.1	10 S 0691894	3903658
12	10 S 0691870	3903710
12.1	10 S 0691873	3903754
13	10 S 0691861	3903774
14	10 S 0691835	3903826
15	10 S 0691733	3903803
16	10 S 0691710	3903775
17	10 S 0691653	3903793
18	10 S 0691661	3903796
19		
20	10 S 0691556	3903826

Table 4.3-2. Survey dates for willow flycatcher (*Empidonax traillii extimus*) and least Bell's vireo (*Vireo bellii pusillus*) along Coon Creek, 2005.

Visit #	Date	Survey Performed
1	22-Apr-05	site visit
2	23-Apr-05	LBVI (1)
3	3-May-05	LBVI (2)
4	17-May-05	LBVI (3) WIFL (1)
5	7-Jun-05	LBVI (4) WIFL (2) PEFA
6	25-Jun-05	LBVI (5), WIFL (3), PEFA
7	5-Jul-05	LBVI (6), WIFL (4)
8	16-Jul-05	LBVI (7), WIFL (5), SNPL (1)
9	28-Jul-05	LBVI (8), WIFL (6), SNPL (2)

SNPL = western snowy plover
LBVI = least Bell's vireo
WIFL = willow flycatcher
PEFA = peregrine Falcon
Site visit # for a particular species in parenthesis

Breeding territories were mapped based on the presence of singing males, territorial pairs, or nests for each survey period. Behavioral observations for each species in the survey area were summarized and final status determinations made based on cumulative observations (Appendix D). Individuals were confirmed as breeders based on the discovery of an active nest, adults carrying food to a nest location, or the presence of "locals" (recently fledged juveniles) within a known territory.

Upland Survey

Surveys of upland habitats focused on California horned lark (HOLA), western grasshopper sparrow (GRSP), and western burrowing owl; and were conducted on three occasions during 2006. Dates, times, and weather conditions for each survey are included in Table 4.3-3.

Table 4.3-3. Dates, times and weather conditions of surveys for California horned lark, western grasshopper sparrow, and western burrowing owl in upland habitats, 2006.

Visit #	Date/Time	Weather Conditions
1	18-Apr-06	Mostly clear, moderate breeze, temperature ~ 60°F
2	5-May-06	Mostly clear, slight breeze, temperature ~ 70°F
3	2-June-06	Partly cloudy, slight breeze, temperature ~ 65°F

Due to the large size of the upland habitat areas (aproximately 85% of the NRSA), specific survey routes varied with each survey conducted. This was done to: (1) provide survey coverage to all upland habitats during the three surveys; (2) allow biologists to detect birds by sight and sound from north and south of the upland areas (to account for ocean and wind noise); and (3) to assess special-status bird occurrence along potential routes of public access (secondary ranch roads).

On April 18, 2006 (Survey 1), the survey started near the caretaker's house, proceeded west to the bluff road, then south along that road past Tom's Pond to Red Barn Road. Survey 2 on May 5, 2006 started at the southern boundary of the NRSA near Seal Rock, proceeded east to Pecho Valley Road, then north along the road to the vicinity of the caretaker's house. Survey 3 on June 2, 2006 once again started near the caretaker's house, continued south along Pecho Valley Road, then west to the vicinity of Point Buchon, and returned via ranch roads to the caretaker's house.

Weather conditions were good for detecting birds during all three surveys (see Table 4.3-3). Mostly clear skies with no marine layer resulted in good visibility. Wind was limited to low to moderate breezes, which provided good conditions for hearing bird vocalizations.

All surveys were performed by two biologists from a vehicle, making periodic stops along the survey routes. Stops were approximately 1/8 to 1/4-mile apart. At each stop, the biologists exited the vehicle and surveyed for birds by sight and sound for 10 minutes.

All birds detected by direct observation or vocalization were noted. The list of bird species observed is included in Appendix C. Each observation of the three target special-status species was to be recorded via GPS technology. Of these three species, only grasshopper sparrows were observed during the surveys. No HOLAs or burrowing owls were observed. Other data collected with each GRSP observation included date, time, general location, dominant plant species in the vicinity, vegetation height and density, relative degree and aspect of slope, and distance to the nearest ranch road.

4.3.4 Survey Results

Riparian Survey

The only Special Status Species observed during riparian surveys were willow flycatchers (probably *E. t. brewsteri*) and yellow warblers. Yellow warblers nested within the survey area in 2005; all willow flycatcher observations involved transient individuals.

A total of 66 species of birds were observed in or adjacent to riparian habitat along the Coon Creek survey transect between April 23 and July 28, 2005. Nineteen species were confirmed breeders in riparian habitat within the survey area based on detection of nests, adults carrying food into nesting territories, or the presence of "locals" (recently fledged juveniles) in established territories. Confirmed riparian-breeding species in 2005 included 14 resident and five neotropical migrant species. Six additional species nested in habitats adjacent to Coon Creek. All of these, except killdeer (*Charadrius vociferous*) also occurred in riparian habitat. A pair of killdeer nested on the beach north of the creek mouth. At least 12 pairs of red-winged blackbirds nested in bulrushes (*Scirpus* sp.) at the mouth of Coon Creek. Four species, California quail (*Callipepla californica*), California thrasher (*Toxostoma redivivum*), orange-crowned warbler (*Vermivora celata*), and Nuttall's white-crowned sparrow (*Zonotrichia leucophrys nuttallii*) nested in adjacent scrub habitat.

Eight species of birds were probable breeders in riparian habitat of Coon Creek based on the continued presence of a territorial (singing or performing other territorial displays) male, observation of a pair within a known territory, or observation of fledged (independent) young within or near a known territory. These species are downy woodpecker (*Picoides pubescens*), Nuttall's woodpecker (*Picoides nuttallii*), Pacific-slope flycatcher (*Empidonax difficilis*), black phoebe (*Sayornis nigricans*), chestnut-backed chickadee (*Poecile rufescens*), bushtit (*Psaltriparus minimus*), black-headed grosbeak (*Pheucticus melanocephalus*) and house finch (*Carpodacus mexicanus*). One species, the black-headed grosbeak, is a neotropical migrant species. This brings the total of breeding bird species on the survey transect of Coon Creek and adjacent scrub habitat in 2005 to 33 species.

Neotropical migrant birds observed in April and May included two willow flycatchers. There was no evidence that either southwestern willow flycatcher or least Bell's vireo attempted nesting on Coon Creek in 2005. Habitat was not optimal for either species (but this is never conclusive, as individual birds can make unusual habitat choices). Because Coon Creek is generally north of the current breeding range for either species, it is unlikely that either species will occur as a breeder. However, Coon Creek is currently supporting willow flycatchers and several other neotropical migrant species of birds during the migratory period, and conservation of areas and habitats used by birds during their annual migration is an important aspect of species conservation.

Despite the proximity to developed areas (park facilities and campsites), only one non-native bird species, the European starling (*Sturnus vulgaris*), was observed in the survey area or adjacent coastal bluff, beaches or chaparral. There was no evidence that this species was breeding in or near the western reach of Coon Creek. The single observation involved a number of individuals perched on the fence at the northern limit of the property.

American crow (*Corvus brachyrhynchos*) and western scrub-jay are both native "human commensal" species of birds with documented deleterious effects on other breeding bird species. There was no evidence that American crow was breeding near the western reach of Coon Creek. One or two pairs of western scrub-jay did nest in the survey area in 2005.

Western Snowy Plover

The Pacific Coast population of western snowy plover (SNPL) was granted Federal threatened status in 1993. This population breeds primarily on coastal beaches from southern Washington to southern Baja California, Mexico. Among the comments PG&E received on the PEB, was a specific request from the DTF that this species be surveyed at the mouth of Coon Creek. Sandy beach habitat at the mouth of Coon Creek was checked for evidence of habitat use or nesting by SNPL. No SNPL were observed at the mouth of Coon Creek or on the stretch of sandy beach to the north on Montana de Oro property during these surveys.

On July 16 the beach at the mouth of Coon Creek was assessed for suitability as nesting habitat for western snowy plover. North of Coon Creek, the beach is shallow and therefore regularly inundated by high tides and unsuitable for nesting SNPL. There is habitat at the creek mouth that is above the high tide mark and a pair of killdeer (a related species with similar habitat affinities but greater tolerance of human presence) did nest there in 2005. Although it is possible that SNPL could use this area, it is unlikely because the area of potential nesting habitat is less than two hectares and although the substrate is primarily sand (65 percent) there is also extensive coverage by coarse gravel/cobble (0.5 to 5.0 cm diameter, average size approximately 1.5 cm in diameter). The beach area also has extensive wrack debris at low tide, consisting of bull kelp (*Nereocystis luetkeana*) and red algae.

The mouth of Coon Creek would be a difficult area for newly-fledged SNPL as the wave action is stronger here than in typical SNPL nesting areas (often at the mouth of rivers) and there is no access (except by flight) to adjacent beaches with more extensive foraging area. Furthermore, it is apparent that humans can (and do) occasionally trespass to access this beach; the survey crew discovered a lean-to structure built of giant reed (*Arundo donax)* sticks and empty beer bottles were present on the site.

Cooper's Hawk

There were no observations of COHA in the NRSA during surveys conducted between April 21 and July 31, 2005. This species is considered to be rare in San Luis Obispo County during the nesting season and uncommon during winter and migration periods (Edell 1996). It is known to breed in the county. Despite the lack of sightings during the 2005 riparian surveys, there is potential for Cooper's hawks to nest on a rare to uncommon basis along Coon Creek in the NRSA. This species was documented within the NRSA and adjacent areas during the comprehensive surveys performed in the early 1990s (BioSystems Analysis 1995).

Peregrine Falcon

A new peregrine nest territory was discovered by marine biology consultants performing field work for PG&E during the early stages of survey work in 2005. PG&E responded by creating a 350 meter buffer around the nest site and restricting access to help prevent unnecessary disturbance until the young falcons had fledged in early July. One or possibly two young are believed to have successfully fledged from the nest site in 2005.

Figure 4.3-1. Peregrine falcon eyrie location.

Photo by Jim Strampe, Tenera Environmental, San Luis Obispo, California.

Two official attempts (June 7 and 25, 2005) were made to observe this eyrie, located between Disney Point and Point Buchon. Observations of adult birds were made during both visits. During the first visit, one adult displayed territorial behavior and actively defended an area ½-mile from the eyrie. On the following visit neither adult exhibited territorial behavior, nor were any nestlings or juveniles observed.

Unofficial observations were made by both the invertebrate and marine biologists on multiple occasions. Two adult birds were observed and possibly one juvenile in May of 2005.

Willow Flycatcher
Two WIFLs were detected on Coon Creek during the spring migration period on April 23, 2005. The timing of these observations suggests that the birds were transient *E. t. brewsteri,* as the SWFL does not typically arrive in southern California until late May (Lehman 1994). There were no further detections of WIFL during protocol surveys, and no past records of this species occur from the NRSA or elsewhere on the Diablo lands.

Least Bell's Vireo
There were no observations of this species in the NRSA during surveys conducted between April 22 and July 28, 2005. Coon Creek is north of the current range of least Bell's vireo, but it is within historic range. The riparian habitat has elements of suitable nesting habitat for this species, but it is not considered to optimal habitat. The riparian zone contains dense vegetation below 10 feet in height as well as taller trees; however the extent of such habitat is limited. The riparian zone is relative narrow. It is unlikely that least Bell's vireos nest along the Coon Creek riparian zone or elsewhere in the NRSA.

Yellow Warbler
Yellow warblers were detected during surveys on April 23, May 3, May 17, June 7 and 25, and July 5 and 16. There were as many as six singing males (May 23) and up to eight individuals detected per survey during the migration period (April to May). There was one confirmed breeding record in the survey area in 2005; on June 5, a fledgling was observed with adults. An additional three pairs of yellow warblers were probable breeders on Coon Creek based on continued presence of territorial males and occasional observations of females during the survey period.

Upland Survey
Fifty-one bird species were observed during the upland bird surveys in 2006 (Appendix C). A number of species were observed at the margins with other habitats, such as riparian and near-shore.

Of the three target special-status upland species, only the grasshopper sparrow was detected during planned surveys. Twelve GRSP were observed during the survey (Table 4.3-5). The 12 sightings included two pairs and eight individual birds. The distribution of sightings among the three survey dates (five in April, four in May, three in June)

supported the incidental sightings and preliminary conclusion from 2005 surveys that a breeding population occurs in the NRSA.

Western Grasshopper Sparrow

During the initial site visit (April 22, 2005) and on two other dates (June 7 and 25) when peregrine falcon nest monitoring was conducted in grassland sections of the NRSA, GRSP were observed in coastal grassland habitat. Intensive surveys were not conducted for this species in 2005 on the coastal bluff and therefore no population size estimates or documentation of confirmed breeding for GRSP is available. However, singing males were detected on the three dates listed above. The observations were made at several localities along the coastal bluff of the NRSA, suggesting that there is a breeding population of GRSP in the area.

During three upland bird surveys in 2006, 12 GRSP were observed. Pairs were observed on two dates (April 18 and May 5). The other eight GRSP sightings were of individual birds. The observations were at different locations within the upland portion of the NRSA. Several were along a secondary ranch road near the corrals at the south end of the NRSA, while others were sighted from the bluff road beginning in the vicinity of Tom's Pond and then north to Disney Point. Based on qualitative vegetation analyses at the sighting locations, it appears that GRSP are using areas with relatively moderate ground cover. Although the vegetative cover was not dense, it was moderately tall with vegetation heights generally six to 18 inches. The species composition was dominated by annual grasses, but most observation sites also contained lesser amounts of shrub cover as well. Much of the upland portion of the NRSA contains this combination of grass and shrub cover up to 18 inches in height, and as such, is potential nesting habitat for this species.

Table 4.3-4. Grasshopper sparrow observations during the April 18, May 5, and June 2, 2006 upland bird surveys, NRSA.

Date	# of Individuals in Observation	General Location
18-Apr-06	1 individual	To be added
18-Apr-06	1 individual	To be added
18-Apr-06	Pair	Bluff Road south of Tom's Pond
18-Apr-06	1 individual	Near Disney Point
5-May-06	Pair	To be added
5-May-06	1 individual	To be added
5-May-06	1 individual	To be added
2-Jun-06	1 individual	Along Corral Trail
2-Jun-06	1 individual	Along Corral Trail
2-Jun-06	1 individual	Along Corral Trail

Most of the GRSP observations were along the bluff road and at the southern end of the NRSA, near the livestock corrals. All were in vegetation that provided at least moderate

ground coverage. The vegetation type was primarily grassland, some areas with a lesser shrub component. Common plant species were wild oats (*Avena fatua*), brome grasses (*Bromus* spp.), Italian ryegrass (*Lolium multiflorum*), black mustard (*Brassica nigra*), wild radish (*Raphanus sativa*), sticky monkeyflower (*Mimulus aurantiacus*), and coyote brush (*Baccharis pilularis*). Vegetation height was generally six to eight inches, but at some observation locations the vegetation was as low as four inches and as high as 18 inches.

Western Burrowing Owl

No burrowing owls or burrows with evidence of use by this species were observed during bird surveys conducted in 2005. The same was true for upland bird surveys conducted in 2006. During night spotlight surveys for badgers in 2005, PG&E biologists detected three burrowing owls, a single bird was observed on September 26, and two were observed on October 3. Three individuals were also observed within the NRSA during winter surveys in 1993 (BioSystems 1995). Despite the lack of sightings during planned surveys in 2005 and 2006, this species is known to utilize the site (as well as areas south of the DCPP), especially from fall through late winter, though no breeding has yet been confirmed on the Diablo lands.

California Horned Lark

During the initial site visit (April 22, 2005) and on two other dates (June 7 and 25) when peregrine falcon nest monitoring was conducted in grassland sections of the NRSA, HOLA were observed in coastal grassland habitat of the NRSA. Surveys were not conducted on the coastal bluff and therefore no population size estimates or documentation of confirmed breeding for HOLA is available. However, singing males were detected on three different dates and at several localities along the coastal bluff of the NRSA, suggesting that there is a breeding population of HOLA on the property.

There were no sightings of HOLAs during more intensive surveys conducted in 2006. Vegetative cover in 2006 appeared to be higher than in 2005, possibly due to the extended rainy season that proceeded the nesting season. Many of the areas surveyed contained grasses that were 12 to 18 inches or more in height. HOLA prefer to nest in very short vegetation. This species could potentially nest in and near the NRSA, selecting specific nest locations based on the amount of vegetative cover present. The amount of cover, in turn, is often a factor of the amount of precipitation received and the intensity of cattle grazing. Grazing pressure on the NRSA is closely controlled to sustain rangeland health. In 2006, it appears that grass and forb cover was higher than optimal for this species, but was suitable for another upland special-status species – GRSP (see below).

HOLA were among the special status species documented within the NRSA and adjacent areas during the comprehensive surveys performed by PG&E in the early 1990s (BioSystems Analysis 1995).

Habitat Survey

Coon Creek Riparian Habitat

The riparian vegetation of lower Coon Creek within the NRSA was evaluated during surveys between April 22 and July 28, 2005 to assess potential as breeding habitat for WIFL and LBVI. This habitat ranges from 90 to 200 meters in width. The canopy trees are entirely willow (*Salix* sp.). The understory is well-developed, except in areas disturbed by a 2004 steelhead habitat restoration project. East of the survey transect, the creek ascends into a narrow canyon in the Irish Hills; this section of Coon Creek flows through oak woodland (*Quercus agrifolia*) bordered by coastal scrub and chaparral. Within the NRSA the creek flows year-round and no changes in the width or depth were detected between April 22 and July 28, 2005 (an above average water year). Along the survey transect, Coon Creek varies from approximately 5 to 8 meters in width and from 0.1 to 1.4 meters in depth. Near the bridge, a series of pools were constructed in 2004 to create habitat for south-Central Coast steelhead (*Oncorhynchus mykiss irideus*). The pools are attractive to wading, piscivorous birds and both great blue heron (*Ardea herodias*) and black-crowned night heron (*Nycticorax nycticorax*) were observed foraging in them.

Dense vegetation coverage prevents walking in the creek from approximately 150 meters west of the bridge. Overall canopy height ranges from 4.5 to 12 meters (average 6 meters). All canopy trees in the survey transect are willows. Understory coverage is extensive (approximately 95 percent), and penetrating the vegetation beyond the edges is difficult in most places. Most of the understory species are native perennials. The most abundant species are poison oak, stinging nettle, California blackberry (*Rubus ursinus*) and poison hemlock. Dogwood (*Cornus occidentalis*) and wild cucumber (*Marah fabaceus*) are also abundant in some areas. Non-native thistle (*Cirsium* sp.) is common along the disturbed edges near the trail and fenceline along the north side of Coon Creek.

Upland Habitat

The upland vegetation of the NRSA was evaluated during surveys between April 18 and June 2, 2006 to assess potential for use as breeding habitat for GRSP, HOLA, and burrowing owls. A majority (approximately 85%) of the 500-acre NRSA contains upland vegetation, which is comprised of annual grasses (including *Bromus* spp. and *Avena fatua*), scattered pockets of native grasses (*Nassella* spp.), and elements of scrub habitat, such as California sagebrush (*Artemisia californica*) and coyote brush (*Baccharis pilularis*). Included with the annual grasses were a number of annual forbs, including wild radish (*Raphanus sativa*) and mustard (*Brassica* spp.). Vegetation height was generally up to 18 inches. Overall vegetation height increased in areas with shrubs.

Based on 2006 surveys, the upland habitat in the NRSA appears to provide nesting habitat for GRSP, but not for HOLA or burrowing owl. The vegetation height may be too great for nesting by HOLA. Burrowing owls appear to prefer more inland locations for breeding in this part of California. The reason for this is not known (personal communication, Deb Hillyard, CDFG). However, the vegetative cover is sufficient, and

suitable nesting substrate (American badger (*Taxidea taxus*) and California ground squirrel (*Spermophilus beecheyi*) burrows) is abundant in the uplands.

The upland vegetation in the NRSA is good nesting habitat for a number of species and is used by others during migration and winter. Its value to upland bird species appears to have been enhanced by current grazing management, which retains suitable amounts of nesting cover and controls grazing animal imact during the nesting season.

In addition to the GRSP, 50 other bird species were observed during the upland surveys. Of that total, 30 could be considered upland species with potential to nest on the ground or in shrubs in upland habitats. Species commonly observed during the surveys included western meadowlark *(Sturnella neglecta*), California thrasher (*Toxostoma redivivum*), lesser goldfinch *(Carduelis psaltria*), American goldfinch (*Carduelis tristis*), wrentit *(Chamaea fasciata*), western scrub-jay (*Aphelocoma californica*), and bushtit (*Psaltriparus minimus*).

Habitat Summary

The western reach of Coon Creek comprises approximately 1.5 km. of riparian woodland. The canopy is monotypic (willow only) but the understory is dense and well-developed, providing nesting habitat for a number of species of resident and neotropical migrant birds. The riparian corridor is relatively short and narrow (approximately 200 meters at its widest) and therefore subject to "edge-effects" resulting in increased risk of predation and nest parasitism (although brown-headed cowbirds were scarce). However, the existing vegetation is "intact," showing few signs of human impact or erosion and degradation associated with grazing. Although native mammalian predators were observed on Coon Creek, species that impact breeding birds including cats (*Felis domesticus*), red fox (*Vulpes vulpes*), and crows (*Corvus brachyrhynchos*) were conspicuously absent while others including raccoon (*Procyon lotor*) and western scrub jay probably occur only in low numbers. Furthermore, only a single non-native bird species, the European starling, was observed.

The remainder of the site is upland habitat, mostly grassland, but also with some scrub habitat interspersed. Ground cover is relatively high, providing foraging, escape, and nesting habitat to a number of birds. The upland areas are valuable not only to birds foraging and nesting on the ground, but also to raptors, such as red-tailed hawk and golden eagle that forage for prey over the open areas.

4.4 Mammals

4.4.1 Study Sites

A small mammal trapping survey was conducted in the NRSA over three consecutive nights (June 18, 19 and 20, 2005) by biologists Paul Collins and Rob Gilman. The purpose of the surveys was to assess presence of sensitive mammals, particularly the San Diego desert woodrat (*Neotoma lepida intermedia)*, a California Species of Special

Concern, and the Morro Bay kangaroo rat *(Dipodomys heermanni morroensis),* a Federal and state endangered species.

A day-time survey for American badger was conducted by Pierre Fidenci and Sally Krenn, on July 26, 2005. Two additional follow-up night badger surveys were performed in August 2005 by PG&E staff biologists Steve Yonge and Kelly Collins. Ms. Krenn also surveyed the southern portion of the NRSA for badger burrows on several dates during July and August 2005.

4.4.2 Sensitive Species Accounts

Desert Woodrat (*Neotoma lepida*)

The desert woodrat is a small, pale gray woodrat with a distinctly bicolored tail. Underparts are pale or white, but the hairs are gray at the base. This animal also has a distinct white throat patch. In California this species inhabits chaparral in the vicinity of rocky outcrops. It is also typical in pinyon-juniper habitats and deserts. Desert woodrats are primarily nocturnal, retreating to dens constructed of debris among rocks and boulders and/or vegetation when inactive during the day. This species feeds on leaves, berries, and seeds of many sorts of forbs, as well as leaves of shrubs and berries, cacti and desert succulents (Jameson and Peeters 1988).

Thirty-one subspecies of desert woodrat exist in the western United States, of which four subspecies, *N. l. lepida, N. l. gilva, N. l. grinnelli*, and San Diego desert woodrat (*N. l. intermedia)*, occur in southern California. The San Diego subspecies is a California Species of Special Concern (CDFG 2005b). It now occurs in coastal California from San Luis Obispo south; historic locations have been recorded from San Luis Obispo near Los Padres National Forest, San Fernando near Angeles National Forest, Redlands near the San Bernardino Mountains and the San Bernardino National Forest, and Julian near the Cleveland National Forest (Jameson and Peeters 1988).

American Badger (*Taxidea taxus*)

The American badger is a large mustelid species adapted for digging and underground life. It is silver-grey with a dark head bearing a distinctive white stripe. It has a short, furred tail. Badgers are found statewide, in open areas primarily with sandy soils, including deserts. It feeds on ground squirrels and pocket gophers, and its population fluctuates with the populations of these animals. Badgers make large burrows, and also tear up ground in pursuit of prey (Jameson and Peeters 1988). It is a California Species of Special Concern.

Morro Bay Kangaroo Rat (*Dipodomys heermanni morroensis*)

The Morro Bay subspecies of kangaroo rat (*D. h. morroensis*) is a federal and state-listed endangered species. It is considered California's most endangered mammal, inhabiting only a small area near Los Osos and possibly at Montana de Oro State Park. They live in sandy plains with sparse vegetation, including plants such as California sagebrush, lupine, and coyote brush (CDFG 2000).

4.4.3 Survey Methods

Small Mammal Trapping Survey

The small mammal trapping survey was conducted by biologists Paul Collins and Rob Gilman during June 18 through 20, 2005. The survey was performed by setting up five trap lines (trap lines 401 – 405) within the NRSA (Figure 4.4-1). Each of the trap lines consisted of a total of 20 extra-large (12-inch long) Sherman live traps, for a total of 300 trap-nights. These larger traps were used to minimize stress and potential injury to larger animals, such as kangaroo rats and woodrats.

The 100 traps were placed in locations in coastal bluff scrub, cactus scrub[2], and grassland habitats. The location of each trap line was recorded using a Garmin V global positioning system (GPS) receiver. The trap line sites were previously selected on June 7, 2005 by Mr. Collins and GANDA wildlife biologist Tom Olson. Mr. Collins previously conducted small mammal surveys over a larger portion of the NRSA for PG&E, the results of which are contained in the PEB (BioSystems Analysis 1995).

Within each trapline, traps were set to maximize the likelihood of capturing small mammals, especially target species, such as San Diego desert woodrat and Morro Bay kangaroo rat. Items taken into consideration included vegetation types, presence of cover, habitat features unique to certain species (such as rock outcrops and cactus patches for San Diego desert woodrat), and observations of sign (scat, burrows, stick nests, etc.). As such, the traplines were not arranged in traditional small mammal trapping grids. Similarly, traps were not placed at a consistent spacing, although in most situations, consecutive traps were 30 feet or more apart.

The traps were baited with a combination of rolled oats and birdseed and set during the late afternoon/early evening for three consecutive nights. During the three trap-nights, there was a ½ to ¾ waxing moon. Mammals captured in the traps were identified to species, sex, age, and reproductive condition, and then measured and released as quickly as possible at the capture site. Data forms were completed on each survey morning to document the trapping results.

Air temperatures during the surveys ranged from approximately 20°C (68°F) in the mornings to 32°C (90°F) in the afternoons. The weather during the surveys was clear and sunny with calm winds in the afternoons, ranging from five to ten miles per hour. The surveys were performed between 0700 and 1100 hours.

Trapline 401 was located on the southeast side of Crowbar Peak, at the extreme southern end of the NRSA. The vegetation in the area was coastal sage scrub, characterized by California sagebrush (*Artemisia californica*), coyote brush (*Baccharis pilularis*),

[2] A small localized occurrence along the boundary fence with Montana de Oro State Park involving a non-native *Opuntia spp.*; not considered a separate community type for purposes of this baseline.

deerweed (*Lotus scoparius*), buckwheat (*Eriogonum parviflorum*), and sticky monkeyflower (*Mimulus aurantiacus*). This location was selected during an earlier site visit because apparent signs of San Diego desert woodrat had been noted.

Trapline 402 was located on a small knoll near the mouth of Crowbar Canyon. The vegetation was mostly annual grassland with elements of coastal sage scrub. Dominant species included annual grasses, especially wild oats (*Avena sativa*), as well as forbs, such as black mustard (*Brassica nigra*). Some native species were also present, such as purple needlegrass (*Nassella pulchra*), California sagebrush, dove weed (*Croton californicus*), and mock heather (*Ericameria ericoides*). The location of this trapline was chosen because the general area appeared to have suitable kangaroo rat habitat.

Trapline 403 was located on a rocky, southeast-facing hillside north of Tom's Pond and Lion Rock. The vegetation in the area was coastal sage scrub characterized by California sagebrush, coyote brush, and poison-oak. Giant wild-rye (*Leymus condensatus*) was scattered through the area. The trapline was selected because it contained elements of suitable San Diego desert woodrat habitat, such as rocky outcrops, some with small stick nests.

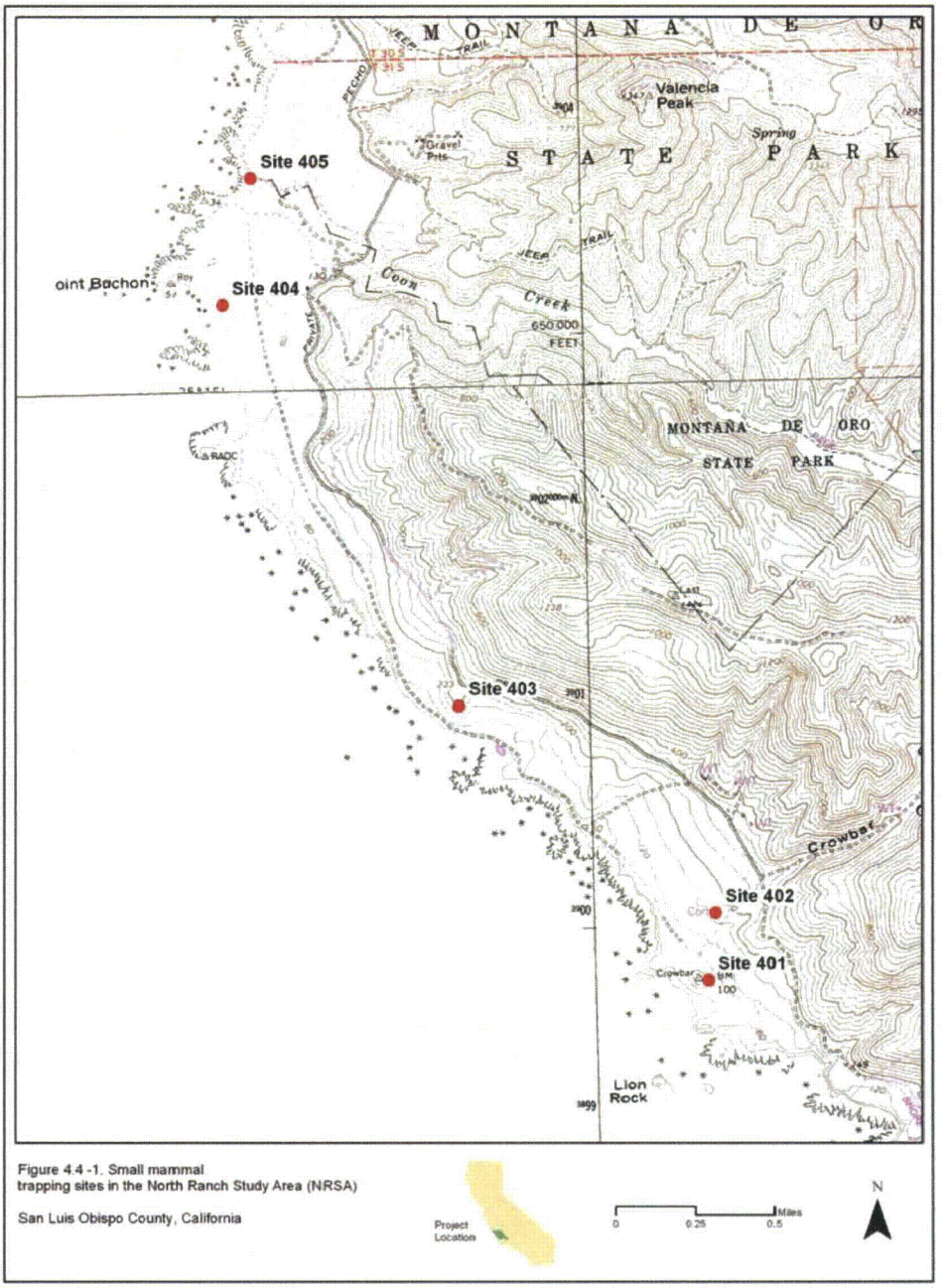
Trapline 404 was located on the east side of the first point north of Point Buchon. The vegetation was a mix of annual grassland and coastal sage scrub. Dominant plant species included wild oats, brome grasses (*Bromus* spp.), Indian paintbrush (*Castilleja* spp.), everlasting (*Gnaphalium* spp.), buckwheat, coyote brush, California sagebrush, and mock heather. The location of the trapline was chosen because it appeared to have suitable habitat for both desert woodrat and kangaroo rats.

Trapline 405 was located near the mouth of Coon Creek on the steep north bank, adjacent to the fence separating the NRSA from Montana de Oro State Park. The vegetation along the trapline was coastal sage scrub that included patches of cactus (*Opuntia* spp.). Some plant species from the adjacent riparian habitat also were present. Characteristic plants included California sagebrush, coyote brush, Italian thistle (*Carduus pycnocephalus*), arroyo willow (*Salix lasiolepis*), poison-hemlock (*Conium maculatum*), black mustard, and star thistle (*Centaurea solstitialis*). The location of this trapline was selected due to the presence of the cactus patches, which are known to be used by San Diego desert woodrats.

American Badger Survey

A day-time survey for American badger was conducted by Pierre Fidenci and Sally Krenn, on July 26, 2005. A nighttime survey was also performed on this date where suitable habitat for the American badger had been previously identified during the day. Two additional follow-up night badger surveys were performed in August 2005 by PG&E staff biologists Steve Yonge and Kelly Collins. Ms. Krenn also surveyed the southern portion of the NRSA for badger burrows on several dates during July and

Figure 4.4-1. Small mammal trapping sites in the NRSA.



August 2005, and mapped more than 50 burrows using a mobile GIS platform with GPS receiver.

Suitable habitat consisted of large areas of open grassland containing numerous burrows large enough to accommodate this species. The majority of this habitat was concentrated in the southern portion of the NRSA.

The first night survey was conducted by walking through areas of suitable habitat with a 6-volt light, searching for eyeshine. In cases where visibility was limited by dense fog, a vehicle was used to improve lighting and visibility. Subsequent night surveys were conducted from a vehicle using a 50,000 candle-power spotlight.

4.4.4 Survey Results

Small Mammal Trapping

A total of 125 small mammals were caught, consisting of five species: desert woodrat (*Neotoma lepida*), deer mouse (*Peromyscus maniculatus*), California ground squirrel, Botta's pocket gopher (*Thomomys bottae*), and California mouse (*Peromyscus californicus*) (see Table 4.4-1). The majority of animals caught were desert woodrats (90 percent). Although the San Diego desert woodrats could not be conclusively distinguished in the field from other *N. lepida* subspecies, they were likely of the desert subspecies (*N. l. intermedia*) based on distributions described in the literature (such as Hall 1981). Hall (1981) indicates that the desert subspecies range extends from Baja California along the coast to a point in San Luis Obispo County north of the NRSA. The subspecies to the north is *N. l. petricola*, reported mostly from Monterey County. No kangaroo rats of any species were caught in this survey. The results of this survey are summarized in Table 4.4-1.

American Badger

Two American badgers were observed during the night survey of July 26. One of the badgers was observed at the entrance of a burrow located at the western edge of Red Barn 1 paddock, and the second individual was observed along Pecho Valley Road, just north of the Red Barn paddocks. Due to the observation of two individuals and the presence of numerous burrows, American badgers appear to be common in the southern part of the NRSA. Earlier surveys (BioSystems 1995) did not detect this species; however, suitable habitat was recorded. Grazing tenant, Bob Blanchard has reported seeing badgers within the NRSA on numerous occasions.

Incidental Observations

Additionally, two mammalian predators were detected during protocol surveys for riparian birds. Coyote (*Canis latrans*) and bobcat (*Lynx rufus*) were detected on most surveys. A mountain lion (*Felis concolor*) was reported seen in the NRSA in 2005, but could not be confirmed.

4.5 Discussion

Source information from the PEB pertaining to terrestrial wildlife (invertebrates, amphibians and reptiles, birds, and mammals) has been identified here and briefly discussed. The principal issues raised by the DTF in their review of this portion of the PEB dealt with:

- habitat assessments for Smith's blue butterfly, foothill yellow-legged frog, California newt, silvery legless lizard, Coast horned lizard, and western spadefoot toad;
- San Emigdio and unsilvered fritillary butterfly presence;
- bat surveys;
- riparian and special-status bird surveys;
- Morro kangaroo rat and Morro shoulderband snail presence;
- tiger salamander presence;
- updating research priorities based on 2005 CNDDB data.

Other issues brought up by DTF members were focused more at the potential of public access to impact special-status species.

After a review of results from 2005 surveys, PG&E decided that surveys for two upland special status bird species (horned lark and grasshopper sparrow) should be conducted in 2006.

Preliminary research showed that the NRSA was well outside the known geographic ranges for the San Emigdio and unsilvered fritillary butterfly. In addition, results of 2005 wildlife studies showed little habitat available for the following species: Smith's blue butterfly, foothill yellow-legged frog, California newt, silvery legless lizard, coast horned lizard, and western spadefoot toad.

Bat surveys were not conducted because minimal roosting habitat exists within the NRSA, which led to the conclusion that bats are unlikely to be affected by day-time managed access on these lands.

Tiger salamander protocol surveys (two-year survey protocol) could not be conducted in the time frame given by the Coastal Commission for completing the baseline; however, this species was not detected during amphibian surveys conducted in the vicinity of Tom's Pond and Coon Creek. Furthermore, there is limited suitable habitat for this listed species within the NRSA; the nearest known population is approximately 10 miles away. Figure 4.5-1 provides a summary of sensitive species occurrence as determined by surveys conducted in 2005 and 2006. PG&E believes that this portion of the baseline inventory is suitably complete and that it will adequately inform the process of planning a trail route and monitoring program.

Figure 4.5-1. Results of sensitive wildlife surveys performed within the NRSA in 2005 - 2006.

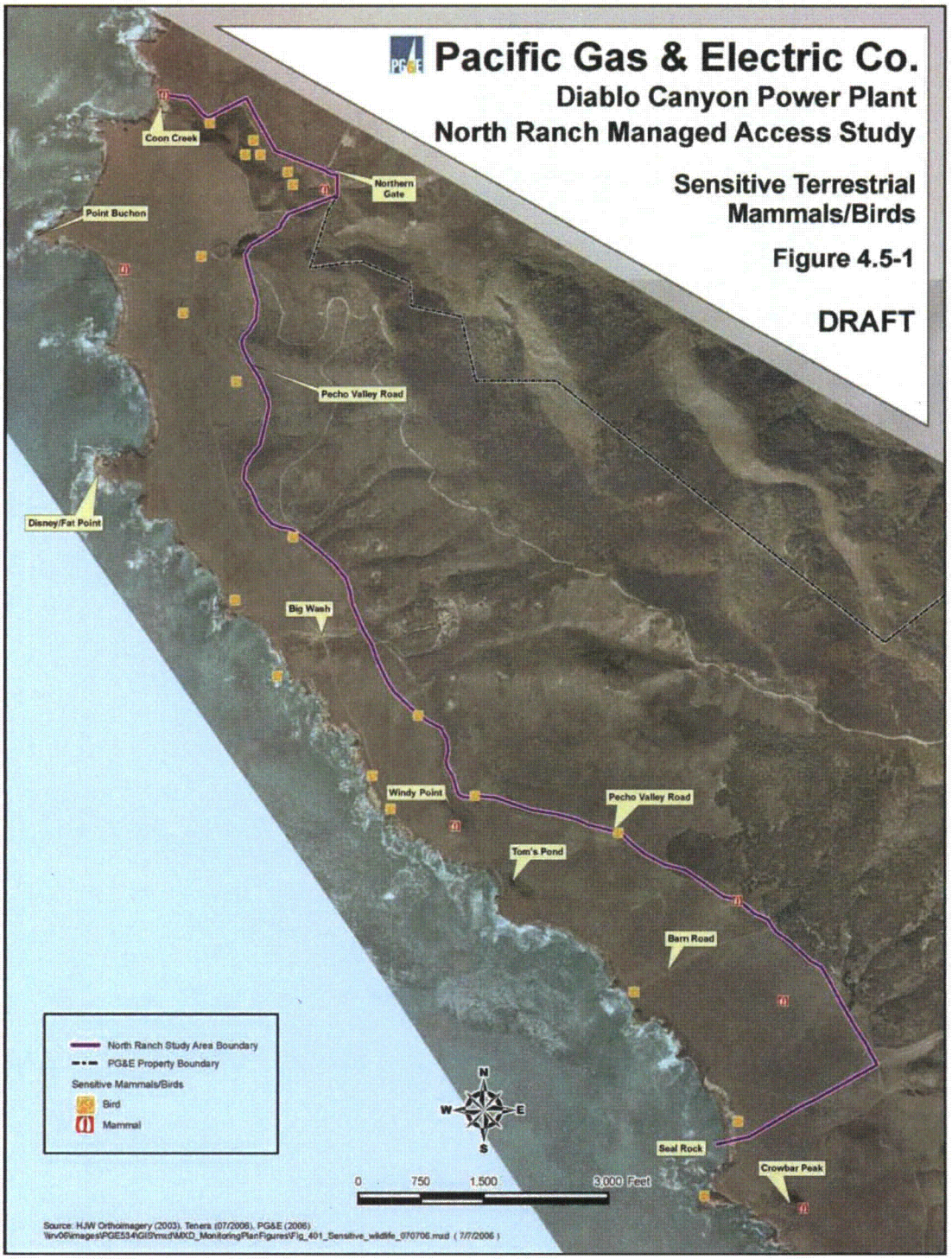


Table 4.4-1. Small mammal trapping results at five sites within the NRSA.

Mammal Species		Trapline 401			Trapline 402			Trapline 403		
Latin Name	**Common Name**	**18-Jun**	**19-Jun**	**20-Jun**	**18-Jun**	**19-Jun**	**20-Jun**	**18-Jun**	**19-Jun**	**20-Jun**
Spermophilus beecheyi (SPBE)	California ground squirrel		1	1		1	1			
Thomomys bottae (THBO)	Botta's pocket gopher									
Peromyscus maniculatus (PEMA)	deer mouse					1	2			
Peromyscus californicus (PECA)	California mouse									
Neotoma lepida (NELE)	desert woodrat	11	11	9				15	14	12
Total Mammals Caught		11	12	10	0	2	3	15	14	12
Number of Traps Set		20	20	20	20	20	20	20	20	20
Number of Traps Sprung		11	13	10	1	2	3	16	14	12
Catch Effort		55%	63.2%	50%	0%	10%	15%	78.9%	70%	60%
Trapline Catch Effort		**56.1%**			**8.3%**			**69.6%**		

Mammal Species		Trapline 404			Trapline 405			Subtotal
Latin Name	**Common Name**	**18-Jun**	**19-Jun**	**20-Jun**	**18-Jun**	**19-Jun**	**20-Jun**	
Spermophilus beecheyi (SPBE)	California ground squirrel							**4**
Thomomys bottae (THBO)	Botta's pocket gopher			1				**1**
Peromyscus maniculatus (PEMA)	deer mouse				1	1	1	**6**
Peromyscus californicus (PECA)	California mouse				1			**1**
Neotoma lepida (NELE)	desert woodrat	4	3	5	9	11	9	**113**
Total Mammals Caught		4	3	6	11	12	10	**125**
Number of Traps Set		20	20	20	20	20	20	**300**
Number of Traps Sprung		4	4	6	14	16	13	**139**
Catch Effort		20%	15.8%	30%	64.7%	75%	58.8%	**44.4%**
Trapline Catch Effort		**21.9%**			**66.2%**			**44.4%**

5.0 Marine Resources

5.1 Intertidal Community

Many intertidal species are relatively common and may be locally abundant where suitable habitats (e.g., specific substrate types) are available. Mapping surveys in 2005 provided a more complete descriptive baseline on intertidal habitat areas along the NRSA coastline than had been available in the PEB.

Data on intertidal species composition and abundance were derived from a long-term (30-year) baseline of data from the DCPP Receiving Water Monitoring Program (RWMP), as well as additional sampling performed within the NRSA in 2005 specifically for the North Access project. The NRSA coast is not contacted by the DCPP cooling water discharge plume (Tenera 1997), and serves as a control for data collected further south within the region of plume effects. This unique scientific baseline allowed the results of substrate mapping to be used to indirectly estimate species composition and relative abundance of intertidal species throughout the NRSA.

5.1.1 Study Site

The NRSA shoreline can be characterized as an exposed outer rocky coast with much physical variation (Figure 5.1-1). The shoreline is composed of headlands that drop steeply into the ocean, covelets between the headlands, and stretches of rocky open shore, all of which are exposed to heavy wave action. Offshore wash rocks.and sea stacks are also common. In any section of shore, the width of the intertidal zone, types of substrates (bedrock, boulders, cobbles), degree of wave exposure, and vertical relief can be variable over short distances. In many areas, a narrow sand/gravel beach occurs in the upper intertidal between the shore cliff and rocky intertidal zone. Wide and long sand/gravel beaches occur between Point Buchon and Disney Point.

The marine community and habitat descriptions below are for the region between the high tide level and approximately the mean lower low water tide level (MLLW). Species on nearshore wash rocks were included in the mapping surveys done in 2005. However, nearshore wash rocks are not sampled in the RWMP studies, and therefore species on wash rocks cannot be described from RWMP data.

5.1.2 Species Accounts

There are no intertidal species in California that are classified as rare, endangered, or threatened by state or federal agencies. The following species accounts address species of local or regional management and/or scientific interest due to limited distribution, declining numbers, slow recovery potential, commercial or recreational value, or ecological role (keystone species).

Figure 5.1-1. Shoreline habitats along the NRSA coast. Note that the upper photographs show the remaining rocks of a collapsed headland.

Much of the species information presented below is from the Multi-Agency Rocky Intertidal Network (see www.marine.gov), a large consortium of marine scientists conducting intertidal research in California.

Black Abalone (*Haliotis cracherodii*)
Black abalone occur mainly in the high intertidal zone, in crevices and underneath ledges. Although the northernmost reported range of black abalone is Coos Bay, Oregon, most black abalone do not occur north of San Francisco. Black abalone were once relatively common along the San Luis Obispo and Santa Barbara County coastlines, including the Channel Islands, but since the 1980s black abalone have declined in abundance from withering syndrome disease (Alstatt et al. 1996; Tenera 1997, 1999; Raimondi and Bergen 2003).

Black abalone can attain a maximum length over 20 cm. The shell exterior is dark blue, dark green, or black. The shell is usually free of epiphytic organisms. The shell holes with rims are not elevated. Usually there are five to seven holes remaining open as new ones form and old ones fill.

The larger abalone feed on drift kelp (Leighton 1966) while the smaller abalone graze on diatoms and crustose coralline algae (Morris et al. 1980). Growth varies with size, location, and other environmental factors, but growth is generally slow and shell size cannot be used to determine age (Morris et al. 1980). Natural predators of abalone include sea otters, sea stars, fish, and octopus (Morris et al. 1980).

Although once very abundant (Douros 1987, Richards and Davis 1993), abalone have severely declined in abundance, causing the fishery in California to close south of San Francisco. Intense fishing and withering syndrome may be the chief reasons for the black abalone population decline (Lafferty and Kuris 1993, Richards and Davis 1993). Abalone in southern California and on the Channel Islands disappeared almost completely during the mid-1980s. Declines also occurred in the vicinity of the DCPP (Tenera 1997). Due to the low population numbers, low recruitment, and slow growth, recovery from disturbances can be long-term (Raimondi et al. 1999). Black abalone are currently being considered by the National Marine Fisheries Service for listing under the federal Endangered Species Act.

Owl Limpet (*Lottia gigantea*)
Owl limpets are most common in the middle intertidal zone on cliff faces and rocks in heavy wave-exposed areas (Morris et al. 1980). Owl limpets range from northern California to Cenos Island, Baja California, Mexico.

Owl limpets maintain territories on rocks by 'bulldozing' other competitors away for rock space (Stimpson 1970). This action creates space and promotes algal growth (Raimondi et al. 1999). The largest limpets are estimated at 10-15 years old and are believed to breed in the fall and early winter in California (Morris et al. 1980).

Owl limpet shells can be 100 mm in length (Lindberg 1981), but larger ones have also been found (unpublished data). Shells are oval and low in profile with an anterior apex. The shell surface is often rough and eroded; shell color is brown with white spots. The shell interior is dark with a brown margin. The shell interior also has a prominent owl-shaped mark within the area of the bluish muscle scar. The foot is gray on the sides and orange or yellow on the sole.

Humans collect owl limpets for food, and the larger individuals are the ones generally collected. Owl limpets are protandrous hermaphrodites, changing sex from male to female with age (Ricketts et al. 1985). Therefore, collecting large individuals may skew the gender ratio of owl limpet populations and decrease reproduction (Kido and Murray 2003).

California Mussel (*Mytilus californianus*)
The California mussel is most abundant on surf-exposed rocks, mainly in the mid- to upper intertidal zone on outer coasts. Mussels attach to hard substrate by secreting byssal threads from the base of the foot (Morris et al. 1980). California mussels can also grow in the offshore subtidal to depths of 24 meters (e.g., on the legs of offshore oil platforms). California mussels range from the Aleutian Islands, Alaska to southern Baja California, Mexico.

California mussels can occur as extensive multi-layered beds (usually in the northern portion of the range). These beds create micro-habitats for many species of invertebrates and algae (Paine 1966, MacGinitie and MacGinitie 1968, Suchanek 1979, Kanter 1980). Mussel beds are susceptible to predation by sea stars (Morris et al. 1980), and are also collected for bait and human food. An area cleared of mussels may take 1-10 years to reestablish itself (Morris et al. 1980, Vesco and Gillard 1980, Kinnetics 1989).

California mussels are black and bluish in color, and valves can be partially white from erosion. The valves can have radial ribbing and concentric growth lines. Shells can grow to be about 13 cm long.

Mytilus galloprovincialis/trosullus, the bay mussel, can be interspersed with California mussels, but bay mussels generally occur in calmer waters because of weaker byssal threads (Morris et al. 1980). Bay mussels have smoother valves, lack radiating ridges, and have a strong elbow-curve at the shell umbo. Bay mussels tend to become less eroded than California mussels.

In California, mussels are quarantined from late spring to early autumn because the toxin from a dinoflagellate accumulates in the mussel tissue (Kozloff 1983). This toxin can cause paralysis and death.

Surfgrass (*Phyllospadix scouleri* and *P. torreyi*)
Surfgrass is an angiosperm with true leaves, stems, and rootstocks, and reproduces by seeds, not spores as in algaes. The long straight grass-like leaves of *P. scouleri* are flat and wide (2-4 mm). In contrast, the leaves of *P. torreyi* are more narrow (less than 2 mm

wide) and tend to be wirier than the leaves of *P. scouleri*. The leaves of *P. scouleri* and *P. torreyi* arise from a rhizotomous base.

P. scouleri is generally found at or below the zero tide level forming dense grass-green beds. It can also occur in mid-low tide pools. *P. scouleri* ranges from Vancouver Island to southern California. *P. torreyi* also grows mainly at or below the zero tide level and can form dense grass-green beds. *P. torreyi* ranges from northern California to Baja California. *P. torreyi* is more likely to be found in sandy areas than *P. scouleri*.

Surfgrass habitat is highly productive, providing shelter for many invertebrates and supporting many species of algae (Stewart and Myers 1980). The red algae, *Smithora naiadum and Melobesia mediocris* are exclusively epiphytic on sea grasses, such as surfgrass (Abbott and Hollenberg 1976). Surfgrass also provides nursery habitat for fishes and invertebrates, such as the California spiny lobster (*Panulirus interruptus*) (Engle 1979). If the rhizome systems remain viable, then recovery following disturbance can be fairly rapid. However, recovery can be long if the entire bed is lost because recruitment is irregular (Turner 1985, 1983), and restoration projects have generally not been unsuccessful.

Sea Palm (*Postelsia palmaeformis*)

Sea palm is a brown alga (Phaeophyta) that resembles a miniature palm tree standing about 60 cm tall when full grown. One hundred or more blades may arise from the tip of the thick, flexible stipe (Abbott and Hollenberg 1976). Sea palms occur on high to midtidal rocks in wave-exposed areas. Sea palms range from British Columbia to San Luis Obispo County, California.

Sea palms compete with mussels and other algae for space. Sporelings can attach to competitors and grow, and the drag effect on the animal can cause the animal to become dislodged during storms. Other sporelings can grow to maturity in the cleared spaces (Dayton 1975).

Sea palms (sporophytes) live only from early spring to late autumn or early winter (Kozloff 1983), and thus each population is dependent on the success of spore production from the previous year's population. Sea palms are collected for food and sold in health food stores and on the internet. Most collecting has occurred north of San Francisco. The California Sea Grant Program is funding studies to determine the vulnerability of sea palms to overexploitation.

Rockweeds (*Silvetia compressa, Fucus gardneri, Hesperophycus californicus, Pelvetiopsis limitata*)

Rockweeds are an assemblage of intertidal brown algal species of the family Fucaceae. Four species of rockweeds are occasional in occurrence along the NRSA coast (*Silvetia compressa*, *Fucus gardneri*, *Hesperophycus californicus*, and *Pelvetiopsis limitata*). These four species are treated together because of their similarities in ecological function, morphology, occurrence in the intertidal, life histories, and susceptibility to visitor impacts. In general, rockweeds are perennial algae that provide habitat and shelter for

algae and many animals (Hill 1980, Gunhill 1983). Each plant grows from a single holdfast that gives rise to a basal stipe. In turn, the basal stipe branches dichotomously many times to form a bushy plant. Although *S. compressa* can grow up to 90 cm, most plants are half that size. *F. gardneri* grows up to 25 cm, while *H. californicus* can grow up to about 40 cm. *P. limitata* is the smallest of the four species, growing up to about 8 cm. All four species can be similar in appearance, particularly when small. The color of the species ranges from yellow to olive-green to brown.

Although each of the four rockweed species tends to form patches of various sizes, the patches of the various species can occur relatively close to one another and close in elevation depending on local variations in habitat and wave exposure. *S. compressa* and *F. gardneri* occur on midtidal rocks that are somewhat protected from the open surf. *S. compressa* occurs from British Columbia to Baja California, while *F. gardneri* ranges from Alaska to Santa Barbara County, California. *H. californicus* occurs slightly higher in elevation than *S. compressa* and *F. gardneri*. *H. californicus* ranges from Santa Cruz, California to Baja California. On the other hand, *P. limitata* is generally infrequent, but when present it tends to occur on the tops of rocks, rarely on the sides of rocks. *P. limitata* tends to be the highest intertidal-occurring rockweed of the four species, on upper intertidal rocks in more wave-exposed areas. *P. limitata* ranges from British Columbia to San Luis Obispo County, California.

Rockweeds are, in general, among the species most susceptible to trampling effects because they occur in the mid- to upper intertidal zone where foot traffic on the shore can be greatest (Denis 2003). Any breakage or weakening of the main basal stipe can result in loss of the whole plant, and recovery can be slow (Hill 1980, Vesco and Gillard 1980). Gamete dispersal is very limited (Johnson and Brawley 1998) and recruitment can be irregular with low survivorship (Gunhill 1980).

5.1.3 Survey Methods

Habitat Mapping

Habitat mapping of the intertidal zone along the NRSA coast was completed by taking an aerial photograph of the shoreline into the field on which to delineate and label the habitat types described in Table 5.1-1. The base map was a photo-mosaic of sequential planar aerial photographs of the shoreline taken on October 27, 2003 when the tide level was approximately +4 foot mean lower low water (MLLW). Although the photo-mosaic did not depict the full width of the intertidal zone, the photos were valuable in orienting the observer's location with respect to the reach of shore being mapped.

The mapping of intertidal habitats was done from the cliff bluff by a two-person team using 10x50 binoculars and a 15-32x50 spotting scope. The mapping could not be done down on the shore because the intertidal zone along the majority of the NRSA coast cannot be accessed, due to tall shore cliffs and headlands that drop steeply into the ocean.

Preliminary mapping was done over various sections of the coast on May 19, June 3, July 14-15, and August 4-5 and 23, 2005. The entire cliff bluff of the NRSA was walked again on December 11, 12, and 13, 2005 when tides were below 0 foot MLLW to observe

Table 5.1-1. Intertidal habitat classification description.

Substrate Classification	Description
Bench platform – elevated	Benchrock that slopes gently offshore and can be traversed during moderate tide levels. Substrate relief can be variable, due to ridges and surge channels. Boulders and cobbles may be present, but are not the predominant substrate. This form of substrate tends to have tidepools because the rocks can hold water at low tide.
Bench platform – low intertidal	Same as elevated bench platform (above) but is in the low intertidal and generally not accessible, since it is most often covered with water.
Vertical wall	Near vertical slope of the intertidal zone. Short width intertidal zone, due to the vertical nature of the rock wall(s). Often with ledges and crevices. This habitat is most common around headlands.
Sand/gravel beach	Beach of fine grained sediments that can also be interspersed with boulders and cobbles
Boulder field	Areas of mainly large boulders (ice-chest size to car size).
Boulder/cobble field	Area or band of the shore with mixed cover of cobbles and boulders
Cobble field	Area of relatively same-size cobbles (approx. football size)
Rocky mixed substrate	Shore of mainly bedrock and/or large boulders. Cobbles and sand/gravel can be minor components. Relief can be variable, due to the mix of substrates. Pools of water can be present at low tide, but can eventually drain.
Offshore outcropping	Rock pinnacles, sea stacks, and wash rocks that are separated from land. Habitat includes the tops and sides of rocks.

and refine the intertidal mapping details and to ensure the mapping was consistent among sections of coast. The habitat polygons and attribute data were later converted into an ArcView/ArcGIS shapefile. This shapefile was then incorporated with the other resource layers within the project mobile GIS platform.

Species Mapping

All intertidal species that could be positively identified through binoculars or spotting scope were recorded for each habitat area mapped. Although the majority of the species mapping was done from the cliff bluff, several shoreline areas could be accessed. These areas were more closely searched for individual species. Species abundances were also noted relative to the size (area) of the habitat type that was mapped (Table 5.1-2).

The effort was focused on those intertidal species listed in Table 5.1-3 that are of scientific and resource management interest based on having at least one of the following characteristics:

- Collected for food
- Can be easily damaged by trampling
- Long-lived
- Limited recruitment
- Limited distribution

- Slow to recover
- No-take regulatory status

Table 5.1-2. Relative abundance descriptions.

Occurrence	Description
Abundant	Plentiful, large supply
Common	Frequent in occurrence, widespread
Occasional	Irregular in occurrence, patches, or clusters
Sparse (rare)	Seldom in occurrence

Surveys were terminated each day when the incoming tide reached approximately the +3 foot MLLW level or when much of the intertidal zone could not be observed between wave sets. The results of the surveys provide species occurrence information above the approximate 0 foot MLLW tide level.

Black abalone was the only species of focus that could not be mapped. Black abalones occur in crevices, underneath ledges, and between boulders, and are therefore hidden from open view. They cannot be seen from a distance, and one must thoroughly search underneath and between rocks for abalone. Furthermore, the abundance of black abalone has declined significantly in central California from withering syndrome (Alstatt et al. 1996, Tenera 1997, 1999, Raimondi and Bergen 2003). Therefore, considerable effort would have been required to specifically find remaining abalone in the NRSA. Areas of stable substrates with crevice habitats are the most likely areas where abalone might occur. Areas of sand/gravel, cobble, and shifting boulders are not prime abalone habitat.

DCPP RWMP Studies

Currently, the RWMP intertidal sampling program consists of two studies, the horizontal band transect (HBT) study and vertical band transect (VBT) study. The HBT study provides abundance data on intertidal algae and invertebrates at fixed stations. The VBT study provides abundance data on intertidal fishes at a separate set of fixed stations. A black abalone special study was also a part of the RWMP, but has been discontinued as of 1995.

RWMP stations occur along the NRSA coast and collectively function as a group of reference (control) stations to compare changes in the marine biota at intertidal stations south of the NRSA that are contacted by the cooling water discharge.

Horizontal Band Transect Study

There have been 27 horizontal band transect (HBT) stations sampled in the RWMP at one time or another. A smaller subset of these continues to be routinely sampled as part of that monitoring program. Currently, there are two HBT stations along the NRSA coast that have been regularly sampled since the inception of the program in 1976 (active stations), and four that have been dropped from the program (historical stations).

Table 5.1-3. Intertidal species of scientific and resource management interest present in the NRSA.

Common Name	Scientific Name	Occurrence	Susceptibility to Human Impacts	Regulatory Status
Owl limpets 	*Lottia gigantea*	In aggregations on rocks exposed to high wave energy as at headlands, and often associated with mussels. Large individuals can be 10-15 yrs old.	Collected for food.	Up to 35 individuals per day can be collected with a valid CDFG fishing license, no size limit of individuals.
Black abalone 	*Haliotis cracherodii*	In rock crevices and in boulder interstices throughout the intertidal zone. Long-lived. Limited recruitment. Limited abundance due to withering syndrome.	Collected for food.	No-take by the CDFG and candidate listing by the National Marine Fisheries Service.
Mussels 	*Mytilus* spp.	In aggregations on wave exposed bedrock and headlands. Long-lived. Can be slow to recover from damage.	Collected for food and bait.	Up to 10 pounds in the shell can be collected with a valid CDFG fishing license.
Rockweeds 	*Fucus gardneri*, *Silvetia compressa*, *Hesperophycus californicus*, and *Pelvetiopsis limitata*	In patches. Long-lived perennials on semi-exposed shores in the upper intertidal zone.	Can be easily damaged by trampling.	Up to 10 pounds wet weight in aggregate can be collected with a valid CDFG fishing license.
Sea palm 	*Postelsia palmaeformis*	In patches. Spring annual on wave exposed headlands. Limited spore dispersal. Southern range limit is San Luis Obispo County, and the southernmost patch occurs on Disney Pt.	Collected mainly north of San Francisco for food and sold in health food stores and on the internet.	Harvesting allowed with a CDFG permit.
Surfgrass 	*Phyllosadix* spp.	Perennial beds in the low intertidal-shallow subtidal between the zero to approx. –15 ft MLLW tide level.	Not highly susceptible to trampling impacts because of its low intertidal occurrence, but slow to recover if damaged.	No take by the CDFG.

These stations are identified in Figure 5.1-2. The amount of sampling that has been completed at each of these stations is presented in Table 5.1-4. Each active and historical station along the NRSA consists of two 30 meter fixed transects oriented parallel to shore, one at the +1 foot MLLW tide level and the other at the +3 foot MLLW tide level. The same 10-1 m^2 permanent quadrat positions are sampled along each permanent transect, which is re-deployed each visit between permanent bolts embedded in the substrate (Figure 5.1-3). Quadrats are re-positioned along each transect according to markers on the transect lines.

The substrate in the intertidal zone is irregular in relief, such that substrate relief in a quadrat varies from none on rock platforms to about 0.5 meter vertical relief. Substrate irregularities result in some quadrats tilting from horizontal. Observers count organisms or estimate species' cover within the quadrat as viewed perpendicularly to the quadrat frame, regardless of tilt angle. Rocks are not overturned.

Percent cover is estimated visually for all algal species and bare substrate in each quadrat. The quadrat is a 1 m^2 plastic frame subdivided by strings into 16-1/16 m^2 sub-quadrats. Algal coverage is recorded as the number of 1/16 m^2 sub-quadrats covered by the species plus the number of 9th subunits of 1/16 m^2 additionally covered (determined by visually separating a 1/16 m^2 sub-quadrat into nine subunits). Species found in less than one 9th sub-unit in each quadrat are recorded as present. Overstory species are estimated first and then moved aside to allow estimates of the understory and crustose species. These data are later converted to percentages for tabulation and analyses. Total algal cover per quadrat often exceeds 100 percent, due to the overlayering of multiple taxa.

Frequently it is not practical to count all invertebrates in a 1 m^2 quadrat, so they are sampled using one of two methods. In five of the 10 quadrats, all species are recorded as either present or absent, and individuals larger than 2.5 cm in greatest dimension are counted. In the other five quadrats the same method is used, except that certain species of invertebrates are counted regardless of size. Black abalone are counted in all ten quadrats, regardless of size, and the percent cover of encrusting invertebrates, such as sponges and tunicates, is estimated using the same visual techniques as for the algae.

Vertical Band Transect Study

Numerous fishes live in the intertidal after the tide recedes. During low tide, they find areas of shade and protection that remain moist, which are mainly areas underneath and between boulders and cobbles. Tidepools also provide a refuge for intertidal fishes at low tide.

The vertical band transect (VBT) study complements the HBT study in sampling fishes underneath cobbles and small boulders (Figure 5.1-4). The VBT study began in May 1979 and was continued through August 1983. Sampling resumed two years later in November 1985, and remains ongoing. There were no VBT stations in the NRSA area until May 1999. This station (NC-1V, see Figure 5.1-2) has been sampled four times yearly between May 1999 and present (Table 5.1-4).

Figure 5.1-2. Locations of the RWMP horizontal band transect (HBT), vertical band transect (VBT), and black abalone stations.

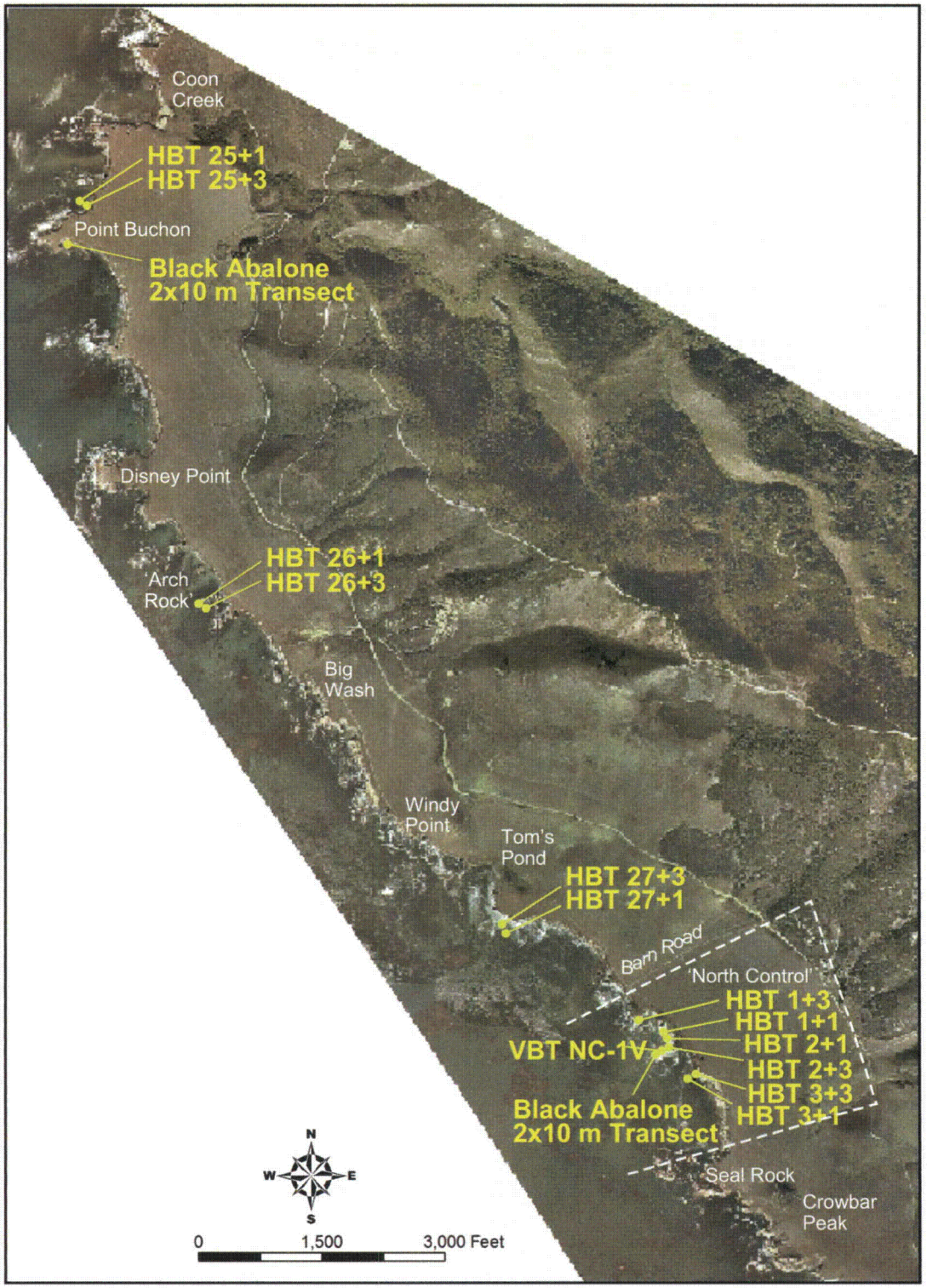


Figure 5.1-3. Tenera biologists sampling intertidal quadrats.

At each station, three transects are positioned perpendicular to the shoreline according to permanent markers. Each transect originates in the high intertidal zone (approximately +4.5 foot MLLW) near the cliff base and terminates near the +0 foot MLLW tide level. Transects within a station are separated by approximately 10 feet (3 meters). Each transect serves as a reference line to position 12, 1-meter^2 permanent quadrats, for a total of 36 quadrats per station.

The fishes that occur in each quadrat are captured in hand nets, identified, measured, tallied, and returned to the quadrat. Initially, this study included recording the presence of algae and invertebrates in the quadrats, but collection of these data was discontinued in 1995, due to duplication of information from the HBT study.

Black Abalone Special Study

The RWMP intertidal program once included special studies of black abalone to monitor the extent and effects of withering syndrome in areas along the coast. Permanent 2x10m transect plots north and south of the power plant were established in rocky areas where black abalone were once abundant. Two of the 2x10 meter transect plots were on the NRSA coast, one at Point Buchon and the other at North Control (see Figure 5.1-1). Sampling at the North Control black abalone transect began in 1989, one year after withering syndrome was first observed near the DCPP. Sampling at the Point Buchon black abalone transect began in 1996. Sampling at all transects was done semi-annually and stopped in 1998 after numbers had declined to near-zero at all transects. The Point Buchon and North Control black abalone transects were re-sampled in December 2005.

5.1.4 Survey Results

Habitat mapping

An example section of coast depicting the mapped habitat types appears in Figure 5.1-5. The species noted in the various habitats are listed in Table 5.1-5.

The habitat maps with corresponding species lists for the entire NRSA shoreline are archived in the project GIS as a separate marine polygon theme. The intertidal areas that could be accessed by foot are indicated as 'visited' in the observation method field of the GIS marine polygon theme.

The habitat areas identified in the mapping survey provided the means to subdivide the shoreline into logical sections for mapping the distribution and relative abundances of intertidal algae and invertebrates. The mapping included species in addition to those listed in Table 5.1-3, but was limited to only the most conspicuous species that could be positively identified from the cliff bluff with the use of binoculars and spotting scopes. Other species included oar kelp (*Laminaria setchellii*) and feather boa kelp (*Egregia menziesii*). Most species could not be mapped because of their small sizes and cryptic occurrences beneath algal fronds and in crevices. Also, the backsides (seaward sides) of rocks were not surveyed.

Table 5.1-4. HBT, VBT, and black abalone sampling along the NRSA coast (1976-2005).

Station	Area	Status	Sampling Frequency	Duration	Comments
HBT 1+1, 1+3	North Control	Active	4 times yearly	1976-Present	Ongoing sampling
HBT 2+1, 2+3	North Control	Active	4 times yearly	1976-Present	Ongoing sampling
HBT 3+1, 3+3	North Control	Historical	4 times yearly	1976-1995	Re-sampled in 2005
HBT 25+1, 25+3	Point Buchon	Historical	4 times	1977, 1985-87	Re-sampled in 2005
HBT 26+1, 26+3	Arch Rock	Historical	Once	1977	Station destroyed from cliff burial
HBT 27+1, 27+3	Tom's Pond	Historical	4 times	1977, 1985-87	Re-sampled in 2005
VBT NC-1V	North Control	Active	4 times yearly	1999-Present	Ongoing sampling
Black Abalone	Point Buchon	Historical	1-2 times yearly	1996-98	Re-sampled in 2005
Black Abalone	North Control	Historical	1-2 times yearly	1989-98	Re-sampled in 2005

Figure 5.1-4. Prickleback fish (Stichaeidae) sampled in the intertidal vertical band transect study.

Figure 5.1-5. Habitat mapping results for the shore surrounding and including Point Buchon. The relative abundances of species associated with each habitat type are presented in Table 5.1-5.

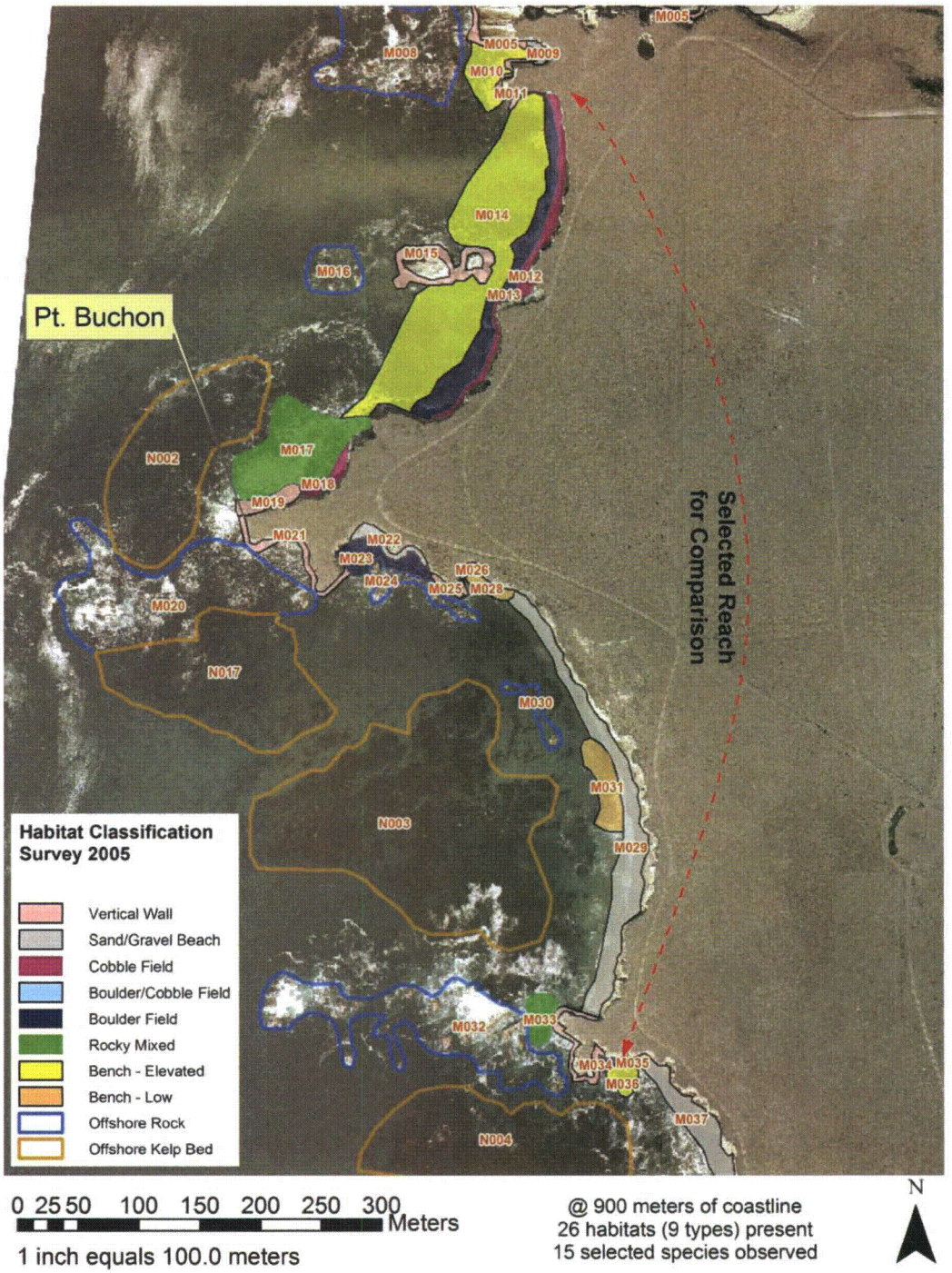


Table 5.1-5. Species and relative abundances associated with the habitats portrayed in Figure 5.1-5.

Relative abundance categories are S-sparse, O-occasional, C-common, A-abundant.

PGE_ID	SUB_LABEL	Cladophora spp.	Egregia men.	Endocladia mur.	Laminaria setch.	Mazzaella flacc.	Nereocystis luet.	Macrocystis pyrif.	Phyllospadix spp.	Silvetia com	Ulva/Enteromorpha	Anthopleura eleg.	Lottia gigantea	Mytilus spp.	Pisaster spp.	Pollicipes poly.
M012	Cobble Field															
M013	Boulder Field															
M014	Bench - Elevated		C	A	O	A	C		A		C	C			S	
M015	Vertical Wall		S	O	C	C			C		C		S	S		
M016	Offshore Rock			O	S	S			O					O		
M017	Rocky Mixed	S	A	A	C	A			C	O	S	C		O		
M018	Cobble Field															
M019	Vertical Wall		C	S		C				C	S	S	S	A	S	
M020	Offshore Rock				A				O		C			C		
M021	Vertical Wall		A		O	C								C	S	O
M022	Sand Gravel Beach															
M023	Boulder Field		A	A		A			S		S			S		
M024	Offshore Rock		A	S		A			A					A		
M025	Vertical Wall		S	A		A										
M026	Sand Gravel Beach															
M027	Vertical Wall		S	S		C								S		O
M028	Bench - Low		C	S		S			S				O	S		
M029	Sand Gravel Beach															
M030	Offshore Rock								A					C		
M031	Bench - Low				O		A		O							
M032	Offshore Rock		C	C	A	A					S			A		
M033	Rocky Mixed		C	A		C			O	C						
M034	Vertical Wall		C	C	C	C							A	C		S
N002	Offshore Kelp Bed						A	C								
N003	Offshore Kelp Bed						A	C								
N017	Offshore Kelp Bed						A	C								

Species Mapping
In general, the same species were present in all rocky intertidal areas. Sandy beach and cobble field areas tended to be devoid of intertidal species, due to the unstable nature of the substrates. The only unique species occurrence was the presence of a stand of sea palms at Disney Point. Sea palms were not present elsewhere. The lone stand was on the outermost tip of Disney Point exposed to the full force of waves. Approximately 800 individuals were counted on Disney Point in 2005 (S. Krenn, PG&E, pers. com.).

Horizontal Band Transect Study
A total of 89 intertidal plant taxa and 147 invertebrate taxa were sampled in the HBT stations along the NRSA coast from 1976 through 2005 (Tables 5.1-6 and 5.1-7). The most abundant species have occurred at all stations (Figures 5.1-6 and 5.1-7). Relative abundances, however, have been different across stations, due to variations in habitat structure and biological interactions.

Common species in the upper intertidal band transects have included the nail brush seaweed (*Endocladia muricata*) and foliose red alga (*Mastocarpus papillatus* and *Mazzella flaccida*). Rockweeds (*S. compressa*) have tended to be common in the upper zone, as well, occurring as distinct patches draping over rocks. Turban snails (*Tegula funebralis*), aggregating anemones (*Anthopleura elegantissima*), hermit crabs (*Pagurus* spp.) and species of limpets (Lottiidae) have generally been among the most abundant of the common species sampled in the HBT study. California mussels have been common-abundant, but only on rocks in the HBT transects that are exposed to the full force of waves. Surfgrass (*Phyllospadix* spp.) occurs in a zone from about 0 foot MLLW (intertidal) to about –15 foot MLLW (subtidal).

The low intertidal HBTs sample the upper zone of surfgrass distribution. Sea urchins (*Strongylocentrotus purpuratus*) are generally more common in the lower intertidal zone. Sea urchins were abundant at Station 26+1, but both transects of Station 26 have since been excluded from sampling after the arch rock that was used as a 'bridge' to access the station collapsed.

Vertical Band Transect Study
The most common intertidal fishes sampled in the intertidal zone have been the gunnel/stickleback species complex (Pholididae/Stichaeidae) followed by rock prickleback) (*Xiphister mucosus*) and black prickleback (*Xiphister atropurpureus*) (Figure 5.1-8). These fishes are eel-like in appearance. The largest ones have been up to about 10 inches long. Most have been less than four inches long.

Black Abalone Special Study
Monitoring at fixed 2 x 10 meter transect plots along the NRSA coastline show a long-term decline in black abalone in the local area (Figure 5.1-9). The sampling of the Point Buchon and North Control black abalone transects in 2005 confirmed a lack of recovery in black abalone since sampling last occurred here (1998). Currently the northernmost

Table 5.1-6. Plant taxa sampled in the HBT stations on the NRSA coast (1976-2005).

Scientific Name	Common Name or Description	Scientific Name	Common Name or Description
CHRYSOPHYTA		RHODOPHYTA (continued)	
Chrysophyta	diatoms	*Endocladia muricata*	turf algae
CHLOROPHYTA		*Erythrophyllum delesserioides*	foliose algae
Acrosiphonia spp.	filamentous algae	*Farlowia/Pikea* spp.	branched algae
Bryopsis spp.	filamentous algae	*Fauchea laciniata*	foliose algae
Cladophora spp.	pin cushion algae	filamentous red algae	filamentous algae
Codium setchellii	prostrate algae	*Gastroclonium subarticulatum*	branched algae
Derbesia marina (*Halicystis ovalis*)	saccate algae	*Gelidium coulteri*	turf algae
Ulva/Enteromorpha spp.	sea lettuce	*Gelidium pusillum*	turf algae
		Gelidium robustum	branched algae
PHAEOPHYTA		*Gelidium* spp.	branched algae
Analipus japonicus	turf algae	*Grateloupia doryphora*	foliose algae
Colpomenia spp.	saccate algae	*Gymnogongrus chiton*	branched algae
Colpomenia/Leathesia/ Soranthera spp.	saccate algae	*Halosaccion americanum*	saccate algae
Cystoseira osmundacea	bladder chain kelp	*Halymenia/Schizymenia* spp.	foliose algae
Egregia menziesii	feather boa kelp	*Hymenena* spp.	foliose algae
Fucaceae	rockweed	juv. articulated coralline algae	articulated coralline algae
Fucus gardneri	rockweed	*Mastocarpus jardinii*	branched algae
Haplogloia andersonii	turf weed	*Mastocarpus papillatus*	foliose algae
Hesperophycus californicus	rockweed	*Mazzaella affinis*	foliose algae
Laminaria setchellii	oar kelp	*Mazzaella flaccida*	iridescent seaweed
Laminariales	oar kelp (juv.)	*Mazzaella heterocarpa*	foliose algae
Leathesia difformis	saccate algae	*Mazzaella leptorhynchos*	branched algae
Nereocystis luetkeana	bull kelp	*Mazzaella lilacina*	foliose algae
Pelvetia compressa	rockweed	*Mazzaella linearis*	foliose algae
Phaeostrophion irregulare	foliose algae	*Mazzaella rosea*	foliose algae
Rosenvingea floridana	branched algae	*Melobesia mediocris*	crustose coralline algae
Scytosiphon spp.	saccate algae	*Microcladia borealis*	branched algae
		Microcladia coulteri	branched algae
RHODOPHYTA		*Neoptilota densa*	branched algae
Ahnfeltiopsis leptophylla	branched algae	*Neorhodomela larix*	branched algae
Antithamnion/Platythamnion spp.	filamentous algae	non-coralline crust	non-coralline crustose algae
Calliarthron/Bossiella spp.	articulated coralline algae	*Odonthalia floccosa*	branched algae
Callithamnion pikeanum	branched algae	*Osmundea* spp.	branched algae
Callithamnion/Pleonosporium spp.	filamentous algae	*Plocamium violaceum*	branched algae
Callophyllis firma	foliose algae	*Polyneura latissima*	foliose algae
Callophyllis flabellulata	foliose algae	*Porphyra* spp.	foliose algae
Callophyllis spp.	foliose algae	*Prionitis* spp.	branched algae
Chondracanthus canaliculatus	branched algae	*Pterocladia caloglossoides*	turf algae
Chondracanthus corymbiferus	foliose algae	*Pterosiphonia dendroidea*	filamentous algae
Chondracanthus harveyanus/spinosus	foliose algae	Rhodophyta (juv. blades)	foliose algae
Chondria decipiens	branched algae	*Rhodymenia* spp.	foliose algae
Corallina officinalis	articulated coralline algae	*Sarcodiotheca gaudichaudii*	branched algae
Corallina vancouveriensis	articulated coralline algae	*Schizymenia epiphytica*	foliose algae
coralline crust	crustose coralline algae	*Smithora naiadum*	foliose algae
Cryptopleura ruprechtiana	foliose algae	*Soranthera ulvoidea*	saccate algae
Cryptopleura violacea	foliose algae		
Cryptosiphonia woodii	branched algae	TRACHEOPHYTA	
Cumagloia andersonii	branched algae	*Phyllospadix* spp.	surfgrass

Table 5.1-7. Invertebrate taxa sampled in the HBT stations on the NRSA coast (1976-2005).

Scientific Name	Common Name or Description	Scientific Name	Common Name or Description
PORIFERA		ARTHROPODA (continued)	
Acarnus erithacus	volcano sponge	*Hemigrapsus oregonensis*	yellow shore crab
Haliclona spp.	purple sponge	*Heptacarpus* spp.	transparent shrimp
Porifera	sponge (unid.)	*Idotea* spp.	isopod
		Isopoda	isopod
CNIDARIA		*Lophopanopeus* spp.	black-clawed crab
Abiet./Sertularella/ Sertularia spp.	hydroid complex	*Loxorhynchus* spp.	masking crab
Anthopleura artemisia	buried anemone	Majidae	spider crab
Anthopleura elegantissima	aggregating anemone	Natantia	ghost shrimp
Anthopleura xanthogrammica	green anemone	*Pachycheles* spp.	porcelain crab
Anthozoa	anemone unid.	*Pachygrapsus crassipes*	lined shore crab
Cactosoma arenaria	prickly anemone	*Pagurus* spp.	hermit crab
Corynactis californica	strawberry anemone	*Paraxanthias taylori*	lumpy clawed crab
Epiactis prolifera	brooding anemone	*Petrolisthes* spp.	porcelain crab
Halcampa decemtentaculata	ten-tentacle burrowing anemone	*Pollicipes polymerus*	goose neck barnacle
Urticina spp.	sea anemone	*Pugettia* spp.	kelp crab
		Pycnogonida	sea spider
PLATYHELMINTES		*Tetraclita rubescens*	volcano barnacle
Platyhelminthes	flat worm		
		MOLLUSCA	
NEMERTEA		*Acanthinucella* spp.	unicorn snail
Nemertea	unsegmented worm	*Acmaea mitra*	white-cap limpet
		Aeolidia papillosa	shag-rug nudibranch
ANNELIDA		*Alia* spp.	dove snail
Chaetopteridae	parchment-tube worm	*Amphissa* spp.	wrinkled dove snail
Cirratulidae/Terebellidae	burrowing worm	*Barleeia* spp.	snail
Dendropoma spp.	worm shell	*Bittium* spp.	threaded bittium snail
Diopatra ornata	ornate tube worm	*Calliostoma annulatum*	purple-ring top snail
Dodecaceria fewkesi	colonial tube worm	*Calliostoma ligatum*	blue top snail
Eudistylia polymorpha	feather duster worm	*Calliostoma* spp.	top snail
Nereididae	segmented worm	*Chama* spp.	clam
Phragmatopoma californica	cement tube worm	*Conus californicus*	cone snail
Pista spp.	tube worm	*Crepidula* spp.	slipper snail
Polychaeta	segmented worm	*Cyanoplax* spp.	chiton
Polynoidae	scale worm	*Diaulula sandiegensis*	nudibranch
Salmacina tribranchiata	tube worm	*Diodora* spp.	rough keyhole limpet
Serpulidae	plume worm	*Discurria insessa*	seaweed limpet
Spirorbidae	tube worm	*Doriopsilla albopunctata*	white spotted nudibranch
		Epilucina californica	California lucine clam
SIPUNCULA		*Fissurella volcano*	volcano limpet
Sipuncula	peanut worm	*Fusinus luteopictus*	painted spindle snail
		Haliotis spp.	abalone
ARTHROPODA		*Hermissenda crassicornis*	opalescent nudibranch
Amphipod (tube)	amphipod tube	*Hipponix* spp.	hoof shell
Balanus spp.	barnacle	*Homalopoma luridum/Lirularia succincta*	dwarf turban snail
Cancer antennarius	rock crab	*Hopkinsia rosacea*	Hopkins rose nudibranch
Cancer spp.	rock crab	Ischnochitonidae	chiton
Chthamalus fissus	acorn barnacle	*Kelletia kelletii*	Kellet's Whelk
Grapsidae (juv.)	shore crab	*Lacuna* spp.	chink snail
Hemigrapsus nudus	purple shore crab	Lepidozona spp.	chiton

Table continued

Table 5.1-7 (continued). Invertebrate taxa sampled in the HBT stations on the NRSA coast (1976-2005).

Scientific Name	Common Name or Description	Scientific Name	Common Name or Description
MOLLUSCA (continued)		MOLLUSCA (continued)	
Lithopoma gibberosum	red tob snail	*Tegula brunnea*	brown turban snail
Littorina spp.	periwinkle snail	*Tegula funebralis*	black turban snail
Lottia asmi	black limpet	*Tonicella lineata*	lined chiton
Lottia digitalis	ribbed limpet	*Tricolia* spp.	pheasant shell
Lottia gigantea	owl limpet	*Trimusculus reticulatus*	reticulate button snail
Lottia instabilis	unstable limpet	*Triopha maculata*	spotted nudibranch
Lottia limatula	file limpet		
Lottia ochracea	yellow limpet	ECTOPROCTA	
Lottia pelta	shield limpet	Bryozoa (encrusting)	moss animal (encrusting form)
Lottia scabra	rough limpet	Bryozoa (erect)	moss animal (erect form)
Lottiidae	limpet	Bryozoa (foliose)	moss animal (foliose form)
Megatebennus bimaculatus	two-spotted keyhole limpet	*Eurystomella bilabiata*	red encrusting bryozoan
Mopalia spp.	chiton		
Musculus pygmaeus	clam	ENTOPROCTA	
Mytilidae	mussel	Entoprocta	goblet worm
Mytilus californianus	California mussel		
Mytilus galloprovincialis	mussel	ECHINODERMATA	
Mytilus spp.	mussel	Asteroidea	sea start
Nitidiscala/Opalia spp.	snail	*Cucumaria* spp.	sea cucumber
Nucella emarginata	dogwinkle snail	*Eupentacta quinquesemita*	stiff-footed sea cucumber
Nudibranchia	nudibranch	*Henricia leviuscula*	blood seastar
Nuttallina californica	chiton	Holothuroidea	sea cucumber
Ocenebra spp.	rock snail	*Leptasterias* spp.	six-rayed seastar
Octopus spp.	octopus	*Lissothuria nutriens*	red sea cucumber
Onchidella borealis	leather limpet	*Ophiothrix* spp.	common brittle star
Pelecypoda (boring)	boring clam	Ophiuroidea	brittle star
Phidiana hiltoni	fighting phidiana nudibranch	*Parastichopus* spp.	warty sea cucumber
Pseudomelatoma torosa	knobbed drill	*Patiria miniata*	bat star
Rostanga pulchra	red sponge nudibranch	*Pisaster ochraceus*	ochre sea star
Serpulorbis squamigerus	tube snail	*Pisaster/Henricia* (juv.)	sea star juvenile
Stenoplax spp.	chiton	*Pycnopodia helianthoides*	sunflower star
Tectura fenestrata	chocolate limpet	*Strongylocentrotus purpuratus*	purple sea urchin
Tectura paleacea	surfgrass limpet		
Tectura persona	speckled limpet	UROCHORDATA	
Tectura scutum	plate limpet	tunicates, colonial/social	sea squirt colony
		tunicate, solitary	individual sea squirt

Figure 5.1-6. Mean abundance of intertidal algae sampled in the HBT upper and lower transects in the NRSA (1976-2005). Species are the top 15 most abundant species across transects and surveys.

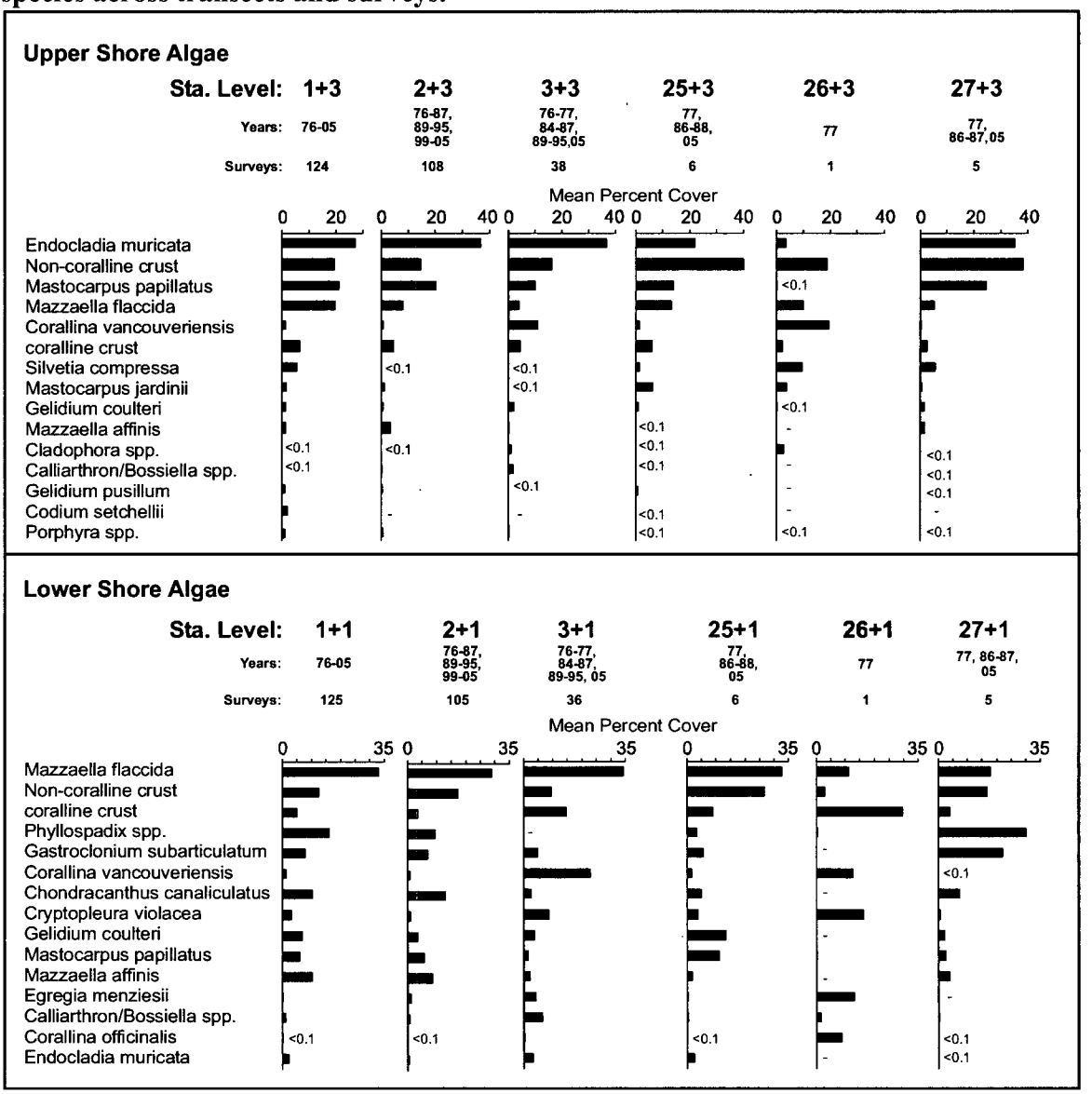
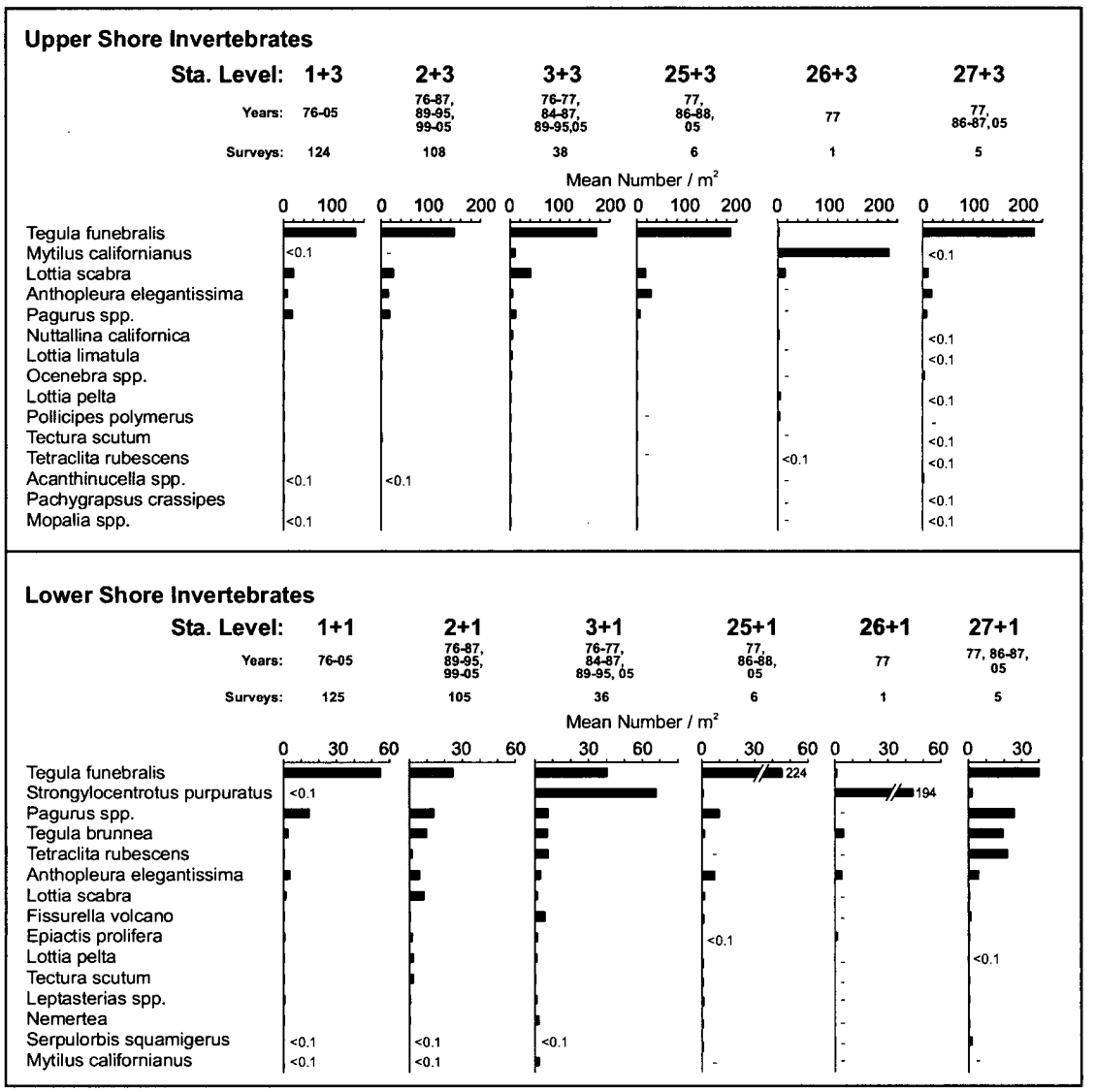


Figure 5.1-7. Mean abundance of intertidal invertebrates sampled in the HBT upper and lower transects in the NRSA (1976-2005). Species are the top 15 most abundant species across transects and surveys.



incidence of withering syndrome is near Cambria, located approximately 30 miles north of the NRSA (P. Raimondi, U.C. Santa Cruz, pers. comm.).

5.1.5 Discussion

Findings in Context with Other Research

Results from the RWMP, HBT, and VBT sampling, and black abalone studies, can be used to describe the types of intertidal communities and species (including species relative abundances) along the NRSA shoreline. In general, the species sampled in the RWMP studies are those expected to be present in any rocky area in the NRSA. All of the species sampled are relatively widespread and common inhabitants of rocky shores in central California. None are unique to the NRSA coast. Relative abundances among the species, however, are expected to vary between and among areas, due to many factors (e.g., differences in substrate composition, elevation, relief, exposure to wave and sand scour effects, competition for space, recruitment, grazing by marine organisms, and predation).

Owl limpets are believed to be not widespread throughout the NRSA. Owl limpets are specific to certain habitats that were under sampled in the HBT study. Owl limpets tend to be most abundant on smooth rocks exposed to the full force of waves, such as on the outer edges of headlands, places where HBT transects were not established.

Black abalone (*Haliotis cracherodii*) is another habitat-specific species in the NRSA. A specialized study was designed to sample this species which tends to occur as solitary individuals or in small aggregations in rock undercuts and crevice habitats. Transect plots were established in habitat areas specific for black abalone and where black abalone were once abundant. Numbers have since declined to near zero in all transect plots.

The Minerals Management Service (MMS) Pacific OCS Region also prepared habitat and species maps of the coast. This was done in the 1980s for the entire California coast, which included the NRSA coast. The intertidal habitat maps were created from helicopter videotape flyovers taken during low tide. A limited number of ground-truth surveys were completed to validate and refine the map details. In general, the MMS maps of the NRSA shoreline show less habitat detail than the intertidal maps prepared for the present study. A further description of the MMS maps, including a comparison of those maps and the maps of the present study is presented in Appendix E.

In comparing species lists between the MMS survey maps and results of the present mapping survey, the species occurrences noted on the MMS maps are similar to those found in the present mapping survey, with two exceptions. The MMS surveys noted sea palms were continuous in distribution from Coon Creek to Disney Point, a distance of approximately one mile. The mapping surveys done in 2005 noted sea palms were present only as a single patch on Disney Point, indicating a local decrease in the distribution of this species between the 1980s and present.

Figure 5.1-8. Mean abundance per survey of intertidal fish sampled in Station VBT NC-1V (1999-2005).

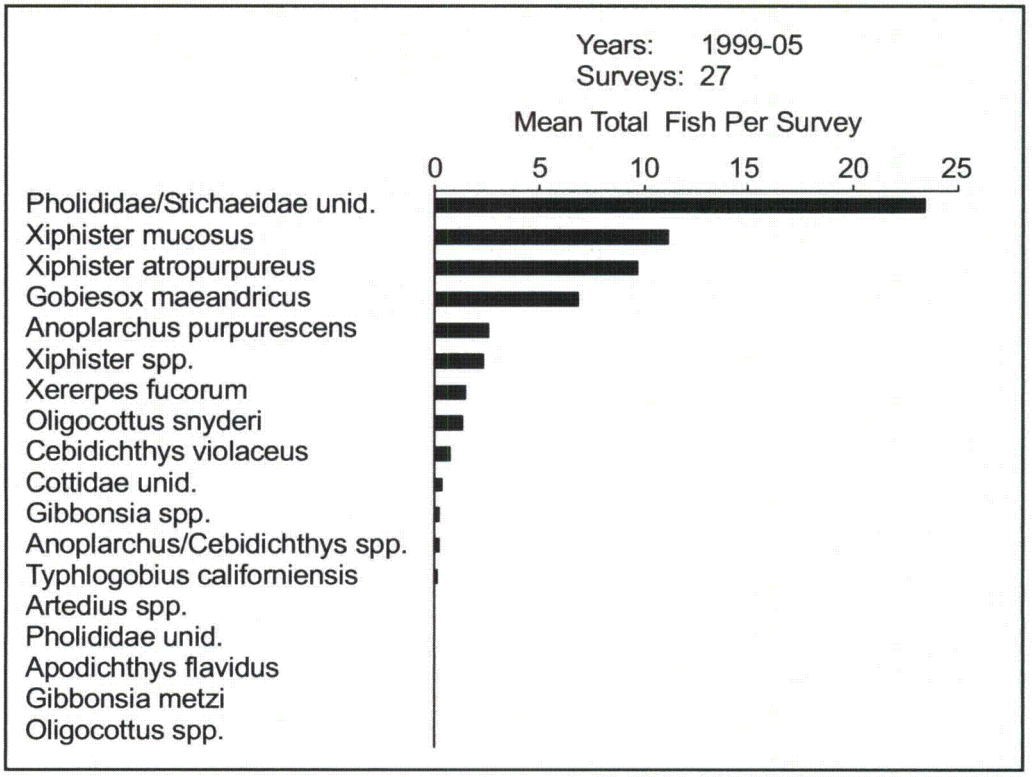
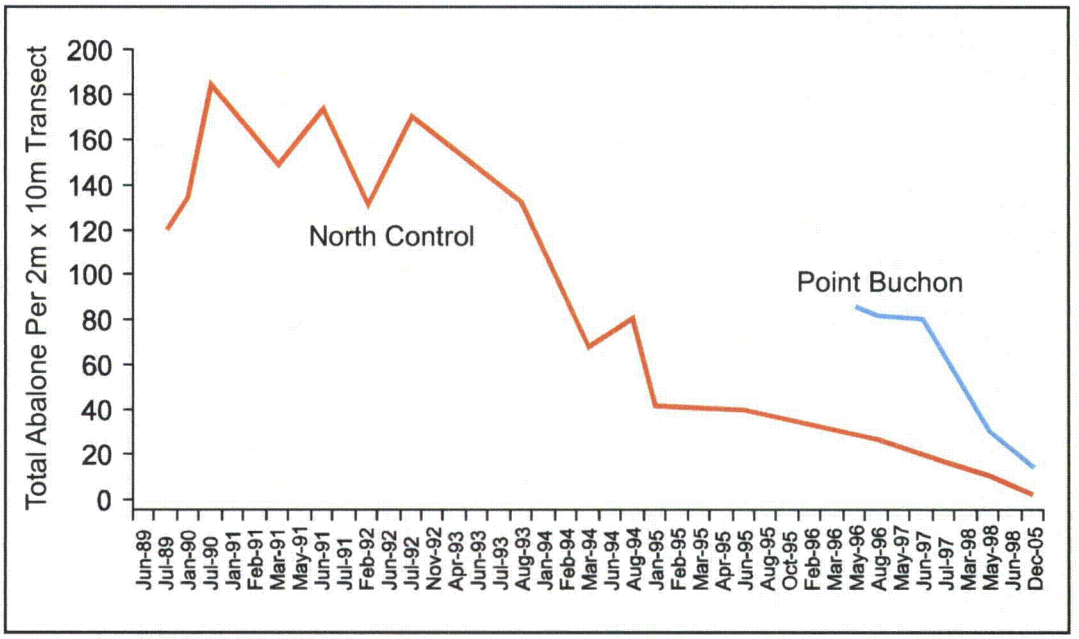


Figure 5.1-9. Changes in the abundance of black abalone in 2 x 10 meter transect plots in the NRSA (1989-2005).



Also, the MMS surveys noted the red algal complex *Odonthalia/Rhodomela* spp. (now *Odonthalia/Neorhodomela* spp.) as being occasional in occurrence throughout the NRSA coast. This description is questionable. It would be difficult, if not impossible, to detect the occurrence of *Odonthalia/Neorhodomela* spp. in aerial photographs, and ground-truth surveys were not done over the entire shoreline of the NRSA. The MMS description of the distribution of *Odonthalia/Neorhodomela* spp. was likely based on habitat association, not confirmed sightings (M. Hill, Minerals Management Service, pers. com.). The only current confirmed occurrence of *Odonthalia/Neorhodomela* spp. along the NRSA coast is at RWMP station HBT 2+1 (Tenera 2006).

Adequacy of the Field Work in Addressing DTF Comments on the Preliminary Environmental Baseline

DTF Comment(s):

- Item #77 requests information on the intertidal algal and invertebrate species that would be exposed to potential visitor impacts (e.g., trampling, collecting, handling), information that is not compiled in this manner in RWMP annual reports.
- Item #88 requests an invertebrate inventory.
- Item #87 requests a more complete description of sensitive intertidal species in the NRSA than provided in RWMP reports.

Actions Taken in Response to DTF Comments:

- Items #77 and #88: The RWMP annual reports present species inventories and data for the stations sampled along the NRSA coast, but also contain a significant amount of information that is not relevant to the CBI. Therefore, this special data summary (above) was prepared for this project consisting only of data from the NRSA coast stations. Also, historical RWMP stations along the NRSA coast that are no longer sampled in the RWMP were sampled again in 2005 expressly for this project to provide a more recent accounting of species composition and abundance at other station locations along the NRSA coast. These data are included above.
- Items #77 and #88: A mapping survey of intertidal habitats along the NRSA coast was completed in 2005 to fill gaps between the RWMP fixed stations.
- Item #87: There are no intertidal algae or invertebrates currently classified as "sensitive" by state or federal agencies (i.e., rare, endangered, or threatened under state or federal Endangered Species Acts, or otherwise officially recognized as sensitive). However, some species are of higher scientific and resource management interest because of limited distribution, declining abundances, or slow recovery potential. While these characteristics may be used to categorize species as sensitive, other species are considered to be important based on habitat value or role as key predators or consumers. The CBI has included information on all such species occurrences along the NRSA coast.
- The RWMP studies (1976-ongoing) provide the most comprehensive and long-term data sets available for describing species composition and abundance along the NRSA shoreline. The CDFG completed studies in 1970-1982 (Burge and

Schultz 1973, Gotshall et al. 1984, 1986). One of the CDFG intertidal sampling areas was on the NRSA coast and in the same area as RWMP horizontal band transects. Thus, there is duplication in sampling results between the CDFG and RWMP studies. North et al. (1989) completed thermal effects studies at DCPP in 1969-1987. However, none of their stations were along the NRSA coast. North (1969) developed the first species list for Diablo Cove, the immediate receiving water body of the DCPP thermal discharge, but the list did not include species north of the power plant in the NRSA. North and Anderson (1989) prepared a thermal effects predictive report that describes short and long-term changes in Diablo Cove that might occur once the power plant became operational. The report did not describe the NRSA coast.

Other Comments Not Specifically Addressed In The CBI:

Several other DTF comments pertain to intertidal studies that might be incorporated into a plan for long-term monitoring. The DTF comments below will be addressed in the final Access Monitoring Plan:

- Item #80 discusses the need to restrict access, regularly monitor, and change access points as needed to minimize impacts.
- Items #81, #82, #84, #86, and #89 are similar in noting the design of the long-term monitoring program should incorporate sampling methods that are the same as or compatible with other similar studies being conducted along the central California coast.
- Item #83 discusses the types of analysis methods that can be used to detect an impact should they exist.

5.2 Marine Mammals

The most important marine mammal species of concern along the NRSA coast is the Pacific harbor seal (*Phoca vitulina richardsi*), because individuals commonly haulout on the shore where there is the potential for haulout behaviors to be disturbed by people visiting the area. PG&E performed seal haulout mapping surveys along the DCPP coast from 1973 to1986, which included the NRSA coast (Krenn and Benech 1987). However, due to the 20 year time span since that work, harbor seal haulout mapping surveys were repeated in spring-summer 2005, to provide a current description of haulout use and locations for the NRSA coast.

5.2.1 Study Sites

The marine mammal haulout mapping survey in 2005 was conducted over the entire NRSA shoreline. Areas used by harbor seals for hauling out are typically sand beaches, reef platforms, and rocks that can be accessed without the seals needing to climb steeply, as the hind flippers of harbor seals cannot be rotated forward and used for pushing. While many rocks may be too steep and high for them to climb onto during low tides, they may be more accessible during mid- or high tides. Harbor seals do not occur on rocks with excessively tall vertical walls, such as offshore pinnacles and sea stacks.

5.2.2 Species Accounts

Pacific harbor seal (*Phoca vitulina richardsi*)

Pacific harbor seals range throughout the North Atlantic and North Pacific as five distinct stocks (populations). The individual stocks have been designated as subspecies, due to the effects of geographic isolation. *Phoca vitulina richardsi* is the Pacific harbor seal subspecies that occurs along the NRSA coast and it ranges from Alaska to Baja California, Mexico.

The Pacific harbor seal is the only pinniped species in California with spotted pelage. Coat color is highly variable, ranging from mottled dark spots on a light background to pale reticulations on a dark background. The sexes are similar, with males only slightly larger than females. The average seal is about five feet long and weighs about 200 pounds. Newborn pups weigh about 22 pounds, and are weaned when they are about six weeks old, at which time their weight has increased to about 50 pounds. Their maximum life span is 25 to 30 years. They are opportunistic feeders, and feed on a variety of nearshore fishes and invertebrates. Unlike other pinnipeds, individual harbor seals tend to remain in the same area (Thompson et al. 1998) and use the same haulout locations year after year for resting, molting, giving birth, and nursing pups (Studer 2000). A typical haulout area may have 30-80 animals. The Marine Mammal Protection Act of 1972 provides federal protection to marine mammals, which includes harbor seals. This law prohibits any activity that results in harassing or killing marine mammals.

Harbor seals have acute vision and hearing, and because of this they can be shy and sensitive to unusual activities while hauled out. The response to an unusual sight or sound can range from head-raising to abandonment of the haulout area. A 'forced' departure from the haulout area during pupping and molting seasons (March–July) would be the greatest form of potential impact.

Sea lions (*Zalophus califonianus*) and sea otters (*Enhydra lutris*) sometimes occur in the same haulout areas with Pacific harbor seals. When disturbed, however, Pacific harbor seals tend to be the first species to 'flush' or scurry off into the water and depart the area. The flight response can cause a 'flight cascade' among other species (S. Benech, pers. obs.).

Based on statewide census data, there are currently about 27,000 Pacific harbor seals that use 567 haulout areas along the California coast and offshore islands (CDFG 2001, NMFS 2003, Lowry et al. 2005). Based on surveys completed in the 1970s and 1980s along the NRSA coast, there were approximately 225 harbor seals that used two haulout areas on a regular basis and four areas on an intermittent basis, including one area for pupping along the coast between Coon Creek and Crowbar Peak (S. Benech, unpubl. data, Krenn and Benech 1987, Hanan et al. 1989 and 1992).

5.2.3 Survey Methods

Four field surveys were completed in 2005 to map harbor seal haulout locations and use along the NRSA coastline. The period from May through July is the standard time used by investigators to conduct population surveys (Hanan et al. 1989). This time span also

generally coincides with the harbor seal's six-week summer molting period when individuals are more likely to spend time hauled out (Hanan et al. 1989). Morning hours are when sea and swell conditions can be most calm, which are conditions conducive for seals to haulout. Low tides are also best to observe haulout areas because low tides provide more intertidal area on which harbor seals can rest.

The haulout surveys were conducted on June 12 and 27, and on July 7 and 28, 2005, between 0750 and 1200 noon. The haulout surveys were conducted simultaneously with regularly scheduled bi-monthly sea otter counts in the NRSA. Low tides during the surveys ranged from -0.02 foot to +2.5 foot MLLW. All observations were made from the bluff edge. The observer carefully approached the bluff edge to not disturb harbor seals on the shore below. Observations and counts were made visually using 7x50 binoculars. The numbers of hauled out harbor seals, locations, and times were noted on aerial photo maps of the survey area. An accurate census of all harbor seals was not expected or possible because of the likelihood that some individual seals were away from the shore and out of view during the observations. Incidental observations of hauled out sea otters and other pinniped species were also noted on the maps. The observer continued along the coastal terrace from one observation point to the next making sure that there was overlap with the previous field of view. This search method was repeated until the entire five kilometer length of the NRSA shoreline was observed (Coon Creek to Crowbar Peak).

5.2.4 Survey Results

Harbor seals were hauled out in mainly four areas: Disney Point, Windy Point, Barn Road, and Seal Rock (Figures 5.2-2 and -3). The Disney Point haulout was new in 2005. It remains unclear whether this area is a new primary or secondary haulout because of the small number of observations. For reporting purposes it is considered a primary area because it was occupied by large numbers of animals during three of the four survey days. The Disney Point haulout area consists of two sand/gravel pocket beaches at the south base of the Point. The maximum number of harbor seals hauled out there was 88.

The shoreline length of the Windy Point haulout area is relatively large with various locations where harbor seals can haulout. The maximum number of harbor seals hauled out in the Windy Point area was 45.

The Barn Road haulout area is physiognomically different from all of the other areas, consisting of a combination of sand beach at the cliff base and an adjoining offshore low bench platform that is exposed during low tide. The maximum number of harbor seals hauled out at Barn Road was 20.

The Seal Rock haulout area is mainly a complex of large offshore rocks where as many as 94 harbor seals were observed.

The haulout sites used most regularly over the four survey days were Windy Point and Seal Rock. Harbor seals were observed hauled out in these areas on each of the four

survey days. The Disney Point haulout area was occupied on three of the four survey days. The Barn Road haulout area was occupied on two of the four survey days.

Sea otters were also observed in the harbor seal haulout areas. Two adult otters were observed at Windy Point, and two adults plus one pup were observed on Seal Rock. In addition, a single adult male sea otter was observed hauled out on rocks south of Coon Creek. Sea otters that were offshore of the intertidal zone along the NRSA were also noted during the marine mammal haulout surveys. Each day there were approximately 53 adults and four dependent pups resting in kelp beds along the NRSA coastline.

5.2.5 Discussion

Findings in Context with Other Research

The results from the harbor seal haulout mapping surveys provide a recent description of haulout locations and use along the NRSA coast since the time they were previously mapped by Krenn and Benech (1987). In general, harbor seals have increased in numbers since the 1970s. However, the relative increase has slowed over recent years (Figure 5.2-2). This pattern is consistent with statewide census trends that indicate population growth has decreased to less than 10% each year.

Using the maximum number of harbor seals that were hauled out in each area and totaling those numbers across areas provides a population estimate of 247 harbor seals for 2005 along the coast between Coon Creek and Seal Rock. This method is an estimate, and accounts for harbor seals that may have been in the water and out of view during the observations. This is the current method used by CDFG to estimate statewide population densities (Hanan et al. 1989).

Another method used to derive seal population estimates uses a correction factor of 1.53 to account for unobserved seals that may be in the water (Hayward et al. 2005). Using this method and the largest single count of the four days surveyed (164), a population estimate for the NRSA of 250 animals was derived; nearly identical to the estimate derived using the other method.

The surveys in 2005 also found that the number of haulout areas had increased slightly and the locations had shifted from the 1970s to the present. There were four haulout areas in the NRSA in 1975 and five in 1986 (S. Benech, un publ. data, Krenn and Benech 1987, Hanan et al. 1989, Lowry et al. 2005). Four areas were occupied during the present surveys, but one was a new area, providing a total of six areas that have been used as haulouts between 1975 and 2005.

Figure 5.2-1. Harbor seal and sea otter haulout locations and number of hauled out animals observed in four survey days within the NRSA, spring-summer 2005.

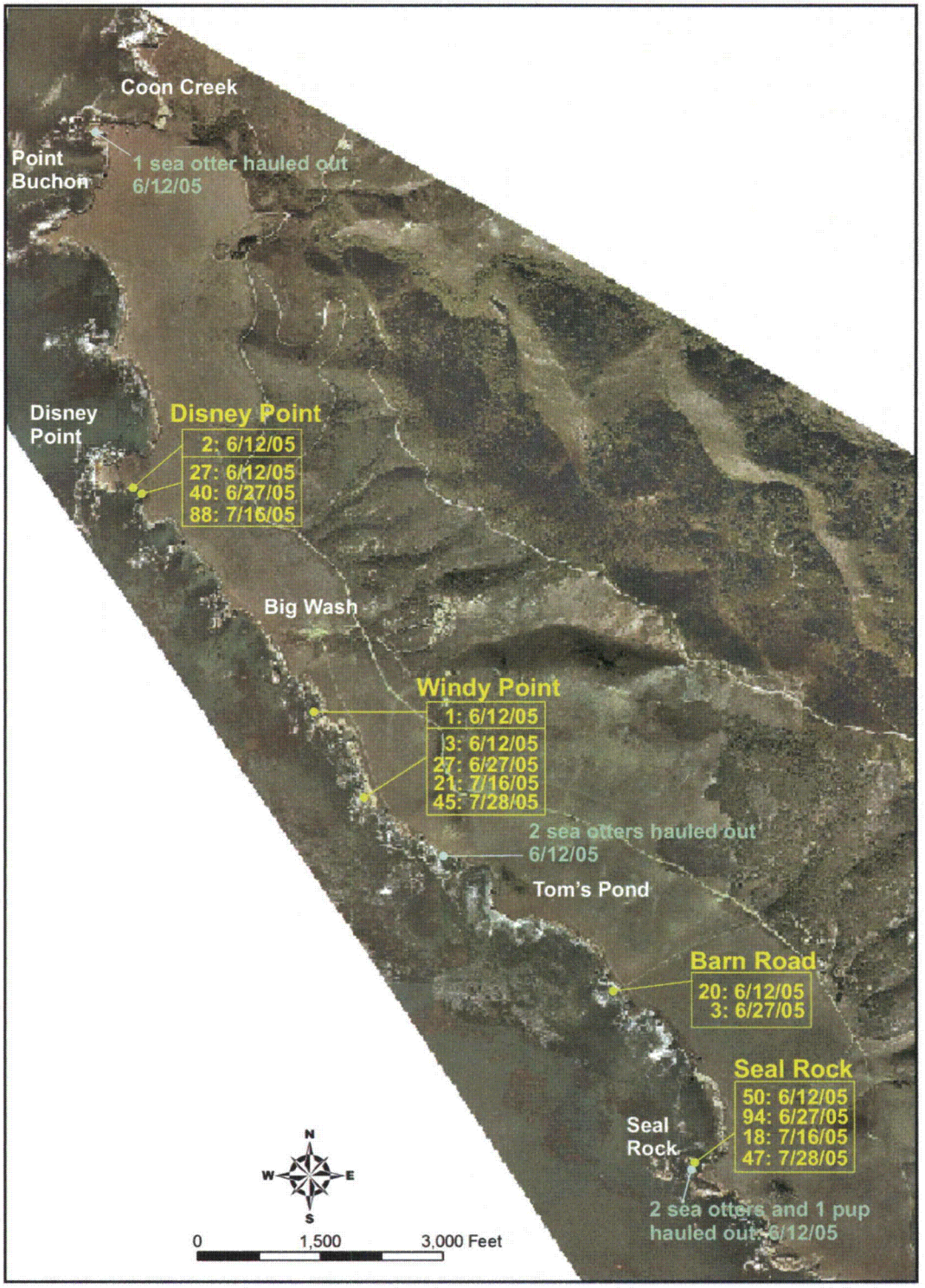
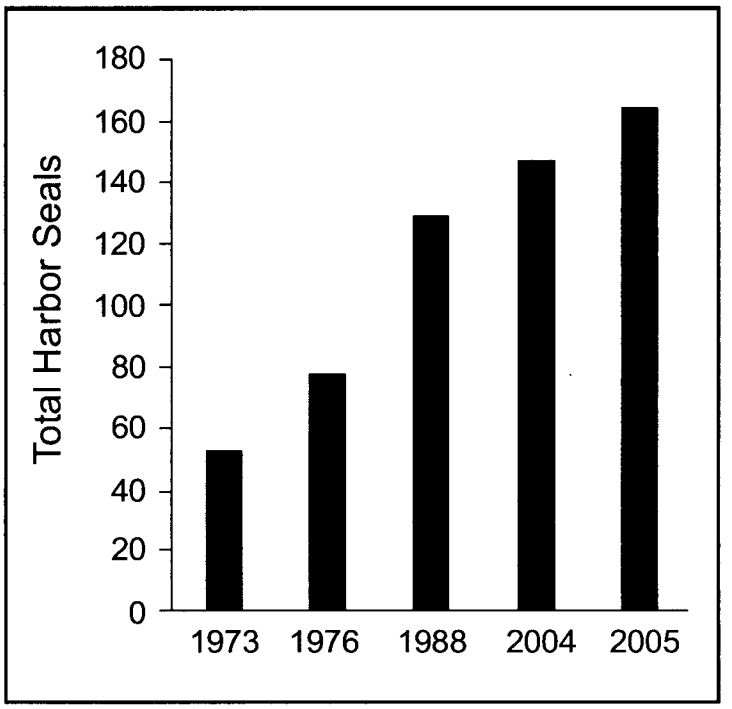


Figure 5.2-2. Maximum number of harbor seals observed hauled out along the NRSA coast (1973-2005). Data for 1973-2004 are from Hanan et al. 1989 and Lowry et al. 2005. Data for 2005 are from the surveys completed as part of the NRSA coast baseline study.



Use of each area also changed over time. In 1975, Windy Point and Seal Rock were 'primary' haulout areas. Primary areas were those almost always occupied on two temporal scales (day and season). At the same time, two areas were 'secondary' areas, one on an extended reef immediately southwest of Tom's Pond and another about 400 meters north of Seal Rock. Secondary areas were less consistent in use on both a daily and a seasonal basis.

Harbor seals increased in numbers from 1975 to 1986, and four primary areas and one secondary area became used (five total haulout areas). The Tom's Pond area had shifted from secondary to primary and the new Barn Road primary area appeared. An additional secondary area appeared at Windy Point. Since then, additional rocks next to Windy Point have been used as haulout sites, such that the Windy Point area is now larger and a primary haulout. It remains unclear whether this area is a new primary or secondary haulout because of the small number of observations. For reporting purposes it is considered a primary area because it was occupied by large numbers of animals during three of the four survey days.

The Windy Point and Seal Rock haulout areas have remained consistent in use over three temporal scales daily, seasonal, and annual. These areas probably provide the most consistent ease of access for harbor seals and are relatively distant from current human disturbances (e.g., ranching practices). However, other areas should not be considered less important as they provide necessary alternate resting areas.

The Barn Road site has the further historical distinction of being an important pupping area, the only documented pupping area in the NRSA (Krenn and Benech 1987). The Barn Road site was used again for this purpose in 2005 (S. Benech, pers. obs.).

Sea lions and elephant seals (*Mirounga angustirostris*) can co-occur in the same haulout areas with harbor seals (Studer 2000). However, this has been rare along the NRSA coast (S. Benech, pers. obs.). Elephant seals in the NRSA vicinity have tended to be juveniles observed mainly on the breakwater tri-bars of the DCPP intake cove. Sea lions in the DCPP area mainly haulout on Lion Rock and Pup Rock. Both are offshore and south of the NRSA. These steeper rocks can be more easily accessed by the more agile sea lions.

In contrast, sea otters can be common co-habitants with harbor seals in haulout areas. Small numbers of otters (usually 2-5) can often be seen hauled out alongside and among harbor seals. Sea otters have been documented at as many as eight haulout locations along the NRSA coast (Benech 1996), which includes the harbor seal haulout areas mapped in the present study. Although sea otters can haulout on rocks year-round, sea otters tend to haulout in largest numbers in spring, their peak pupping season. Sea otters can bully harbor seals, and if there is competition for space, the otter will generally win (S. Benech, pers. obs.).

Although harbor seals tend to be 'loyal' to specific haulout areas, they may vary their use at a particular area hourly, daily, and seasonally. Use is dictated by sea conditions, tidal height, and perceived exposure to danger or harassment, which can change over time.

Pupping, nursing, and molting can also affect the time and place of use. Harbor seals are quite capable and not hesitant to shift to alternate haulout areas depending on the nature of conditions and availability of other haulout areas.

Harbor seals are vulnerable to human disturbances, and are known to flush from haulout areas when humans approach within 300 meters (Trulio 2005). The National Oceanic and Atmospheric Administration (NOAA) recommends 90 meters as a suitable distance to minimize haulout disturbance effects. However, the actual 'comfort' distance for harbor seals can be affected by the degree and regularity of the disturbance. For example, slow, quiet movements tend to be less alarming to harbor seals than loud, fast movements and noises. Also, harbor seals can become tolerant to various sights and sounds if they are regular in occurrence. It is the unpredictable infrequent event, such as low flying aircraft, occasional human visitors, or dogs that can be the most disruptive.

Adequacy of the Field Work in Addressing DTF Comments on the PEB

The literature comprising the PEB includes the report of Krenn and Benech (1987), which describes marine mammal haulout locations along the NRSA coast from surveys conducted over the period 1973 to 1986.

DTF Comment(s):

- Item #91 requests that a marine mammal haulout mapping survey be completed as part of the CBI because the previous mapping survey along the DCPP coast was done 20 years ago.
- Item #79 also requests that a marine mammal haulout mapping survey be completed as part of the CBI. Item #79 further states that monitoring should continue once there is public access and that bluff trails be re-routed if impacts occur, particularly during the pupping season.

Actions Taken, or to be taken in Response to DTF Comments:

- Items #79 and #91: Marine mammal haulout areas were mapped along the NRSA coast in 2005 to provide updated information on haulout use and locations.
- As appropriate, based on a final trail route, annual monitoring will include assessment of access related effects on marine mammals.

5.3 Nesting Sea Birds

Surveys of seabird nesting colonies were done along the NRSA coast in spring-summer 2005. Nesting seabirds that are close to public trails can be vulnerable to human disturbances. Greatest impacts can be disruption to nesting behaviors that result in reduced survivorship of eggs and fledglings. The Migratory Bird Treaty Act of 1918 provides federal protection to migratory birds, including seabirds, and prohibits any activity that can result in harassing or killing seabirds.

Twenty five species of seabirds nest along the California coast with the greatest diversity and local abundance occurring in two areas along the northern coast; the Farallon Islands and the coastline between Cape Mendocino and the Oregon border (Osborne and

Reynolds 1971, Sowls et al. 1980, USFWS 2005). The Santa Barbara Channel Islands also comprise an important location for breeding seabirds, supporting the entire California breeding populations of black storm-petrels (*Oceanodroma melania*), brown pelicans (*Pelecanus occidentalis*), and Xantus' murrelets (*Synthliboramphus hypoleucus*).

Several species of seabirds have been documented as nesting along the NRSA coast during previous surveys of the area. These include the western gull (*Larus occidentalis*), Brandt's cormorant (*Phalacrocorax penicillatus*), pelagic cormorant (*Phalacrocorax pelagicus*), pigeon guillemot (*Cepphus columba*), and black oystercatcher (*Haematopus bachmani*). Of the seabird species that nest along the California coast, these five species are reported to have the widest distribution of nesting colonies (Sowls et al. 1980).

5.3.1 Study Sites

Seabirds nest on offshore rocks, on coastal shore cliffs that are relatively stable, and on ledges of headland walls. The NRSA coast has a variety of these habitats available to nesting seabirds, therefore the entire NRSA coastline was included in the 2005 field surveys.

5.3.2 Nesting Sea Bird Species Accounts

Brandt's Cormorant (*Phalacrocorax penicillatus*)

Brandt's cormorants are a common yearlong resident and the most abundant of the cormorants nesting on the California coast. They are protected under the Federal Migratory Bird Treaty Act, and their Conservation Classification for breeding seabirds under the California Current System is 'moderate'.

The breeding range extends from southeast Alaska to Baja California, Mexico. Brandt's cormorants reside in marine subtidal and pelagic zones, especially near rocky shores. Except while fishing, Brandt's cormorants spend little time on the water. They roost communally on rocky headlands and islets, and occasionally on sand beaches. Brandt's cormorants nest on the flat or moderately sloping tops of offshore islets, as well as inaccessible mainland bluffs and cliff ledges.

The most recent surveys indicate a total range-wide breeding population of <100,000 Brandt's cormorants, of which approximately 75% breed in Oregon and California (USFWS 2005). Brandt's cormorants are monogamous and breed mostly from March to August and lay eggs from April to July. Clutch size ranges from three to six, with four being the norm. Both parents incubate the eggs. The young are altricial; the age of first flight and independence is unknown.

Brandt's cormorants are susceptible to disturbance during the breeding season. Humans, boats, and low flying aircraft easily frighten parents off their nests, which can result in heavy predation on eggs and the young. Crows, ravens, and western gulls are common predators of the eggs and young of Brandt's cormorants. Repeated disturbance can cause a colony to be permanently abandoned.

Pelagic Cormorant (*Phalacrocorax pelagicus*)
The pelagic cormorant is the smallest and least gregarious of the Pacific cormorants and is a fairly common year-long resident along most of its range, which extends from the Chukchi and Bering seas south to Japan and northern Baja California, Mexico. They are protected under the Federal Migratory Bird Treaty Act, and their Conservation Classification for breeding seabirds under the California Current System is 'high concern'. Pelagic cormorants reside in marine subtidal habitats along rocky coasts with cliffs and offshore islands. They forage relatively close to shore, usually within 10 kilometers of land.

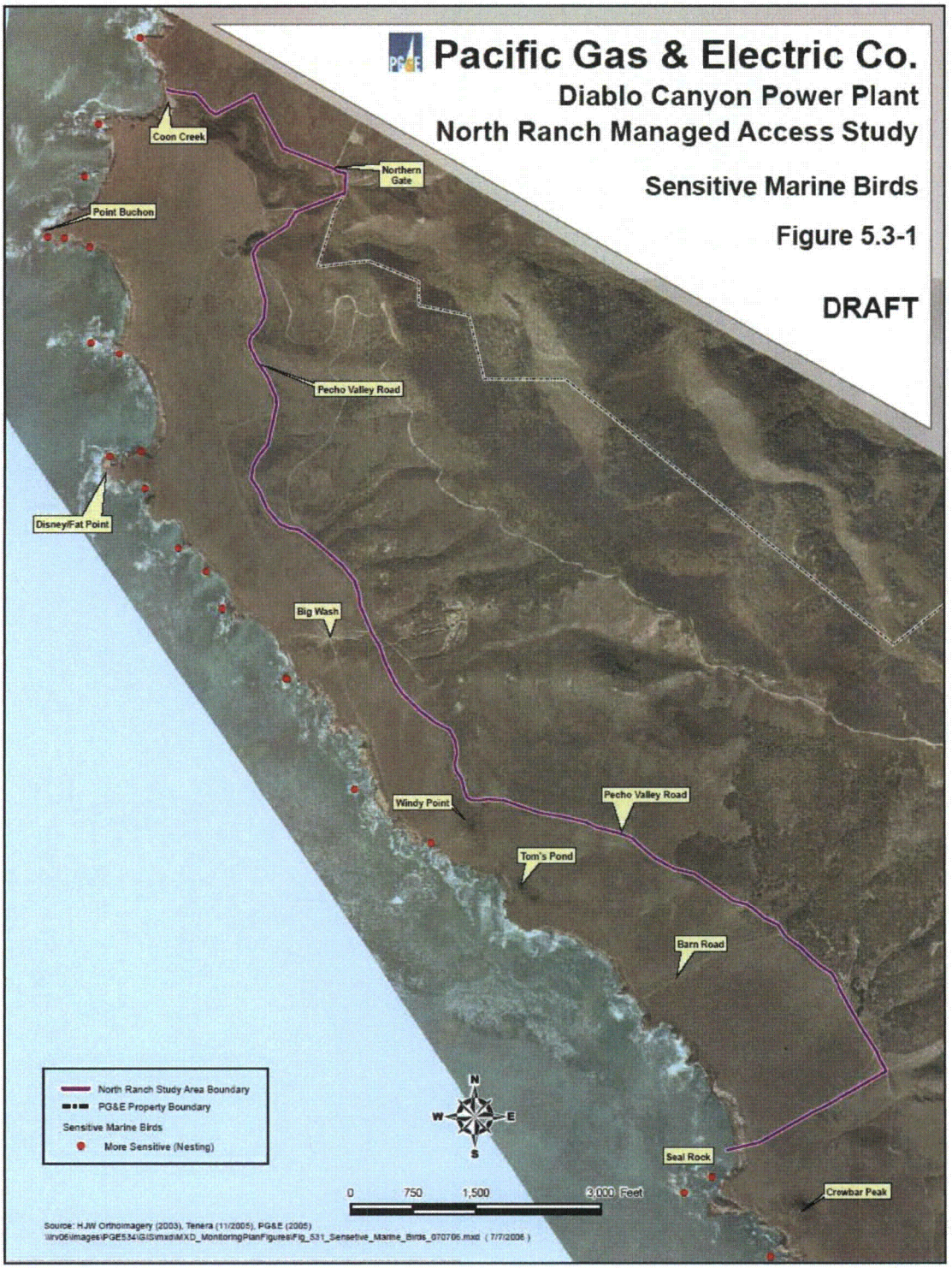
Pelagic cormorants breed from April to September and the eggs are laid mainly from May to June. Pelagic cormorants are monogamous colonial nesters, although colony size is comparatively small with generally fewer than 100 birds per colony (USFWS 2005). Clutch size is usually three to five eggs, but can be six to seven. Pelagic cormorants are capable of raising only one brood per season, but may lay a replacement clutch if the entire clutch is lost early in the season. The young are raised in platform nests built of seaweed that are on small outcrops and ledges situated anywhere from hundreds of feet above the ocean to just within the spray zone.

The global population of pelagic cormorants is estimated at approximately 400,000 birds with about 69,000 breeding in North America (USFWS 2005). California represents less than 21% of the North American breeding population at an estimated 14,300 birds (USFWS 2005). Numbers of birds and breeding success have declined dramatically during El Niño events.

Shoreline development poses a threat to pelagic cormorants in California. Pelagic cormorants are highly sensitive to human disturbances during breeding season. Adults, in their panicked retreat, may knock eggs and young chicks from nests or leave them vulnerable to predation by crows, ravens, and western gulls.

Pigeon Guillemot (*Cepphus columba*)
Pigeon guillemots inhabit subtidal and intertidal marine habitats and are found along rocky coasts from the Kurile Islands to southern California. They are protected under the Federal Migratory Bird Treaty Act, and their Conservation Classification for breeding seabirds under the California Current System is 'moderate.' In California, pigeon guillemots breed on offshore rocks and inland cliffs from the Oregon border south to Santa Barbara Island. There are five recognized sub-species; *C.c. eureka* breeds in Oregon and California. Pigeon guillemots forage close to shore and birds are rarely encountered greater than five kilometers offshore (USFWS 2005).

Figure 5.3-1. Known locations of sensitive marine birds within the NRSA as determined by surveys performed in 2005.



Pigeon guillemots typically nest in natural rock crevices and talus slopes, but occasionally use burrows or artificial cavities, such as wharf timbers and drain pipes (Sowls et al. 1980). On the Channel Islands, eggs are laid from mid-April through mid-June, with a peak in early May (CDFG 2005c). The young hatch from mid-May through mid-July, and fledge from late June through August (CDFG 2005c). Clutches usually contain two eggs.

The global population estimate of pigeon guillemots is 246,000 birds with about 88,000 breeding in North America; California's breeding population is 15,500 (USFWS 2005). A northward movement takes place following the breeding season, and most pigeon guillemots disappear from the California coastline during fall/winter, reappearing just before breeding the following year.

Compared to other seabirds, pigeon guillemots are not highly vulnerable to human disturbance, due to relatively low nesting density, inaccessible nests sites, and their widespread distribution along the Pacific coast. Nevertheless, pigeon guillemots will readily abandon their nests if disturbed during incubation or brooding (Sowls et al. 1980).

Black Oystercatcher (*Haematopus bachmani*)

Black oystercatchers are shorebirds that inhabit rocky shores along most of the California coast. They are protected under the Federal Migratory Bird Treaty Act, and their Conservation Classification for breeding seabirds under the California Current System is 'high concern'. The U.S. Shorebird Conservation Plan lists black oystercatcher as a 'Species of High Concern' based on relative abundance, threats on breeding grounds, and non-breeding distribution (Brown et al. 2001).

Although black oystercatchers are usually found on the same rocks and offshore islands as colonial nesting seabirds, they are non-colonial nesters and permanent residents of the coastal areas they inhabit. The nests of black oystercatchers, which are difficult to find, are composed of a slight depression on a rock ledge, usually lined with pebbles or shell pieces, and located just above the ocean splash zone (Sowls et al. 1980). Black oystercatchers begin laying eggs in early May. Clutch size is one to three eggs, with an average of two. The chicks are precocial and within about a week of hatching follow the adults to nearby intertidal feeding grounds (Sowls et al. 1980). By late September most chicks have fledged (CDFG 2005c).

Black oystercatchers require clean and undisturbed rocky coastlines for nesting and feeding, and are highly susceptible to human disturbance. Human activity may cause incubating parents to abandon their nests, leaving eggs and chicks vulnerable to predacious gulls and ravens. Mortality among eggs and chicks is high. In addition to predation, occupied nests are frequently destroyed by storm waves (Sowls et al. 1980).

Sowls et al. (1980) estimates the California breeding population of black oystercatchers to be 1,000 birds, with the Farallon Islands supporting 6% and the Channel Islands 34% of the state population (CDFG 2005c). Black oystercatchers vanished from the Farallon Islands in the 1860s, probably as a consequence of too much human disturbance. It was

not until 1956 that black oystercatchers were once again observed on the Farallon Islands on a regular basis (Sowls et al. 1980).

Western Gull (*Laris occidentalis*)
Western gulls are endemic to the west coast of North America and are abundant yearlong residents of coastal California. They are protected under the Federal Migratory Bird Treaty Act, and their Conservation Classification for breeding seabirds under the California Current System is 'low concern'.

Their range extends from British Columbia to the southern tip of Baja California, Mexico. There are two recognized sub-species of the western gull: *L. o. occidentalis* (British Columbia to San Francisco) and *L. o. wynami* (San Francisco to Baja) (Grant, 1999). Western gulls hybridize extensively with glaucous-winged gulls in the northern part of their range (USFWS 2005).

Although western gulls nest in a variety of habitats, they are primarily found on the more horizontal surfaces of offshore rocks and islands. Western gulls may also nest along the mainland coast on steep slopes and cliff faces that are inaccessible to terrestrial predators. Western gulls also nest on man-made structures, such as building tops, bridges, and anchored boats. Western gull nests are usually substantial and consist of an arrangement of vegetation, debris, and feathers. Western gulls breed colonially from early April through August (CDFG 2005c). Clutch size can be up to three eggs (USFWS 2005).

The total worldwide breeding population of western gulls is estimated to be between 80,000 and 126,000 birds, with the majority of the population (50-77%) in California (USWFS 2005). Although reproductive success since the 1970s and 1980s has declined on the Farallon and Santa Barbara Islands, the California statewide population has increased in numbers by 39% (USFWS 2005).

Although human impacts on western gulls are limited due to the remote breeding localities and the resilience of individuals and populations, they, like other seabirds, are susceptible to human disturbance while nesting. Disturbance may result in lowered reproductive success and intra-specific predation of eggs and chicks (Sowls et al. 1980).

5.3.3 Survey Methods

The objective of the survey effort was to identify seabird nesting locations and summarize the distribution, species composition, and relative abundances of nesting seabirds within the NRSA. Surveys were conducted during the spring-summer months of 2005 (from mid-May to mid-July) to encompass the peak of the nesting season. Survey results represent a snapshot in time and are intended to provide current information on the locations where seabird nesting activity occurs along the NRSA coastline.

Field surveys of seabird nesting colonies were conducted along the 3.3-mile section of the NRSA coast, from Coon Creek to Seal Rock. The NRSA was surveyed on two occasions in 2005, once early in the seabird nesting season and once near the end of the nesting season. Each survey effort was conducted between the hours of 0930 and 1500

(when birds were resting following their morning foraging bout) and required two days to complete. The first survey was initiated on May 19 at Coon Creek and progressed southward to Peregrine Rock (about half way through the NRSA). The first survey effort was completed on June 3 when the remaining section of coast to Seal Rock was surveyed. The second survey effort commenced on July 14, beginning at Coon Creek and ending at Tom's Pond. The second survey was completed on the following day (July 15) when the remaining section of the coast to Seal Rock was surveyed.

Field surveys were conducted by two teams of two biologists. Binoculars and spotting scopes were used to count and identify seabirds and to observe nesting activity. One of the observers on each team served as a data recorder. Counts were made from vantage points at or near the top of the mainland cliff. Usually both teams counted birds from the same location and compared counts. Counts were repeated to ensure accuracy. Observer teams recorded the site location, number of birds by species, and number of birds on nests. After a consensus was reached about the seabird count at a specific location the observer teams moved to the next vantage point. This count method was repeated until the entire coastline between Coon Creek and Seal Rock was surveyed. Therefore, the data collected during surveys was based on direct counts of individual birds and nests and not estimates. However, there were few vantage points along the NRSA coast that would allow the observer teams to count seabirds loafing or nesting on the ocean (offshore) side of nearshore rocks. Therefore, actual nesting abundance is likely to be higher than survey count totals.

5.3.4 Survey Results

The seabird data was grouped by geographical reference areas (coastal sections) that correspond to the permanent grazing paddocks located immediately adjacent to the coastal bluffs all along the NRSA coast (Figure 5.3-2). Seabird nests were observed in nine of the twelve coastal sections (Figure 5.3-3 and Table 5.3-1).

The survey results indicate that four common local seabird species nest along the NRSA coastline: Brandt's cormorants, pelagic cormorants, western gulls, and pigeon guillemots. Black oystercatcher pairs were also observed in and around nesting colonies on offshore rock formations. Black oystercatcher nests were not positively identified during the survey, but nesting activity within the NRSA is considered likely.

Western Gull (*Laris occidentalis*)

Western gulls were the most abundant and widely distributed seabird species nesting within the NRSA with a total of 59 nests distributed within eight of the twelve coastal sections. Nests on offshore rock formations within the PF4 (Point Buchon) and Big Wash paddock areas accounted for 77% of the western gull nests observed during the survey. Western gulls nested singly or in loose aggregations atop tall offshore rock formations. The spacing of the nests appeared to be a minimum of several meters, as defined by the territory of the adult gulls. Old, abandoned gull nests were also found on top of the mainland bluffs at several locations along the coast.

Pelagic Cormorant (*Phalacrocorax pelagicus*)

As with western gulls, the PF4 (Point Buchon) and Big Wash coastal sections supported the greatest number of pelagic cormorant nests, which were second in nest abundance within the NRSA. Pelagic cormorants were observed nesting on narrow ledges along the vertical surfaces of offshore rocks and rocky coastal cliffs that receive some protection from direct exposure to ocean swells and wind. A total of 52 pelagic cormorant nests were observed during surveys within coastal section PF4 (Point Buchon), DP (Disney Point), and Big Wash.

Pigeon Guillemot (*Cepphus columba*)

Pigeon guillemot nests were also detected in these three sections of the NRSA. Pigeon guillemots often utilized the same semi-protected vertical rock cliffs as pelagic cormorants, however the pigeon guillemot nests were located back inside crevices instead of on narrow ledges along the rock face. Although pigeon guillemots appeared to be relatively abundant within the NRSA and were commonly observed on the ocean adjacent to rocky headlands, nesting activity was positively identified at only four locations. The nesting abundance of pigeon guillemots is easily underreported because nests are hidden back in crevices, and once nesting has begun, nest sites are often very difficult to detect. Additionally, it is impossible under most circumstances to distinguish breeding pigeon guillemots from non-breeders so counts reflect the total number of birds around a colony instead of the number of breeding birds (Sowls et al. 1980). A total of 119 pigeon guillemots were counted between the Coon Creek and WP1 (Windy Point) paddock areas, inclusively.

Brandt's Cormorant (*Phalacrocorax penicillatus*)

Like western gulls, Brandt's cormorants utilize the top of tall offshore rock formations for nesting. The Brandt's cormorant had the most restricted nesting distribution within the NRSA with nests present on one offshore rock in section PF5 (Lover's Beach). Brandt's cormorants nest in relatively dense colonies with the nests generally evenly spaced (one meter or less). Consequently, the nesting colony in PF5 with both Brandt's cormorant nests and western gull nests supported the greatest density of nesting birds in the NRSA.

Black Oystercatcher (*Haematopus bachmani*)

Although black oystercatcher nests were not detected in the NRSA, as many as 27 black oystercatchers were observed along the coast during a single survey, including several adult oystercatchers exhibiting possible incubating or brooding behavior.

Figure 5.3-2. Sections of coast (ranch paddocks) used to summarize coastal distribution data on nesting seabirds within the NRSA.

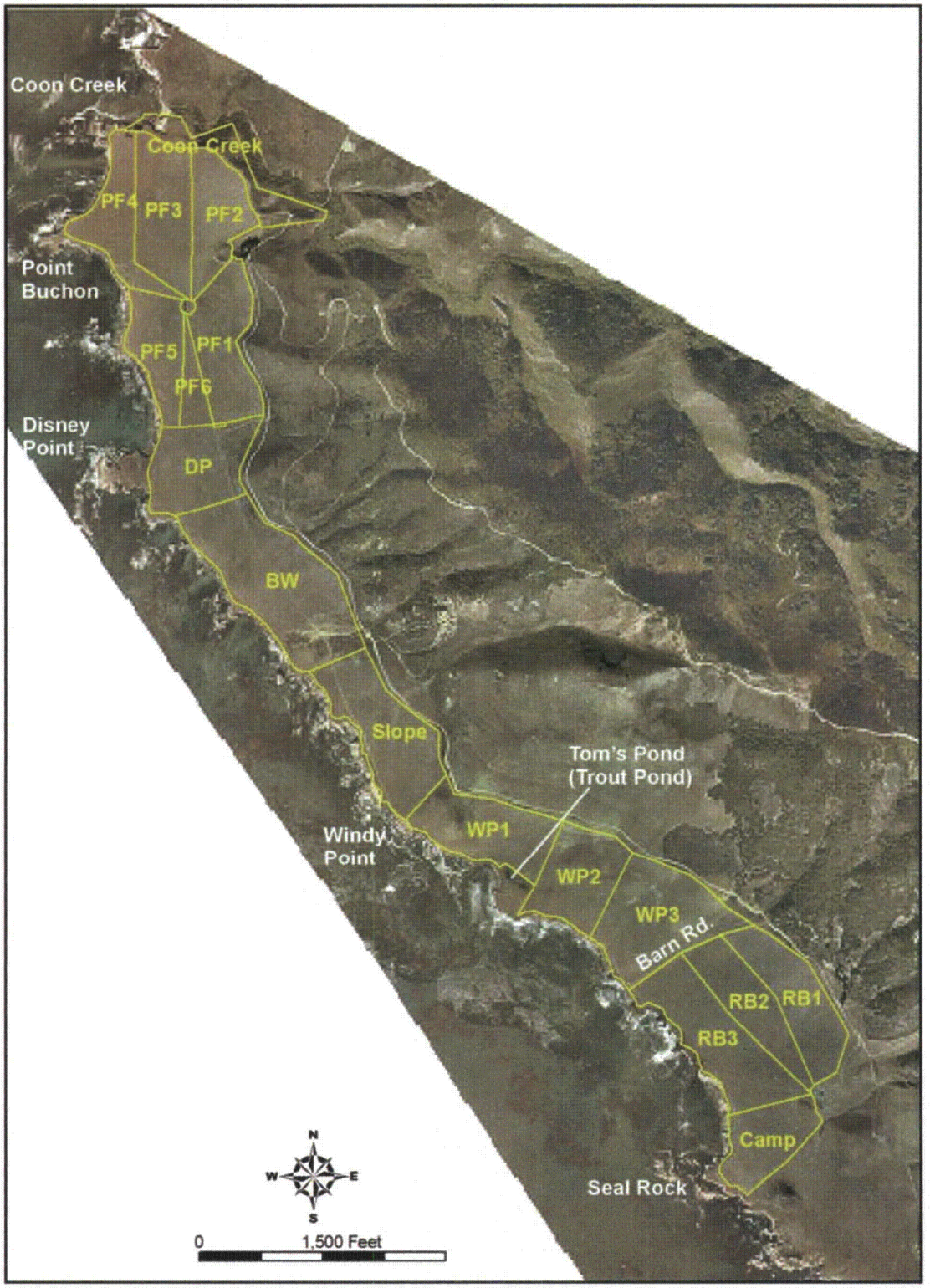


Figure 5.3-3. Number of nesting seabirds observed by sections of coast in two surveys completed in spring-summer of 2005 along the NRSA. The numbers represent the summation of the maximum numbers observed per site within each section over the two surveys.

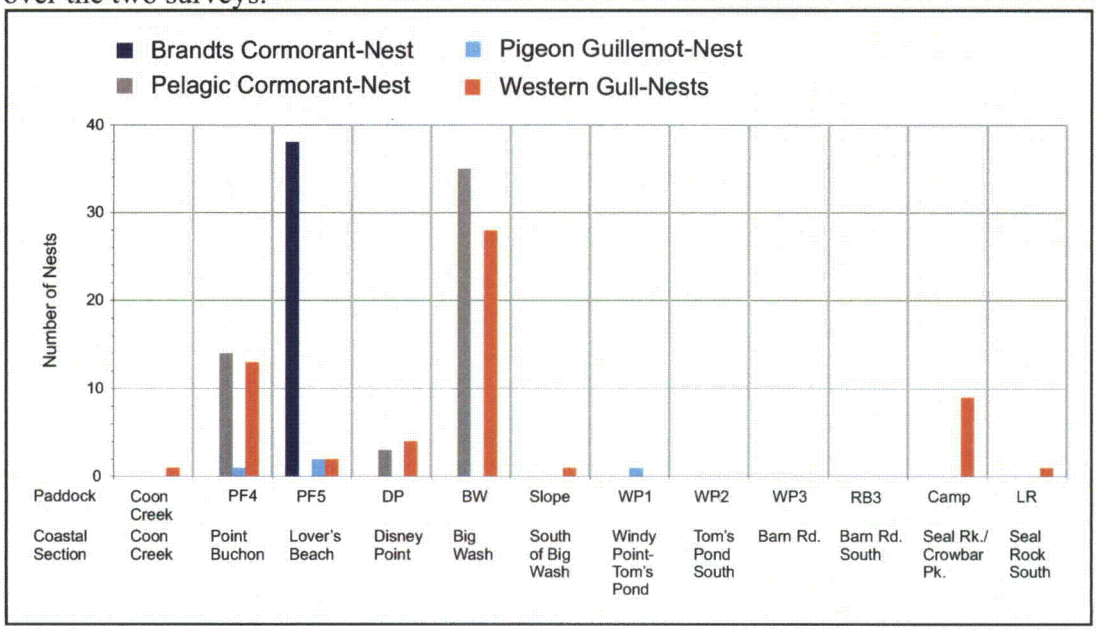


Table 5.3-1. Nest and breeding bird count data for the NRSA coast.

Species	Number of Seabird Nests per Section of Shore (Paddock)/												
	Coon Creek	PF4	PF5	DP	BW	Slope	WP1	WP2	WP3	RB3	Camp	LR	Total
Western gull *Larus occidentalis*	1	13	2	4	28	1					9	1	**59**
Brandt's cormorant *Phalacrocorax penicillatus*			38										**38**
Pelagic cormorant *Phalacrocorax pelagicus*		14		3	35								**52**
Pigeon guillemot *Cepphus columba*		1	2				1						**4**
Total	**1**	**28**	**42**	**7**	**63**	**1**	**1**				**9**	**1**	**153**

A variety of other seabirds that do not nest along the NRSA coast were also observed during the surveys. These include brown pelican (*Pelecanus occidentalis*), glaucous-winged gull (*Larus glaucescens*), Heermann's gull (*L. heermanni*), ringbilled gull (*L. delawarensis*), and black turnstone (*Arenaria melanocephala*). Nesting cliff swallows (*Petrochelidon pyrrhonota*) and peregrine falcons were also observed.

5.3.5 Discussion

Most nesting activity was observed north of the Big Wash area and can be explained by the geophysical characteristics of the coastline. The coastal bluffs north of the Big Wash area are mainly headlands, rocky promontories extending into the ocean, steep shore cliffs, and tall offshore pinnacles and sea stacks. Excluding the Seal Rock area at the southern end of the NRSA, nesting activity was rare along the southern portion of the NRSA. The relative unsuitability of this reach for nesting is due mainly to the lack of offshore rocks and sea stacks of sufficient height to provide nest areas that are protected from large waves. In addition, the shore cliffs along this reach consist mainly of weathered unconsolidated soils rather than hardened rock. The cliffs are highly erosive and have few ledges and crevices that offer suitable nesting areas.

Findings in Context with Other Research

In addition to the work of Krenn and Benech (1987), seabird nesting surveys were conducted previously along the NRSA coast by Frame (1972) and Sowls et al. (1980). Frame (1972) surveyed pelagic cormorant nesting sites from Coon Creek to the southern extent of the Big Wash paddock area. Sowls et al. (1980) cataloged seabird colonies along the California coast that included Area 477 (San Luis Obispo). Three of the seabird colonies surveyed, Colony 009 (Point Buchon), Colony 010 (Unnamed Rocks), and Colony 028 ('Pup Rock and Adjacent Mainland') were in the current NRSA. These three areas encompassed much of the higher value nesting habitat observed in the present study. In comparing data, one principal difference between data collected in 1979-1980 by Sowls et al. (1980) and data collected during the 2005 survey is the vantage points used. Observations of seabird colonies by Sowls et al. (1980) were made entirely from a boat, except for Colony 028 where the field team landed on Pup Rock to count western gull nests. The surveys conducted in 2005 for the present study were completed from the top of the shore cliff.

Sowls et al. (1980) reported the number of breeding birds in a colony by multiplying the total count of nests by two (except for pigeon guillemots, in which all pigeon guillemots were counted). Table 5.3-2 compares the count data (nests and breeding birds) between the Sowls et al. (1980) study and the 2005 study for similar sections of the NRSA coast. The Sowls et al. (1980) breeding colony 009 corresponds to coastal paddock areas PF4 (Point Buchon) and PF5 (Lover's Beach); breeding colony 010 corresponds to coastal paddock areas DP (Disney Point), BW (Big Wash), and Slope; breeding colony 028 corresponds to paddocks Camp (Seal Rock area) and LR (Lion Rock), although breeding colony 028 includes areas south of Lion Rock.

A comparison of the 2005 survey results with the Sowls et al. (1980) data show an overall increase in nesting activity within the NRSA for western gulls, Brandt's cormorants, and pelagic cormorants with some variation in the distribution of nests for each species. The Brandt's cormorant nesting colony documented in the 2005 study was not reported in Sowls et al. (1980) or by Frame (1972), and may be a recent expansion of the large colony on Lion Rock. In contrast, pigeon guillemot numbers appear to be reduced. This could reflect differences in survey timing and methods between the two studies rather than a population decline. Black oystercatcher nesting was not identified during the 2005 survey. However, survey methods and timing may also have played a part in this finding.

Table 5.3-2. Comparison of nest and breeding bird data for the NRSA coast, Tenera 2005 survey vs. Sowls et al. 1980.

	2005 Study			Sowls et al. (1980)		
	Shore Areas (paddocks)			Comparable Seabird Colony		
Species	PF4-PF5	DP, BW, and Slope	Camp and LR	009	010	028
Western gull *Larus occidentalis*	15 nests 30 birds	33 nests 66 birds	4 nests 8 birds		11 nests 22 birds	27 nests 54 birds
Brandt's cormorant *Phalacrocorax penicillatus*	38 nests 76 birds					
Pelagic cormorant *Phalacrocorax pelagicus*	14 nests 28 birds	38 nests 76 birds		2 nests 4 birds	32 nests 64 birds	
Pigeon guillemot *Cepphus columba*	53 birds	45 birds		20 birds	200 birds	
Black Oystercatcher *Haematopus bachmani*				3 nests 6 birds	5 nests 10 birds	1 nest 2 birds

Actual black oystercatcher nest locations are found in a low percentage of circumstances, so in previous studies nesting was usually indicated from the territorial defense behavior of adults, which required a close approach (Sowls et al. 1980). The 2005 study was conducted from a distance that would be unlikely to elicit territorial defense behavior, and therefore nesting activity could not be identified by this method. The vantage points along the top of mainland bluffs did not allow a closer approach and no attempts to elicit a defense response were made. Despite the negative findings, the relatively high number of black oystercatchers observed during surveys and possible incubating/brooding behaviors suggest that breeding does occur within the NRSA.

Adequacy of the Field Work in Addressing DTF Comments on the Preliminary Environmental Baseline

PG&E had no information to provide in the PEB on nesting seabirds along the NRSA coast, thus prompting new field studies in 2005 to establish a baseline for this resource category.

DTF Comment(s):

- Items #75, #78, and #90 recommends that a nesting seabird mapping survey be done as part of the DCPP environmental baseline.
- Item #78 also recommends the bluff trail avoid areas of nesting seabirds and that monitoring be done and the trail re-aligned as necessary to minimize impacts to nesting seabirds.

Actions Taken in Response to DTF Comments:

- Items #75, #78, and #90: Surveys of seabird nesting colonies along the NRSA coast were done in spring-summer 2005 for use in coastal bluff trail planning and preparation of the access monitoring plan.

PG&E believes that all aspects of the marine resources baseline (intertidal species, marine mammals, and seabirds) are complete and responsive to comments received from

the DTF. This information will suitably support development of the Access Plan and Access Monitoring Plan.

6.0 Cultural Resources

Twenty-nine prehistoric and historical archaeological sites (or potential sites) have been identified within the NRSA. Some of these sites were first recorded in the 1940s when Arnold Pilling performed the earliest systematic archaeological surveys of the region under the auspices of the University of California (Pilling 1951). Pilling's sites were assigned the first trinomial designations in San Luis Obispo County under the state's newly designed numbering system (e.g. CA-SLO-5, CA-SLO-6, CA-SLO-9). In the 1980s Wilcoxon (1988) performed limited surveys on behalf of PG&E, recording additional sites, and in the early 1990s Shelly Davis-King conducted a more thorough survey of the NRSA property, documenting or updating the records for most sites in the NRSA (Davis-King 1991, Davis-King and Williams 1992). Since that time, however, the sites have not been formally revisited. Most recently, PG&E cultural resources specialist, Lynn Compas (2003) surveyed a small portion of the NRSA prior to replacement of an old bridge recording several historical features.

In response to comments received on the PEB from the DTF, PG&E agreed to relocate and update the records of all known cultural site within the NRSA. A contractor, Applied Earthworks (Æ), was hired to perform this work.

Æ's redocumentation focused on current site conditions, and used sub-meter accurracy GPS technology to plot site locations and boundaries. In addition to archaeological field work, Æ researched historical uses of the NRSA, including the farming activities of Japanese immigrants during the 1920s and 1930s. Although the scope of the study did not involve significance evaluation of historical or prehistoric sites, research sought to expand on existing overviews of the NRSA and provide a context for future interpretation of the sites.

6.1 Physical and Cultural Setting

6.1.1 Physical Environment

The NRSA is variously referred to as the Pecho Ranch, North Ranch, and/or North Property, and is located at the southern end of the Santa Lucia Range, one of the southern Coast Ranges that extend south from San Francisco Bay to the Santa Ynez River, west of the San Andreas Fault zone (Norris and Webb 1990). Long valleys parallel the coast, with faults and folds controlling the direction of drainage throughout the region (Norris and Webb 1990). The coastal terrace lies between the Irish Hills on the east and the Pacific Ocean. It consists of uplifted bedrock overlain with successive layers of ancient marine deposits and more recent alluvial sediments (Greenwood 1972). The NRSA consists of approximately three-miles (500 acres) of this marine terrace and coastline, situated between Coon Creek in the north and Crowbar Canyon in the south, and ranging in elevation from sea level 320 feet. Coon Creek, the major drainage in the NRSA, is a perennial stream that originates in the hills and flows through a narrow canyon to the sea. Natural springs occur near Tom's Pond, and provide the source water for this small man-

made reservoir. Monterey and Franciscan cherts are found throughout the coastal region and were the primary tool stones worked by prehistoric inhabitants.

The climate is generally mild with cool summer temperatures averaging 70 degrees Farenheit and winters ranging from 40 to 50 degrees Farenheit (Jones and Waugh 1995). Most rainfall occurs between December and March. The NRSA is often blanketed by fog, particularly in the summer months when the warm inland air rises creating an on-shore flow of cool moist marine air.

The coastal region supported a variety of resources important to both prehistoric and historical inhabitants. Along with fish and sea mammals, shellfish are plentiful in the shallow waters offshore. *Olivella*, *Haliotis*, and *Mylitus* species, whose shells are well represented in prehistoric middens, provided not only sustenance but also the raw material for tools and ornamentation (Greenwood 1972). Small and medium size-mammals (e.g., squirrels, raccoon, coyote, fox, mountain lion, and deer) are found in the coastal hills. The immediate NRSA is characterized by four distinct vegetation community types. These are described in detail in Section 3.0.

In historical times, a variety of crops were cultivated on the coastal terrace, and domestic livestock, primarily cattle, may have grazed here continuously for the past 200 years. Similarly, the Irish Hills have been used as pasture land for many years, but the chaparral and woodland habitats of this region have remained comparably undisturbed and include grass and scrublands as well as stands of oak and Bishop pine.

6.1.2 Prehistory

Archaeological evidence suggests that Native American use of this Central Coast region began during the late Pleistocene, as early as 9000 B.C. A scant but growing body of evidence from this earliest period of occupation includes two fluted projectile points: one is a basal fragment discovered near Santa Margarita (Gibson 1995) and one is a complete point found near Nipomo (Mills et al. 2005). More conclusive evidence of human occupation has been found at a few coastal sites dating to the early Holocene, prior to 6500 B.C., including four deep shell middens dating from 7000-8000 B.C. The paucity of sites and materials from this time, termed the Paleocoastal Period by Moratto (1984), suggests that population density was low and settlements were impermanent. People used relatively simple technology to procure plant foods, shellfish, and a limited array of vertebrate species (Breschini and Haversat 1982; Greenwood 1972; Jones and Waugh 1993; Jones et al. 1994; King 1990).

Well-developed shell middens, numerous milling implements, and fishing tools provide the evidence for more intensive and settled human occupation after 6500 B.C. Although the period is best defined by the predominance of handstones and milling slabs, indicating a reliance on hard seeds and other plant foods, flaked stone tools include leaf-shaped bifaces, oval bifacial knives, choppers, and scrapers. Hammerstones, fishing equipment (grooved net sinkers and bipointed gorges), and *Olivella* beads are also included among the artifacts.

Cultural changes after 3500 B.C. are thought to be a response to environmental shifts, rising sea levels, and an increase in population. Diagnostic artifacts of this period include large side-notched, square-stem, and contracting-stem projectile points as well as *Olivella* beads. Although milling slabs and handstones continued as the primary plant processing tools, mortars and pestles were added to the artifact inventory, probably indicating systematic use of acorns (Glassow and Wilcoxon 1988). In response to climatic changes, local residential sites appear more settled but not permanent, with an increase in logistical organization of economic activities (Jones et al. 1994). The greater diversity of site types during this period reflects an increasing number of short-term occupations near labor-intensive resources. Trade and exchange also increased in importance as population mobility decreased, as evidenced by exotic shell beads and obsidian materials in midden deposits (Jones et al. 1994).

Prehistoric technology and economy became markedly more complex after 600 B.C. The artifact assemblage contains shell fishhooks and other fishing gear, saucer-type *Olivella* beads, and contracting-stem projectile points. The use of handstones and milling slabs continued during this period, but pestles and mortars occur in greater proportions (Jones and Waugh 1995). After A.D. 500 the bow and arrow was adopted and the *tomol*, or plank canoe, was developed on the coast (King 1990). Along the Santa Barbara Channel the *tomol* became the basis of an extensive maritime fishing industry and helped link the mainland to the Channel Islands; it is unclear, however, to what extent the *tomol* was used north of Point Conception, although local residents utilized tule balsas and dugouts.

Subsistence practices during late prehistory emphasized fish and acorns, with greater use of seasonal resources and the first attempts at food storage (Glassow and Wilcoxon 1988; King 1990). Continuation of trade relationships is evident in the increased number and diversity of obsidian items and beads associated with this period. Settlement practices were similar to those of the prior period. Sites were occupied on an extensive basis but not as permanent settlements. These residential bases functioned in conjunction with smaller short-term occupations at specialized resource processing areas.

The period after A.D. 1000 was a time of emergent political complexity, development of social ranking, and the rapid development of craft specialization along the Santa Barbara Channel. Similar evidence is lacking, however, in San Luis Obispo County. In this area settlement appears to have shifted away from the coast, perhaps reflecting adaptations to warmer temperatures and changes in available resources on the coast (Jones et al. 1994). Artifact assemblages contain a mixture of earlier artifact types such as stemmed projectile points, milling slabs, handstones, bowl mortars, and *Olivella* beads. Moreover, the absence of imported obsidian after A.D. 1000 suggests a change in trade relationships that is likely associated with the shift in settlement patterns (Jones et al. 1994). Native populations in San Luis Obispo County may have decreased during this time as villages became temporary hunting camps and native inhabitants increasingly relied on terrestrial mammals for subsistence.

No subsurface investigations have occurred in the NRSA, but in the late 1960s, prior to the construction of the DCPP, Roberta Greenwood excavated six sites: CA-SLO-2, -51, -

52, -61, -584, and -585 between Diablo Canyon Creek and Pecho Creek (Diablo Creek lies about 1-mile south of the NRSA, while Pecho Creek crosses the marine terrace approximately 3.5 miles south of DCPP). These investigations produced a wealth of material remains, including flaked and ground stone tools, bone and shell artifacts, and deeply stratified shell midden deposits containing numerous human burials. CA-SLO-2 produced radiocarbon dates indicating that occupation began more than 9,000 years ago (Greenwood 1972). In addition, the upper levels of the site yielded several types of small triangular and lanceolate projectile points typically associated with late prehistoric and historic Chumash groups. CA-SLO-2 contains ample evidence that the occupants of this site were fishermen, but the level of technology suggests that fishing was limited to the immediate seashore and apparently represented an important but not central part of the subsistence strategy (Greenwood 1972).

More recently, Gary Breschini and Trudy Haversat performed limited test excavations at CA-SLO-7 and –8, two smaller sites immediately north of CA-SLO-2 (Breschini and Haversat 1988). They concluded that CA-SLO-7 contained two occupational components, one representing Phase 1 of the Late Period and the second representing either Early or early Middle Period occupation. CA-SLO-8 appeared to be a single component site associated with the Late Period Phase 1. The Late Period components at both sites appeared to be seasonally occupied fishing camps related to the village at CA-SLO-2, while the Early/Middle Period component at CA-SLO-7 was more difficult to interpret because of its very sparse assemblage. Both sites were judged to be significant historical resources according to CEQA criteria (Breschini and Haversat 1988). Additionally, the California Department of Parks and Recreation has sponsored a field school at CA-SLO-9 for the students of California State Polytechnic University in San Luis Obispo. The results of two seasons of excavation are not yet published, but a suite of radiocarbon dates indicates that the portion of the site investigated dates exclusively to the Late Period (Terry Jones pers. comm. 2005).

6.1.3 Ethnography

San Luis Obispo County lies within the traditional ethnographic territory of the ObispeZo, or northern Chumash. The Chumash were among the most populous and socially complex groups in all of native California. By the beginning of the Protohistoric Period, the Chumash were living in large villages along the Santa Barbara Channel coast, with less dense populations in the interior regions, on the Channel Islands, and in coastal areas north of Point Conception. Population density was unusually high for a nonagricultural group; some villages may have had as many as 1,000 inhabitants. Occupational specialization went beyond craft activities such as bead production to include politics, religion, and technology. Complex social and religious systems tied many villages together and regulated regional trade, procurement and redistribution of food and other resources, conflict, and other aspects of society. Leadership was hereditary, and some chiefs had influence over several villages, indicating a simple chiefdom level of social organization (Arnold 1992; Johnson 1988).

The ObispeZo apparently were never as populous as their relatives in the Santa Barbara region, and archaeological research suggests societies less dependent on fishing (Glassow and Wilcoxon 1988). Local populations may have led a less sedentary lifestyle with a dietary focus on inland rather than coastal or maritime resources and greater reliance on logistic mobility than their southern neighbors (Woodman et al. 1991). The ObispeZo may not have attained the levels of social and political development of their southern counterparts, and the extent to which they participated in regional networks integrating social and economic activities remains to be clarified.

Spanish occupation of California began in 1769 and brought Chumash culture to the brink of extinction. The establishment of the Spanish Presidio in Santa Barbara and five Franciscan missions in Chumash territory significantly disrupted social, economic, and political organization. Introduction of domestic plants and animals as well as European wild grasses caused irreversible changes in the local environment. Native Californians had limited resistance to European diseases, which caused significant deaths among the Chumash.

Although people of Chumash ancestry still live in the region today and many strive to retain parts of their culture, the complex social system of the Chumash ended during the Mission Period (1769–1830). Larson et al. (1989) suggest that climatic variability, prolonged droughts, and warmer sea-surface temperatures during this period forced the Chumash into the missions as a strategy to minimize economic and social risk. However, Price (2005) argues that Mission agricultural yields were insufficient to support the native population, and the Obispeno continued to practice the full suite of traditional foodways well into the Mission period.

6.1.4 History

Euro-American settlement in San Luis Obispo County began with the founding of the Mission San Luis Obispo de Tolosa in 1772. The mission was part of a series of churches established along the California Coast by the Franciscan Order of the Catholic Church under the patronage of the Spanish Crown. Initially, Spanish ships supplied the province with basic foodstuffs, tools, and other goods, but by the late 1770s the missions were producing enough wheat and corn to meet their own needs (save for the occasional climatic calamity). The friars also cultivated beans and barley and raised a variety of livestock.

The ensuing Mexican Period (1821-1848) served as not only a temporal transition between the Spanish and Anglo-American periods in California history but an economic one as well. Following independence from Spain, the Mexican authorities dispensed with Spanish mercantilism, opened the door to foreign markets, expanded trade with Americans and other foreigners, and afforded private individuals—both Mexican nationals and immigrants—the right to obtain title to land (Hackel 1998). Such immigrant-friendly laws directly contributed to the migration and eventual permanent presence of Anglo-Americans in California.

In 1834, Governor Jose Figueroa initiated the process of secularization, formally ending the influence of the missions and converting them into mere churches. The mission estates were subsequently redistributed to private citizens; the economic void created by the demise of the missions was filled by the emergence of the ranchos—huge parcels totaling several thousand acres each and supporting large herds of livestock.

The political and economic unrest in California during the early and mid-1840s is evident in the Mexican government's conveyance of the Cañada De Los Osos y Pecho y Islay, a 32,431-acre land grant that includes the North Diablo Canyon lands. In 1842, Governor Alvarado granted the Cañada De Los Osos to Victor Linares; one year later, Alvarado's successor as governor, Manuel Micheltorena, awarded the Pecho y Islay to Francisco Padillo (Title Insurance and Trust Co. 1957). In 1845, Micheltorena was ousted from power and replaced by Pio Pico (Thompson and West 1883). In September of that year, Pico consolidated the two grants and issued them to Diego (James) Scott and Juan (John) Wilson (Title Insurance and Trust Co. 1957). By 1850, Wilson had bought out Scott and become the sole proprietor of the Cañada De Los Osos y Pecho y Islay.

Along with the Cañada De Los Osos y Pecho y Islay properties, Wilson's holdings included the Piedra Blanca, La Laguna, and Suey ranchos. Wilson even purchased part of the San Luis Obispo Mission from the Mexican government in 1845, although the U.S. government restored these lands to the church in 1856 (*La Vista* 1969). Wilson died in 1860 (Thompson and West 1883), leaving his estate to his wife Ramona Carrillo Wilson.

The Pecho y Islay Rancho (or Pecho Ranch) was likely used as pasture land. Although the eastern boundary of the ranch lay only 10-12 miles from the town of San Luis Obispo, the property was largely isolated and undeveloped. Until fairly recently, the Pecho Road—which winds northward from the ranch over the Pecho Hills, then eastward through the Los Osos Valley, and on towards San Luis Obispo—was the only land route between the ranch and outside world.

The emergence of the dairy industry, following the 1862-1864 drought, attracted many northern Italian immigrants as well as Portuguese from the Azores Islands to San Luis Obispo County (Krieger 1988). Among these émigrés was Luigi Marre, native of Genoa, Italy. Marre had arrived in San Francisco in 1854, and by the time he leased the southern part of the Pecho Ranch in 1879, Marre was an accomplished stockman boasting several thousand head of cattle and sheep (Morrison and Haydon 1917). Marre leased the Pecho Ranch for 18 years, after which he bought 3,800 acres of the property. Marre's parcel lay south of Diablo Creek

The northern portion of the Pecho Ranch is associated with another prominent stockman in San Luis Obispo County—Alden Bradford Spooner, Jr. (Morrison and Haydon 1917). A.B Spooner was one of seven children born to Reverend A.B. Spooner Sr., long time resident in the Morro area. In 1892, the younger Spooner leased a 6,500-acre swath extending from just north of Islay Creek to Diablo Creek. That same year he built his ranch house, which today serves as the visitors' center for Montaña de Oro State Park.

Near his residence, Spooner erected a dairy barn and milk house; a water wheel along Islay Creek powered the dairy's cream separator and butter churn (Miossi 1973).

The most reliable shipping link for the Spooner Ranch was via steamboat. By October 1892 Spooner had built a landing near the mouth of Islay Creek, on the southern cliffs of the well-protected cove that would eventually bear his name (*San Luis ObispoTribune* 1892). Throughout its history, much of the ranch's development and activity centered around Spooner's Cove; the remainder of the property was used primarily as agricultural and pasture lands.

Along with livestock, agriculture was part of the Spooner Ranch's economy from the very beginning. According to Ed Petersen (2005), crops were grown primarily on the coastal terrace, while livestock grazed in the hills further inland. In its first year of production, the ranch loaded 2,500 sacks of beans and barley onto a steamer docked at Spooner's Cove; the amount represented only half of the cargo ready for shipment, since the freighter could not accommodate the entire harvest (*San Luis Obispo Tribune* 1892). In 1902, Spooner shipped from the wharf at Cayucos over 4,800 sacks of small white beans harvested the previous year (Tognazzini 2002). That same year he purchased the ranch from Henry Cowell, who had previously acquired the property from John Wilson's granddaughter, Ramona Hillard (Morrison and Haydon 1917).

In 1920 Spooner died, leaving the business to his three sons—Quincy, Carleton, and Alden III. As remembered by Ed Petersen (2005), each brother was responsible for a different aspect of the operations of the ranch; Quincy oversaw the farming activities, Carleton managed the cattle, while Alden "milked the cows."

During the 1920s and 1930s, much of the coastal terrace, including the NRSA, was leased to Japanese farmers. To some extent, the Japanese farmers were insulated from the depressed prices of the country's traditional staples, since they grew then exotic crops like bush peas, Brussels sprouts, and artichokes. The impact of Asian farmers on the county's agricultural economy was considerable; by 1938, the market value of vegetable crops—led by peas, lettuce, and tomatoes—totaled just over $2.8 million, surpassing the $2.2 million combined figure for wheat, barley, and beans (General Directories 1938). The Japanese continued to farm the land until 1942, when they were involuntarily relocated to interment camps established during World War II under Executive Order 9066.

In 1942 Oscar Field acquired the Spooner Ranch. Sometime in the 1940s, he constructed a small dam and pump house from which irrigation water was piped to agricultural fields downstream (Petersen 2005). In 1954 he sold the northern half of the ranch (outside the NRSA) to Irene McAllister; following financial troubles, the land passed into federal receivership and became part of the Montaña de Oro State Park in 1965 (Miossi 1973). Eventually, Field gave up farming because of difficulties in tapping enough water to irrigate his crops (Petersen 2005). PG&E purchased the property and incorporated it into the grounds of the DCPP. In 1985 the Company began commercial operation of the plant, providing power to customers in central and northern California.

6.2 Methods

To generate baseline data, Æ performed background historical research and field surveys of the NRSA. Background research focused on historical uses of the NRSA, including the farming activities of Japanese immigrants during the 1920s and 1930s. Field work was intended to relocate and update the site records of previously identified cultural resources on North Diablo Canyon lands. Æ's redocumentation focused on current site conditions, and used sub-meter accurracy GPS technology to plot site locations and boundaries.

6.2.1 Background Research Methods

Æ performed historical background research to expand on existing historical overviews of the area and provide context for interpretation of the historical archaeological sites. Historical research focused on three general topics: initial development of the Pecho Hills; A.B. Spooner and the Spooner Ranch; and the Japanese community which farmed portions of the ranch from the 1920s to early 1940s. Æ's in-house library contains several texts and maps regarding the history of San Luis Obispo County, which provided the baseline data for the archival study. These were supplemented with information from local San Luis Obispo County repositories including the Main Branch of the San Luis Obispo County Library and the San Luis Obispo Historical Society. The Historical Society was particularly helpful in providing references about the Spooner Ranch and Japanese community in San Luis Obispo County. In addition, Company Biologist Sally Krenn, who served as Æ's in-field contact for the project, and Dean E. Miller, archivist at the Special Collection Department of the Kennedy Library at California Polytechnic State University, also offered guidance during the study. Although the above sources offered ample information about the Pecho Hills/Spooner Ranch in general, little textual information exists about the NRSA per se. To complement the findings of archival research, Æ interviewed local residents knowledgeable about the NRSA. On 11 October 2005, Edward Petersen, descendant of A.B. Spooner and long-time resident of the North Diablo Canyon property, recounted the various personalities associated with the ranch as well as pertinent facts and events during the tenure of both the Spooner and Field families. Additionally, the Petersens hold numerous photographs of ranch life, including some that are specific to the NRSA.

On 14 November 2005, Æ interviewed Mr. Mas Tarioka, who grew up on his father's farm located on the Spooner Ranch. Mr. Tarioka's recollections included several details about his and other farms occupying the ranch's coastal terrace that offered invaluable information about the social structure of the community as a whole. Ms. Krenn, who arranged the interview with the Petersens and provided the contact information for Mr. Tarioka, facilitated both interviews.

Prior to field work, Æ also performed a records search at the Central Coastal Information Center at the University of California, Santa Barbara, to update existing information regarding cultural resources within the NRSA. We consulted the site records, reports, and base maps on file at the Information Center to ensure that we had the most up-to-date information about each site in the NRSA.

6.2.2 Field Methods

Æ revisited archaeological sites on the NRSA during October 2005. As each site was relocated, the area in and around the resource was intensively surveyed, using pin-flags to mark the location and distribution of surface artifacts, features, and concentrations of cultural remains. The nature and distribution of cultural remains visible on the surface was compared to the data recorded on the existing site record, and site boundaries were established based on both data sets. Information gathered during the current field effort was combined with data from the original site records, and each site was recorded to current standards on the appropriate California Department of Parks and Recreation form (DPR 523).

In most cases the existing site maps were sufficiently detailed and accurate that new maps were not drafted; any additional information was plotted on the existing map. In those cases where sketch maps were missing or contained substantial inaccuracies, new maps were drafted in the field. To further document site conditions, each site was photographed using a digital or 35-millimeter camera.

A Trimble GeoXT Global Positioning System (GPS) was used to record the boundaries of each site and collect other geospatial data. GPS data were delivered to PG&E as ArcView shape files and were included as a layer in the Company's Geographic Information System (GIS). In accordance with the Company's GIS protocols, the coordinate system used for data collection was the Universal Transverse Mercator (UTM) Zone 10, and the 1983 North American Datum.

Most of the archaeological sites within the NRSA are scatters of shell dietary debris or shell midden accumulations. Because shell can be dated by the radiocarbon method and can provide a valuable source of chronological information, and because of the potential loss of this information from natural erosion, Æ collected 29 shell samples from 14 sites for radiocarbon dating. Three radiocarbon samples were submitted to Beta Analytic, Inc., in Coral Gables, Florida, for radiocarbon assay. The remaining samples are currently stored in Æ's laboratory in Fresno. Æ also collected a single complete projectile point found on the surface of one of the sites.

6.3 Study Results

A complete report on the results of Æ's study, including updated cultural resource records for all archaeological sites, is on file at the Central Coastal Information Center of the California Historical Resources Information System, on the campus of the University of California, Santa Barbara. The results of the study are summarized below.

6.3.1 The Japanese Community in San Luis Obispo County

Most Japanese immigrants arrived in California around the turn-of-the century and promptly established communities along the Central Coast and San Joaquin Valley. Although the particulars vary from place to place, a common thread runs through the history of each of these early settlements. Subsistence centered on the production or exchange of farming goods, by which the Japanese introduced numerous new varieties of

fruits and vegetables to the State's agricultural industry. As with other ethnicities, the Japanese communities were composed of tightly knit families often living near each other, and business transactions were primarily conducted within the community. Religion was ecumenical in nature, and communities typically supported multiple places of worship from the Buddhist, Christian, and Shinto faiths. While the social characteristics of these groups were determined largely by historical and cultural factors, the permanence of each community was a matter of its structure as well as the effect of the prevailing land laws towards Asian immigrants in the first quarter of the twentieth century. In general, Japanese families established deep roots in places where they were able to purchase land and/or integrate themselves as a whole into the broader commercial network. Conversely, communities were relatively short-lived in cases where farmers could acquire land only via a lease (rather than by title) or in instances where the community's mode of production was dominated by one person or interest (rather than spread across multiple individuals and business).

Within San Luis Obispo County, Japanese immigrants began settling in the Arroyo Grande and Oceano areas around the turn of the century. While each farmer planted his own mix of crops, depending on specific soil and climatic conditions, agricultural plots invariably included bush peas, which thrived in the year-round cool climate of the Central Coast. In response to the expanding harvests of peas, commercial interest groups like the Pismo Pea Growers Association (1922) and Arroyo Grande Pea Growers Association (1925) were established to pack the vegetables, serve as a distribution point, disseminate information about commodity prices, and generally enhance the marketability of the product (Fukuhara 1976). In 1927, the two organizations merged to form the Pismo Growers Vegetable Exchange (POVE), which operates today as a major grower-shipper of numerous coastal vegetables.

The POVE offered more than just market assistance. The organization's first president, George Fukunaga, was a U.S. citizen (born in Hawaii), which was of critical importance in securing agricultural land for the *Issei* (native-born Japanese) farmers. In addition to its restriction on property ownership, the 1913 Alien Land Law limited the period of lease to Asian aliens to three years. To circumvent this discriminatory statute, Fukunaga would serve as a go-between by acquiring land via a primary lease, then subletting the property to immigrant farmers.

Another focal point of Japanese immigrant life in the county emerged in the 1920s, when Tameji Eto moved his family and farming business from Pismo Beach to Los Osos Valley. Arroyo Grande was the commercial and social hub of the Japanese community, but at the time no phone lines existed between Los Osos Valley and Arroyo Grande. Along with other valley residents, Eto organized the Los Osos Mutual Telephone Company, which was later bought out by the Bell System (Krieger and Krieger 1991). In addition, he created the South Central Japanese Agricultural Association and the San Luis Obispo Packing House Exchange to help support the price of farm products and facilitate the flow of goods from the farm to the retail market (Krieger 1991).

In most areas where the Japanese congregated, a primary school was established to educate the *Nisei* (U.S.-born children of native Japanese) in their ancestral language and culture. Schools were founded in Arroyo Grande, in Pismo Beach, on Eto's property in Los Osos Valley, and on French Road near the site of the Madonna Inn (Krieger and Krieger 1991). Students were taught the standard public curriculum in the morning and Japanese language and history in the latter part of the day.

By 1940, the Japanese had survived the anti-Asian legislation of the early twentieth century and become well ingrained in county life. However, following the bombing of Pearl Harbor by the Japanese Imperial Navy and the subsequent outbreak of World War II in the Pacific, sentiment once again turned against Japanese Americans. On February 19, 1942, President Roosevelt signed Executive Order 9066 that led to the incarceration of approximately 120,000 Japanese aliens and citizens from the Pacific states (Ostgaard et al. 2000). The detainees were initially assigned to nearby temporary stations, where they were then transported to one of ten War Relocation Authority relocation centers located throughout the western United States. Although non-Japanese friends and business associates generally protected the interests of families tied to organizations like the POVE and Yamato Colony, many suffered material loss during their interment since few possessions could be carried to the camps. When the war ended, the detainees were allowed to return home.

6.3.2 Japanese Farming on Spooner Ranch

The information below is based primarily on the recollections of Mr. Mas Tarioka (2005), interviewed by Æ in November 2005. Born in 1928, Mr. Tarioka grew up on his family's farm located within the NRSA and Spooner Ranch.

Sometime in the 1920s, the Spooners began leasing tracts of the coastal terrace to Japanese immigrant farmers. The Tarioka family had emigrated from Japan years earlier. At the urging of his grandfather, who arrived in the United States around the turn of the century, Tarioka's father crossed the Pacific and landed in California in 1915. After a stint working for the railroad, he took up farming on the Spooner Ranch in the south part of the NRSA. As many as seven families settled along the coast, including the Honda, Yoshida (near Coon Creek), Kuranaga, Nakamura, and Tarioka clans. These were large families, including extended relatives and as many as ten children.

Although he could not remember the size of his father's farm, Tarioka did state that two other families occupied the coastal terrace between the Tarioka homestead and Diablo Canyon, suggesting that each farm encompassed at least 100-200 acres. Bush peas, which could be cultivated without irrigation water, were grown around the Tarioka homestead. When the fields were fallow, the Spooners brought their cattle to drink at the springs near the present-day site of Tom's Pond. Interestingly, a family's crop was not necessarily grown in the fields immediately adjacent to the homestead; Tarioka recalls that his father grew lettuce, artichokes, and tomatoes near the mouth of Diablo Creek, about 1.5 miles down the coast from the family's residence. There, irrigation water was tapped further upstream and channeled to the coastal terrace. Tarioka remembers that the creek was dammed and water was delivered via surface pipe, while Ed Petersen (2005)

stated that a wood lined ditch extended from the present-day site of the PG&E switchyard to Lions Rock. These differences in description likely reflect changes that occurred to the irrigation system between the 1930s and 1950s. Harvested crops were sold to the Los Angeles market and shipped via the Sakata Trucking firm, located along Los Osos Road (General Directories 1938). The produce was likely packaged in San Luis Obispo or Arroyo Grande before being freighted south.

As a boy at the time, Tarioka was not certain about the specifics of the lease agreement and suspected the land was let out directly from the Spooners. According to Davis-King (1991), "the land was sold and then leased to a Japanese farmer named George Fuganawa", who assisted his countrymen in obtaining the necessary materials and labor. However, Ed Petersen noted that while Fuganawa was associated with the ranch in the 1960s, he had no knowledge of Fuganawa's involvement prior to WWII. That the Tariokas resided on the property well beyond the three year limit imposed by the alien land laws suggests either that some U.S. citizen served as a middleman between the Spooners and the foreign born farmers or alternatively that the Spooners simply ignored the contractual restrictions imposed by these statutes and leased the land directly to the Japanese.

Tarioka was acquainted with the Japanese school along Coon Creek, but like most of his classmates, the better part of his elementary education occurred outside the Spooner Ranch, at the Sunnyside School near Los Osos. (The Sunnyside school may be the same as the Eto school mentioned by Krieger and Krieger [1991].) He remembers the schoolhouse was a one-room structure and that a small cottage was later added on to house grades 1-3. The school taught English curriculum in the morning and Japanese culture and language in the afternoon. During harvest season, enrollment grew as the children of vegetable pickers attended the school. Tarioka mentioned that for one year (probably 1938) he attended the school along Coon Creek, after the bus that shuttled children between Los Osos and the Spooner Ranch discontinued its service. To his knowledge the school did not have a formal name.

In 1939 the family moved to Arroyo Grande. Along with other families, the Tariokas were relocated to an interment camp during World War II. After spending time in a temporary camp at the Fresno Fairgrounds, the family was sent to Jerome, Arkansas and later to Gila River camp in Arizona, after the former closed in June 1944. Following the war, the family returned to Fresno, where Mr. Tarioka presently resides.

6.3.3 Inventory of Archaeological Resources

Æ relocated and rerecorded 22 previously identified prehistoric and historical archaeological sites between Coon Creek and Crowbar Canyon. These locations are confidential and thus no maps or other reference material are provided. Æ was unable to relocate one previously recorded site, CA-SLO-1456. This sparse scatter of marine shell with one concentration covered a 25 x 21 meter area "on a subtle hilltop and coastal terrace" about 30 meters east of Pecho Coast Road (Davis-King 1991). A careful examination of the ground surface in the general location did not reveal any remains.

Additionally, Æ did not attempt to examine sites on the north side of Coon Creek or south of Crowbar Canyon, and sites in these areas are not discussed below.

At the north end of the NRSA, two sites with prehistoric and historical remains reflect both Native American occupation and subsequent Japanese farming life during the first half of the twentieth century. CA-SLO-1450/H and –1451/H contain historical remains associated with Japanese families who farmed the coastal terrace under lease to the Spooners, as described above. These two sites contain architectural remnants of as many as eight buildings and other structures, including residences, a schoolhouse, chicken coops, sheds, and other structures. Don Spooner, a descendant of the family who leased the land to the Japanese, indicated in 1991 that the Japanese occupation began around 1920, and that the sites were created by a family named Yoshiba (possibly Yoshida) (Davis-King and Williams 1992).

Both CA-SLO-1450/H and –1451/H also contain prehistoric shell midden deposits. Unfortunately, the main drainage bordering the sites is presently choked with very thick growth of willow and other riparian vegetation, making a detailed examination of these sites impossible. However, the westernmost end of the complex is less densely vegetated, and the shell midden and historical features in this area could be examined. An exposed cutbank at CA-SLO-1451/H revealed a buried midden stratum that is grayish, highly indurated, and likely to be considerably more ancient than the surface deposits. A shell sample from the lower stratum yielded an uncorrected radiocarbon age of 2560 ± 50 BP (Cal BC 160 to Cal AD 130 @ 2 sigma).

Also at the north end of the NRSA, CA-SLO-1370 and –1467 comprise one large, continuous prehistoric site with variably dense and diffuse shell midden deposits extending from the edge of the coastal bluff upslope to the east for approximately 450 meters. A stratigraphic profile exposed in the cliff face at the west end of the site revealed two discrete midden strata as much as two meters thick. The upper midden stratum, extending from the surface to up to 100 cm deep, is a dark black, dense shell midden typical of late prehistoric deposits in the region. A shell sample from the base of this deposit yielded an uncorrected radiocarbon age of 3780 ± 60 BP (Cal BC 1670-1360 @ 2 sigma). The lower midden is a grayish, highly indurated deposit that yielded an uncorrected radiocarbon age on shell of 5420 ± 40 BP (Cal BC 3700-3510 @ 2 sigma).

Human remains have been identified at CA-SLO-1370. The site also contains a minor historical component consisting of trash and agricultural waste dumped into a "blowhole" at the western end of the site.

Moving south there are a series of small shell scatters along the coastal bluff. Most of these are very sparse, non-midden deposits with few constituents other than shell fragments. These may be remnants of once-larger sites that have eroded into the sea. Although none of the sites were tested, it is unlikely that they have deeply buried components. The exceptions are CA-SLO-1466, a rock shelter with a dense midden at least 50 cm deep as indicated by rodent burrows; and CA-SLO-1459, which has a moderately developed midden and possibly some depth of deposit.

The site CA-SLO-1457/H is densely covered with ice plant and other vegetation. Prehistoric archaeological remains were visible primarily along the edges of the bluff, where vegetation is thinner, and the shell density in these areas was less than was noted by Davis-King (1991). However, more varied and intense cultural deposits may be preserved in the central areas beneath the vegetation. The concrete pads and other historical features at the site also had become completely buried by residual soils and vegetation; probing and minor trowel excavation was needed to confirm their locations.

Only two sites in the areas discussed above are not located along the coastal bluff. CA-SLO-1454/H is a sparse deposit of historical debris on a low mound. CA-SLO-1198H is also a deposit of twentieth century debris. At present, neither site can be definitively associated with particular events or individuals, although both are likely to be thematically linked to ranching and agriculture.

The coastal terrace widens at the southern end of the NRSA, and two major site complexes plus several smaller sites are found. A substantial complex of prehistoric and historical remains was recorded as CA-SLO-1366/H. The prehistoric site contains two deep midden mounds with substantial deposits of shell and bone dietary debris and numerous stone tools. The site also contains a bedrock milling station with at least three mortars. This site is likely to contain human remains, and may be the local Chumash village noted by Spanish explorers (T. Jones pers. comm. 2005). The historical component at CA-SLO-1366/H includes an earth and masonry dam, pond, remnants of a water tank and platform, and artifacts associated with agriculture and settlement. The historical features and remains are linked to ranching, agriculture, and settlement themes, and may be related to the Japanese agricultural settlements of the early to mid-twentieth century.

The remnants of the Tarioka Farm were recorded as CA-SLO-1197/H. The Tarioka family emigrated from Japan near the beginning of the twentieth century and began leasing land on Spooner Ranch in the 1920s. Mas Tarioka, who currently lives in Fresno, was born at the site in 1928 and lived there with his family until 1939, when they moved to Arroyo Grande. The Tarioka Site contains the remains of a house and barn, agricultural equipment, and a broad scatter of agricultural, residential, and domestic artifacts. A discrete, localized concentration of shell debris may reflect a prehistoric component of the site.

Two prehistoric shell middens lie south of the Tarioka Site. CA-SLO-6 appears to be a moderately dense shell midden, but the site is densely covered with ice plant and other vegetation, completely obscuring the surface except at the edge of the bluff and one or two other isolated locations. CA-SLO-5 lies just beyond the southern boundary of the NRSA but was revisited at the Company's request because of its proximity. CA-SLO-5 is larger and more complex than CA-SLO-6, with a principal midden mound, surrounding lithic scatter, bedrock milling stations, and other features. The nature and complexity of this site suggest that it, too, might harbor human remains.

Finally, CA-SLO-1464 is a very sparse lithic scatter. Davis-King (1991) collected a stemmed chert projectile point from the site in 1991; a few questionable chert flakes are the only cultural materials remaining.

6.4 Discussion

Documents containing information on cultural resources have been identified from the PEB and briefly discussed above. Because of the confidentiality of archaeological site locations, cultural resource reports are not included in the baseline data. These reports were made available to the archaeological member of the DTF, Dr. Terry Jones of Cal Poly. Comments received by the DTF concerning this portion of the baseline were focused on updating the site records, utilizing GPS to both incorporate the confidential layer into the mobile GIS platform, and to conduct historic research for context in better understanding the nature of the historic sites and features. A request to provide a permanent datum for each of the archaeological sites was withdrawn by the DTF after discussions. The sub-meter accuracy GPS data gathered in 2005 will allow relocating of these sites for monitoring purposes without use of permanent survey monuments. PG&E's concern was that monuments might disclose the location of sites to unauthorized individuals.

Prior to recent work on the NRSA, complete archaeological examination of the area had been performed in 1990 and 1991. While the previous studies were performed to then current professional standards, mapping of the sites was inaccurate due to the problems of the USGS maps available for the area. As indicated in section 6.3.3 above, the archaeological sites were revisited in the fall of 2005 and site locations were entered into the mobile GIS platform based on recent sub-meter GPS data. Historical background research for the area was undertaken so as to provide a better context for assessing the importance of the historic sites found in the area.

PG&E believes that this portion of the baseline is complete and adequately supports trail planning as well as development of a plan for access monitoring.

7.0 Sustainable Agriculture

Special Condition 3 of the Coastal Development Permit speaks of the need to assure "*compatible multiple public benefits*" including sustainable agriculture, during the development and implementation of a plan of public access. This section has been included to provide baseline information on the present day agricultural practices within the NRSA. Some historical data is also included here, to provide a long-term historical context for agricultural land use in this part of San Luis Obispo County.

Where applicable throughout this section, the reader is referred (for additional information) to specific source documents contained in the PEB, submitted to the CCC and the DTF by PG&E in March 2005.

7.1 Historical Context

Euro-American settlement in San Luis Obispo County began with the founding of Mission San Luis Obispo de Tolosa in 1772. By the late 1770s the California mission system had become self-sufficient in terms of food production growing wheat, corn, beans, barley and a variety of livestock.

In the period following its independence from Spain (1821-1848), Mexico expanded trade with Americans and other foreigners, directly contributing to the migration and eventual permanent presence of Anglo-Americans in California.

Secularization of the missions (1834) led to the redistribution of mission estate lands to private citizens. The economic void created was quickly filled by the emergence of the ranchos, huge parcels totaling many thousands of acres often supporting expansive herds of free-ranging cattle and horses. One such "land grant" rancho was the Cañada De Los Osos y Pecho y Islay. Totaling 32,431 acres, this rancho was comprised of two smaller properties that became consolidated into a single holding in 1845, and included those lands within our NRSA.

The gently sloping coastal terrace of the Pecho y Islay Rancho (or Pecho Ranch) was likely first used as pasture land. Although the eastern boundary of the ranch lay only 10-12 miles from the town of San Luis Obispo, the property was geographically isolated from the interior valleys by a steeply rising complex of coastal hills (the Irish Hills). This region was then and has remained largely undeveloped.

In 1892, Alden Bradford Spooner, Jr. leased the northern portion of the Pecho Ranch; a 6,500-acre swath extending from just north of Islay Creek to Diablo Creek, including the entire NRSA (Morrison and Haydon 1917:287-289). Along with livestock, agriculture was part of the Spooner's ranch economy from the beginning. Crops were grown primarily on the coastal terrace, while livestock grazed further inland. In its first year of production, the ranch loaded 2,500 sacks of beans and barley onto a steamer docked at Spooner's Cove; the amount represented only half of the cargo ready for shipment, since the freighter could not accommodate the entire harvest (*San Luis Obispo Tribune* 1892). In 1902 Spooner shipped from the wharf at Cayucos over 4,800 sacks of small white beans harvested the previous year (Tognazzini 2002:122). That same year he purchased the ranch from Henry Cowell (Morrison and Haydon 1917:288).

During the 1920s and 1930s, much of the coastal terrace, including the NRSA, was leased to Japanese farmers. To some extent, the Japanese farmers were insulated from the depressed prices of the country's traditional staples, since they grew then exotic crops like bush peas, brussel sprouts, and artichokes. The impact of Asian farmers on the county's agricultural economy was considerable. By 1938, the market value of vegetable crops (led by peas, lettuce, and tomatoes) totaled just over $2.8 million, surpassing the $2.2 million combined figure for wheat, barley, and beans (General Directories 1938:37). The Japanese continued to farm the land until 1942, when they were involuntarily relocated to interment camps established during World War II under Executive Order 9066.

In 1942 Oscar Field acquired the Spooner Ranch. Sometime in the 1940s, he constructed a small dam and pump house on lower Coon Creek, approximately 0.4 miles upstream of its confluence with the Pacific Ocean (Figure 7.1-1). Irrigation water was piped from here to agricultural fields located along the flood plane of the stream and the adjacent marine terrace for production of vegetable crops (Petersen 2005). In 1954 he sold the northern half of the ranch (north of the NRSA) to Irene McAllister. In 1965, following financial troubles, the land passed into federal receivership and became part of the Montaña de Oro State Park (Miossi 1973). No crop agriculture or grazing has occurred on these state lands since.

Figure 7.1-2 shows agricultural fields as they appeared along Coon Creek (circa 1970's), contrasted with their present-day appearance following two-decades or more of "old field succession" that ensued after abandonment of row crop agriculture here.

Farming continued for a time within the NRSA, south of Montaña de Oro State Park, but was abandoned here too in the 1980s, coincidental with a period of prolonged state-wide drought (1984 – 1991). Grazing paddocks in the northern end of the NRSA between Coon Creek and Disney Point still bare the name, "Pea Fields." It was at this time (1985) that PG&E purchased the remaining Field Ranch property, incorporating these lands into the security buffer that today surrounds the DCPP. From this period to the present, grazing has been the only agricultural practice on PG&E property north of the power plant.

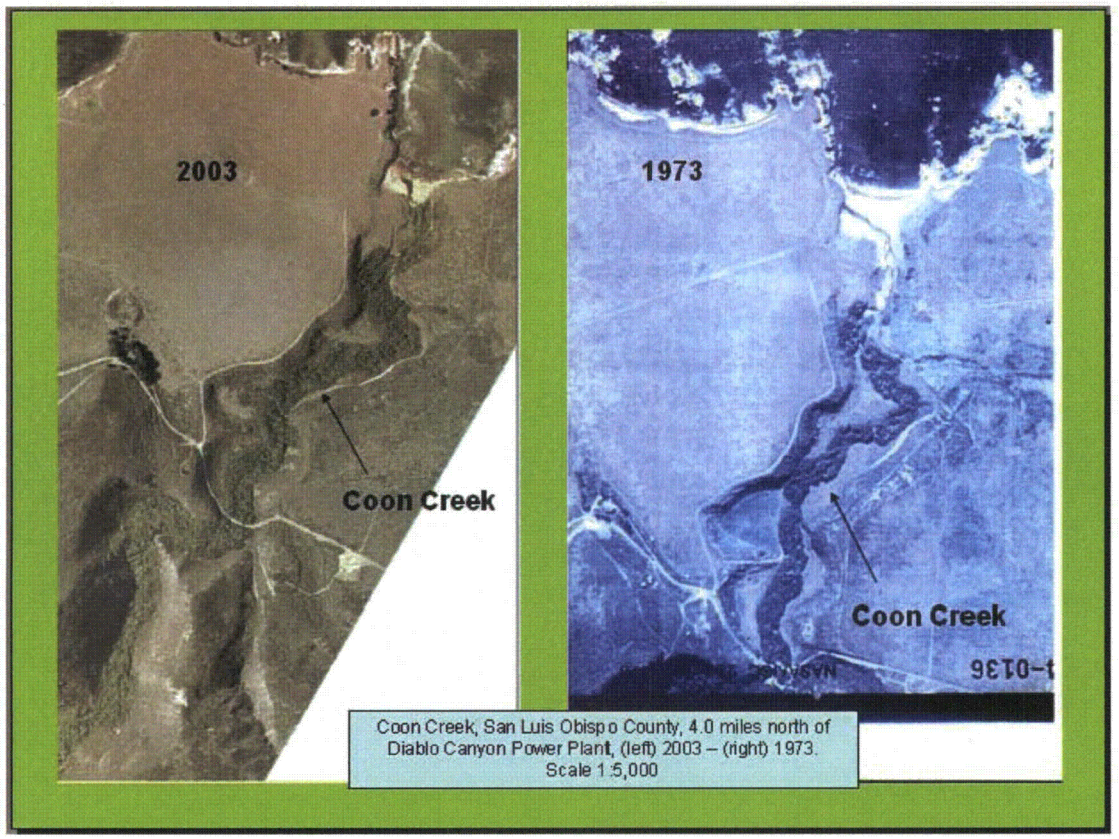
7.2 Land Stewardship and Best Management Practices

PG&E implemented a formal program of Land Stewardship on its fee-title lands surrounding DCPP in 1990, by creating the LSC. A detailed discussion of this program is included in the preliminary baseline, Vol. 2: Folder 7; PG&E 1993. The Stewardship Program is grounded on Best Management Practices (BMPs) developed for each of eight resource or land use categories. The BMPs established in 1993 to guide grazing management have not been further modified and remain relevant to the present (see below).

One of the first projects undertaken by the LSC addressed grazing management on the North Ranch. A general rangeland assessment was conducted in 1990, a copy of which is found in the PEB (Vol. 1: Folder 3; Fry 1990). The assessment showed much of the terrace rangeland on the North Ranch grazed beyond appropriate levels due to below normal forage production (nearing the end of a seven-year drought) and failure to adjust stocking levels to compensate. Recommendations included development of a grazing management strategy that could better balance stocking and available forage, while protecting sensitive resource areas. A successful solution was found using high intensity, short duration grazing management (HISD), a decision that would lead to a fundamental change of direction in resource management on the North Ranch.

Figure 7.1-1. Historic pump house built in the 1940s, located on Coon Creek within the NRSA.

Figure 7.1-2. Old field succession along Coon Creek following end of crop agriculture in the late 1970s.



7.3 Ranch Operations

7.3.1 Grazing Management

HISD grazing, sometimes called holistic grazing (Savory 1988), or high intensity – low frequency grazing (Heitschmidt and Stuth 1991) has been in use on the North Ranch continuously since 1991. HISD grazing attempts to more closely mimic the grazing behavior exhibited by wild free ranging ungulate populations (e.g., bison, antelope, etc.). Wild herds tend to remain bunched for protection from predators, while continuously moving across seasonal ranges following traditional movement corridors. HISD grazing places an entire herd of livestock together in one relatively small paddock for a short period of time (typically a few days) before the herd is moved to the next paddock, allowing the first paddock to rest. Because of the high number of paddocks involved each receives significant rest between grazing episodes. This results in more uniform forage use while improving growth and reproduction of native perennial grass species. On the North Ranch other advantages, including reduced veterinary costs, elimination of supplemental feeding, and lower bull costs have also been attributed to this change in grazing management.

CATTLE GRAZING
Best Management Practices

PG&E will ensure that:

- **Cattle grazing and related activities will be conducted in a manner minimizing degradation of sensitive biological resources such as streams and riparian areas.**
- **The suitability of continued grazing will be reviewed as proposals for multiple land use activities, including managed access, come under consideration.**
- **Cattle grazing will comply with the U.S. Environmental Protection Agency guidelines for control of non-point source pollution in coastal waters. This will include the controlled use of herbicides, pesticides, chemical fertilizers, and livestock access to coastal streams, bays, and estuaries.**
- **Grazing practices that establish required levels of residual dry matter to protect the soil surface from erosion while optimizing conditions for forage production will be implemented. Annual monitoring will be practiced to ensure compliance.**
- **Grazing capacity, as reflected in the standing crop of available forage, will be evaluated annually and used to adjust stocking rates.**
- **Land use practices encouraging establishment and spread of undesirable plants will not be allowed.**

Studies comparing various grazing management strategies have tended to show lower per unit or per area production values with HISD compared to continuous grazing (Heitschmidt and Taylor (in) Heitschmidt and Stuth 1991). However, one clear advantage of this system as shown by the North Ranch experience is a level of animal control that virtually eliminates common environmental impacts associated with more traditional grazing systems. Over use of native perennial grasses, impacts to riparian zone vegetation and aquatic habitats, water quality impacts, declining biodiversity, increase in non-native species, and accelerated erosion are examples of common grazing-related resource management concerns.

The success of the North Ranch grazing program received national recognition in 1999, when the National Cattlemen's Beef Association presented its 9th annual Region 6 Environmental Stewardship Award to the Blanchards for outstanding achievement in the area of environmental stewardship.

7.3.2 Management Infrastructure

Transitioning to HISD grazing required an investment in new infrastructure (fencing and water systems) that PG&E helped bring about. This was necessary because of the need to begin rotating livestock through a larger number of smaller paddocks to achieve more uniform forage use and eliminate areas of over use.

In 1978, under management more like continuous grazing, the NRSA on the North Ranch contained just four paddocks defined by conventional barbed wire and steel post fencing (PEB Vol. 1: Folder 3; Stechman 1978, pg. 15). By 1991, under HISD grazing, this same area had been reconfigured with 16 paddocks defined by smooth-wire electric fence, and an expanded livestock water system with additional distributed tank storage, and new water distribution lines and troughs supplying each new paddock (Figure 7.3-1).

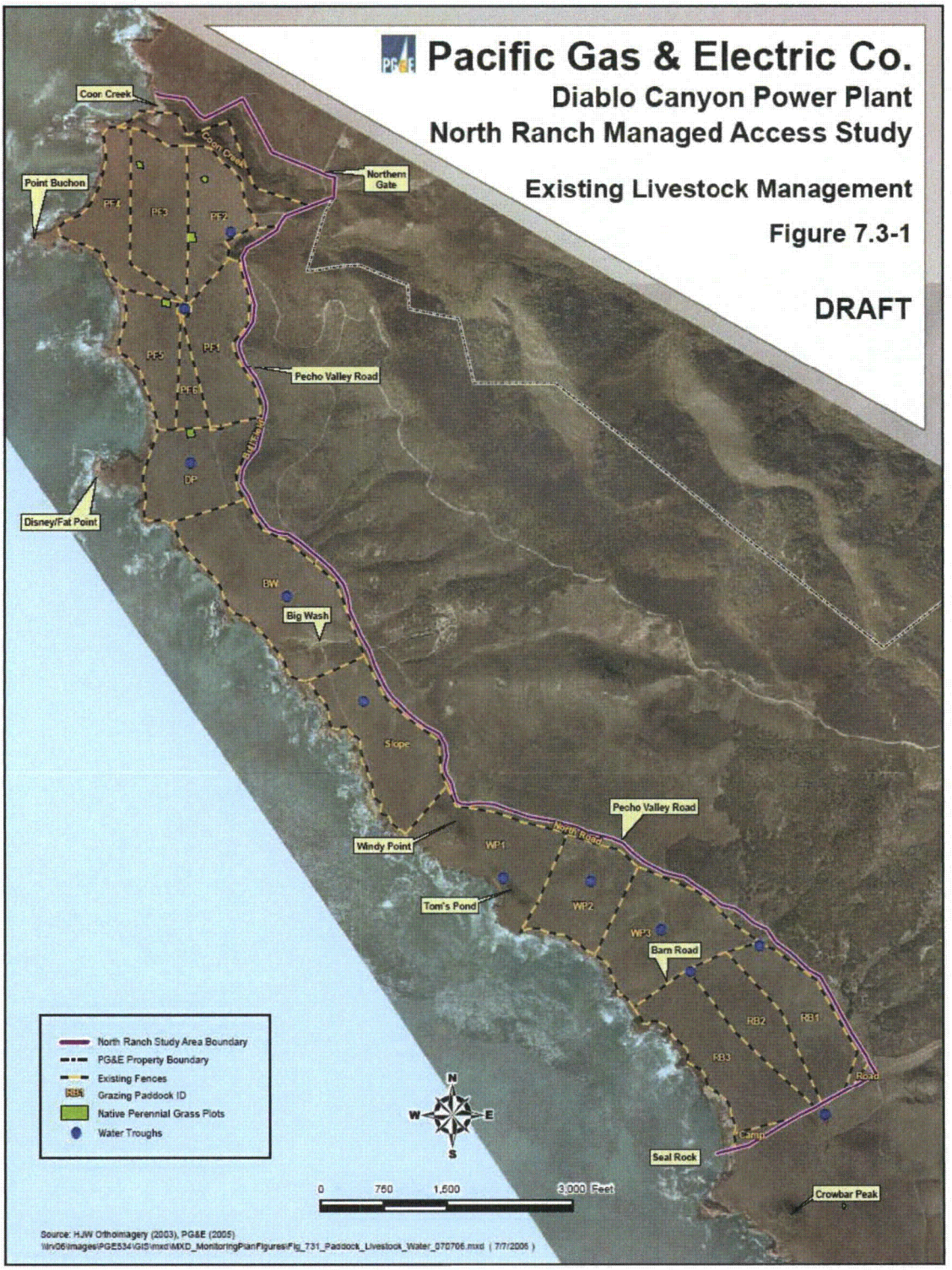
At this time too, the grazing lessee voluntarily implemented changes in the maintenance of secondary roads throughout the property to reduce soil erosion. These roads are no longer graded and are allowed to support grass cover that is either grazed or mowed to reduce the risk of ignition from vehicles. Also, the amount of vehicle use has been reduced to further encourage natural revegetation of road surfaces.

Over time, a working partnership has evolved among the North Ranch, the LSC at Diablo Canyon, and other local and community stakeholders. The result has been the emergence of a resource management program that incorporates goals beyond maximizing livestock production, and embodies a land ethic that acknowledges the role of grazing in biodiversity conservation, protection of sensitive species and habitats, and restoration of native grasslands.

7.3.3 Livestock

Over the past 15 years, the North Ranch has been primarily a cow-calf operation. This means that a production herd is maintained on the property year-round, and the annual calf crop is sold after weaning. The PEB (Vol. 1: Folder 3; Fry 1991) summarizes the numbers of livestock on the North Ranch annually from 1978 through 1991. Two

Figure 7.3-1. Current paddock configuration and location of watering points on the NRSA.



quantitative assessments of grazing capacity have been conducted on the North Ranch to guide management decisions and administrative policy. Reports of these assessments were included in the PEB (Vol. 1: Folder 3; Stechman 1978 and Fry 1991). There was very close agreement between the two studies regarding a maximum grazing capacity of from 120 to 130 animal unit months (AUMs) on the North Ranch.

Since 1991, the North Ranch has tended to keep stocking at low to moderate levels as reflected in annual monitoring surveys, and beginning about 2000, the Ranch began "experimenting" with multiple species of livestock (cattle, goats, and sheep). Differences in forage use and feeding behavior exhibited by mixed species of livestock have long been recognized as creating additional management options (Stoddart and Smith 1955). In this context, management refers to the measured and controlled use of animal impact (disturbance) to achieve specific management goals. In addition to the grazing BMPs identified earlier, these goals include sustaining the productivity of natural plant communities and the benefits of important ecological processes (e.g., energy flow, nutrient cycling, water cycle, and soil building processes) to benefit rangeland health (National Research Council 1994). The LSC has encouraged the North Ranch to explore grazing management alternatives that are consistent with established grazing BMPs.

PG&E's annual program of wildland fuels management, a cooperative undertaking involving the California Department of Forestry and Fire Protection, also utilizes mixed-species grazing to reduce fuel volume in high risk areas near power plant facilities. Over the last ten-years, this program has become increasingly integrated into the operation of the North Ranch (Figure 7.3-2).

7.4 Annual Monitoring (Stock flow, photostations, and RDM)

Since 1991, grazing has been monitored annually in three ways: 1) stock flow records kept by the rancher document numbers of animals and time spent in each paddock throughout the year, 2) photo monitoring from permanent stations established throughout the property is conducted twice annually (spring and fall) by the LSC (see Vol. 1: Folder 3; PG&E 2005photo), and 3) quantitative measurement of residual dry matter (RDM) is performed by the LSC annually in the late fall, before the first soaking rains (see Vol. 1: Folder 3; PG&E 2005).

Figure 7.4-1 illustrates the location of recent RDM sample sites and permanent photo monitoring stations.

7.5 Resource Management Initiatives on the North Ranch

7.5.1 Public Outreach

Involvement with the local community is another aspect of the North Ranch operation, encouraging education and research opportunities. Examples include the hosting of Cal Poly range management student field trips to the ranch, field outings for the Women's Farm Bureau, Five Nations Beef Tour, and California Agriculture Education Foundation. These activities are typically arranged and hosted by the Blanchards and coordinated through the LSC and PG&E's security department at Diablo Canyon.The LSC routinely processes requests for access to the North Ranch for various purposes including research.

Managed access was a recognized element of the Stewardship program from its inception as reflected in BMPs developed for the program (see preliminary baseline, Vol. 2: Folder 7; PG&E 1993, pg. 39).

Currently, two State University proposals are being considered that request use of the North Ranch for long-term research projects. One of these will examine the effects of HISD grazing on wildlife populations. The other will use the long-protected Pecho coast marine intertidal resources and their associated long-term scientific baseline to help plan the management of these resources in recently acquired State Park properties elsewhere in the Central Coast region.

Figure 7.3-2. Goats used in wildland fuels management near the DCPP are temporarily pastured on the North Ranch during kidding season to reduce losses from predators. Guard dogs protect the flock (center left).

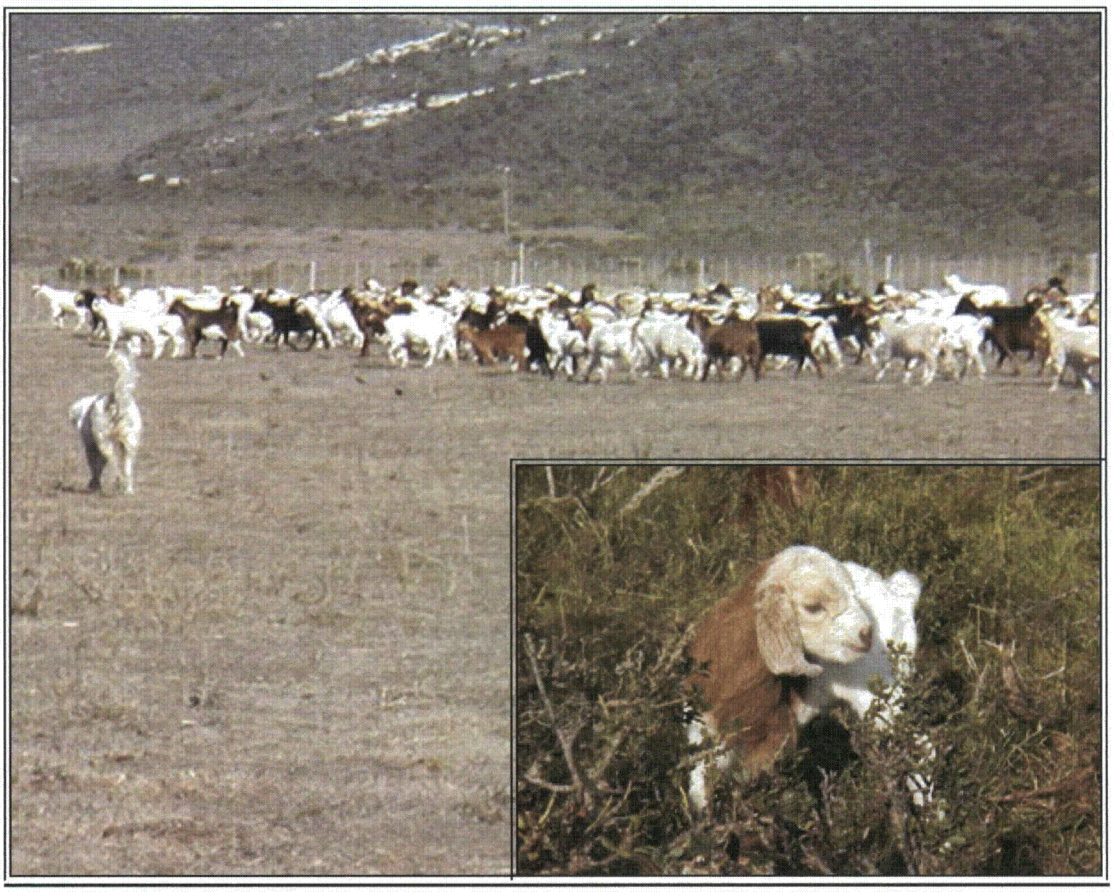
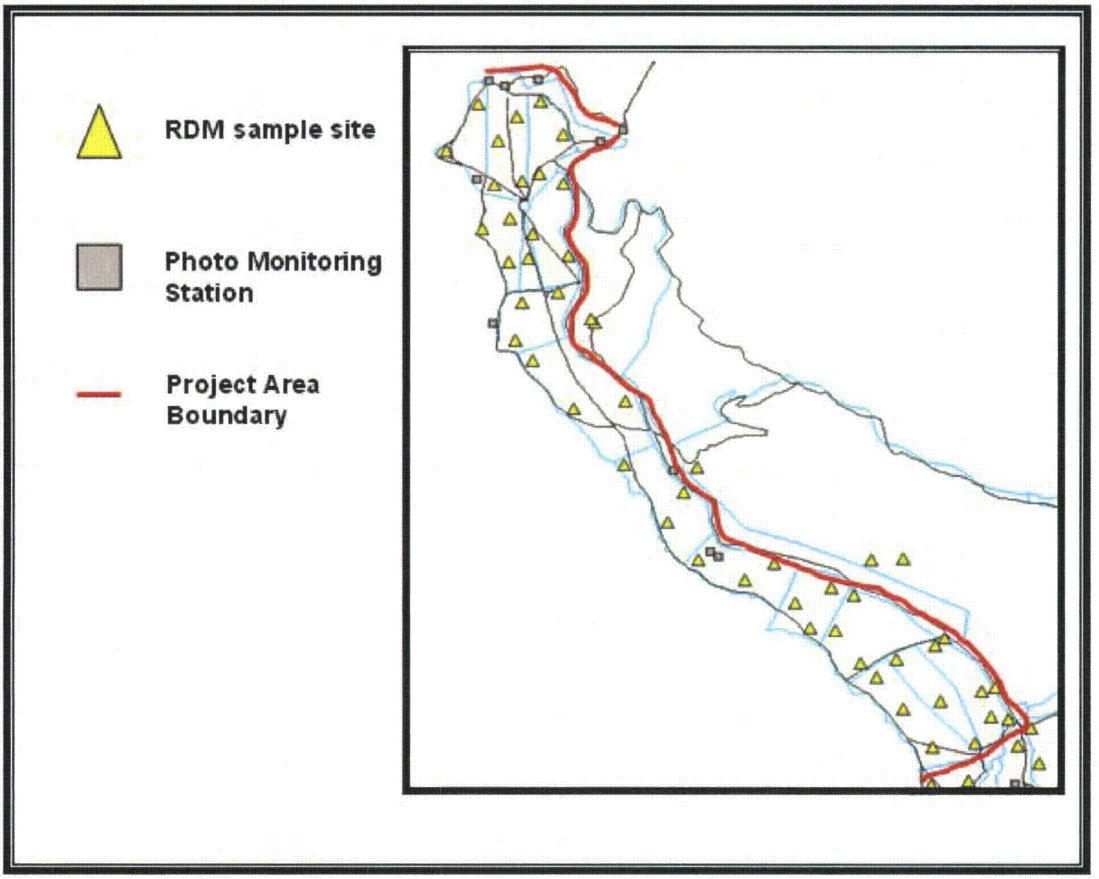


Figure 7.4-1. Location of RDM sample sites and photo monitoring stations within the NRSA.



7.5.2 Cultural Resource Protection

As discussed in Section 6.0, the NRSA is rich with Native American sites and artifacts, some dating back as far as 9,000 years or more. The Land Stewardship Program BMPs are clear regarding the need to periodically review land use practices with potential to affect cultural resources and ensure their protection (see PEB, Vol. 2: Folder 7; PG&E 1993, pg. 33).

The 2005 field surveys remapped known cultural sites on the NRSA and documented several new sites. Also identified during these surveys were areas of significant ground disturbance caused by cattle, in or near cultural sites. Three impacted sites, two within the NRSA and one located south of Crowbar Peak, are currently under review by the LSC; plans will be developed in consultation with the North Ranch for reducing animal impacts at these sites.

7.5.3 Native Grass Restoration

Prior to the Spanish colonial period, California's grasslands were characterized predominantly by several species of native perennial bunch grasses. Ornduff et al. (2003 rev.) state that the introduction to California of large herds of cattle by the Spanish, was accompanied by importation of Mediterranean annual grasses. Today, 99 percent of all California grasslands are covered by non-native annual grasses.

Of those native grasses identified by Crampton (1974) from the central and south coast region and central valley of California, several species are today still found on the North Ranch. These include purple needle grass (*Nessella pulchra*), California brome (*Bromus carinatus),* blue wildrye *(Elymus glaucus),* small flowered melic (*Melica imperfecta*), meadow barley (*Hordeum brachiantherum*), and giant wildrye (*Elymus condensatus*). Additional information on grasslands of the NRSA is found in the PEB, Vol.: 2; Folder 5, BioSystems 1995, pgs. 40 – 44.

As discussed earlier (see section 3.1) descriptions of "Coastal Prairie" grasslands occurring within the NRSA (BioSystems 1995; PG&E 2001) were found to be unsupported based on the results of field surveys performed in 2005. It now appears more likely that the NRSA represents part of a geographical transition zone between plant associations with predominantly northern affinities and those with predominantly southern affinities.

Still, interest in native grass restoration has grown in recent years through the efforts of groups like the California Native Grass Society and the Central Coast Grazing Coalition. The North Ranch managed grazing program has provided conditions favorable for the growth and reproduction of perennial grasses. Study plots established in 2005 at five locations on the ranch will allow measurement of the trend in perennial grass populations here over time (Figure 7.5-1).

7.6 Discussion

Source information from the PEB pertaining to managed grazing has been identified here and briefly discussed. The monitoring protocols followed by the LSC within the NRSA annually for the past 15 years have also been discussed and illustrated with maps and figures.

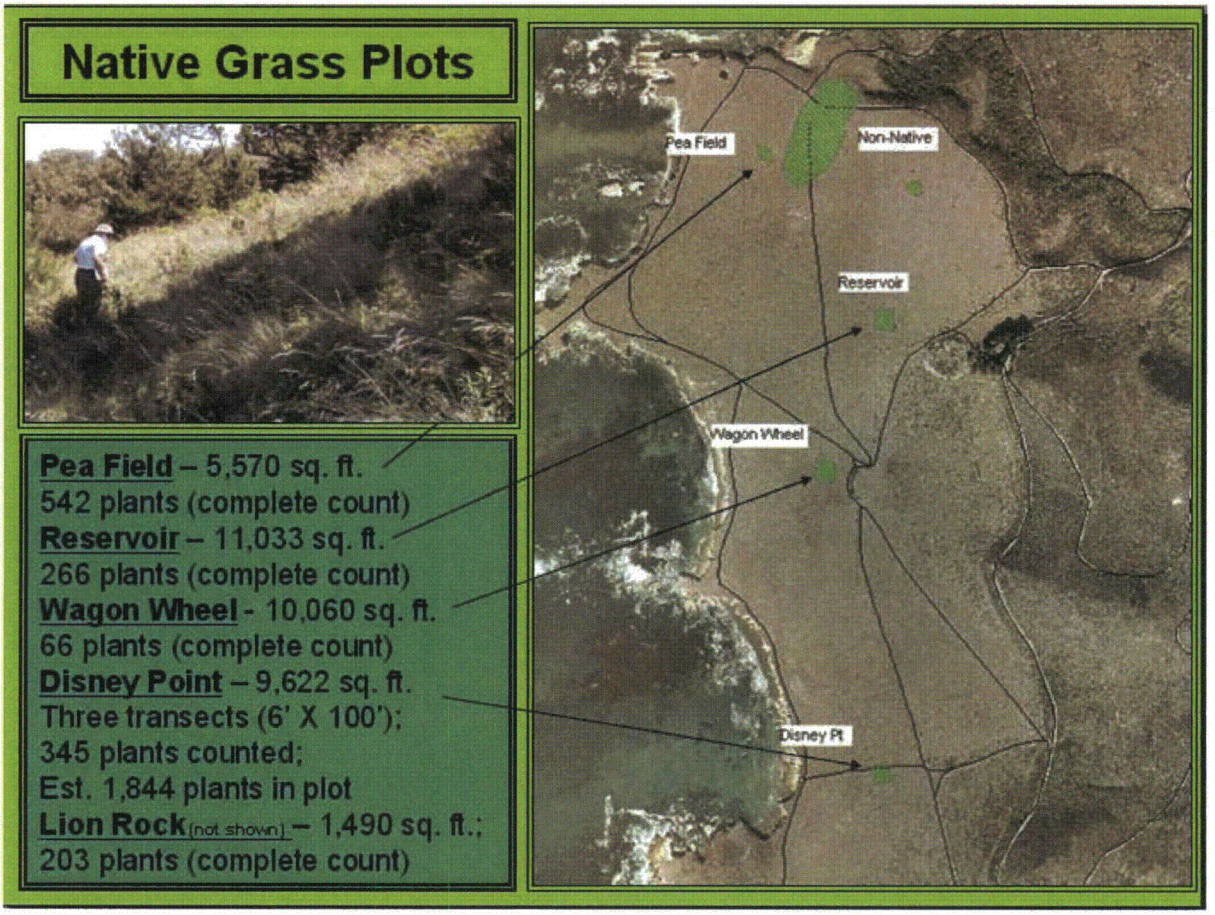
The principal issues raised by the DTF in their review of this portion of the preliminary baseline dealt with assuring that managed grazing and native perennial grass restoration efforts would not be adversely impacted by or modified to accommodate public access. Other issues focused on whether the public could be protected from accidents and injury resulting from livestock or guard dog interactions and contact with electrified fencing.

The existing ranch infrastructure has been identified and illustrated, as well as the operational dynamics of HISD grazing. These data will help the trail planning process minimize conflicts between livestock and people.

Results of 2005 botanical studies showed native bunch grasses currently occupy too small a percentage of the coastal terrace grasslands to be effectively mapped. Several small study plots have been created and mapped to further assess the condition and growth trend of these plants. Within these plots, perennial grasses were counted to determine density per unit area. Some counts were made along linear belt transects and other plots received total area counts. Once a final route plan is developed for access, additional plots may be established to assess the specific impacts of access on these species.

PG&E believes that this portion of the baseline is complete and adequately supports trail planning as well as development of a plan for access monitoring.

Figure 7.5-1. Location of 4 of 5 perennial grass study plots established on the NRSA in 2005.



8.0 Geology and Soils

The primary importance of geology and soils information as a component of the environmental baseline is to inform planning and monitoring functions regarding the potential for erosion issues. Erosion (coastal bluff erosion or sheet erosion across the marine terrace) could affect human safety as well as natural and cultural resource values in the NRSA. A secondary interpretive value is recognized, providing information on the geologic origin of coastal rock formations and landforms for the enjoyment of the public.

The PEB contains several references relevant to this theme, each containing data specific to the NRSA (Vol. 2: Folder 6; Erickson 1990, PG&E 1991, Schwalbach 1992. Vol. 2: Folder 7; Dames and Moore 1975, Belknap 2003).

A topographic map of the NRSA with hill shading is presented in Figure 8.0-1. From this map it is apparent that the NRSA slopes gently from east to west except for the general vicinity of Windy Point where the slope increases considerably and the width of the marine terrace narrows. A color map of the soils found in the NRSA, based on the work of Ernstrom (1984), Department of Agriculture, Soil Conservation Service (now the Natural Resources Conservation Service), is provided in Figure 8.0-2.

Immediately east of the NRSA in the Irish Hills, the predominant soil type is the Lopez very shaly clay loam, on slopes of 30 to 75 percent. This soil formed in residual material weathered from hard shale.

In contrast, there are two predominant soils within the NRSA Santa Lucia very shaly clay loam, and Still gravely sandy clay loam. These soils typically lie on slopes of 5 to 9 percent, but locally (e.g., Windy Point area) may increase to from 30 to 50 percent. They formed in residual material weathered from sandstone or shale and within the NRSA are associated with Monterey formation.

The Monterey formation leads to the development of loose, very coarse-textured soils of low to moderate fertility and water-holding capacity. With the exception of a narrow band of coastal bluff scrub vegetation and occasional intrusions of coastal sage scrub (e.g., Windy Point and Big Slide) these soils are predominantly occupied by grassland vegetation. The stratigraphy of the Monterey formation has been described in detail from field studies conducted at Point Buchon, located within the NRSA on the coast south of Coon Creek (Vol. 2: Folder 6; Schwalbach 1992).

No ultramafic rocks (e.g., serpentine) are found within the NRSA (Kruckeberg 1984).

Figure 8.0-1. Topographic features of the NRSA.

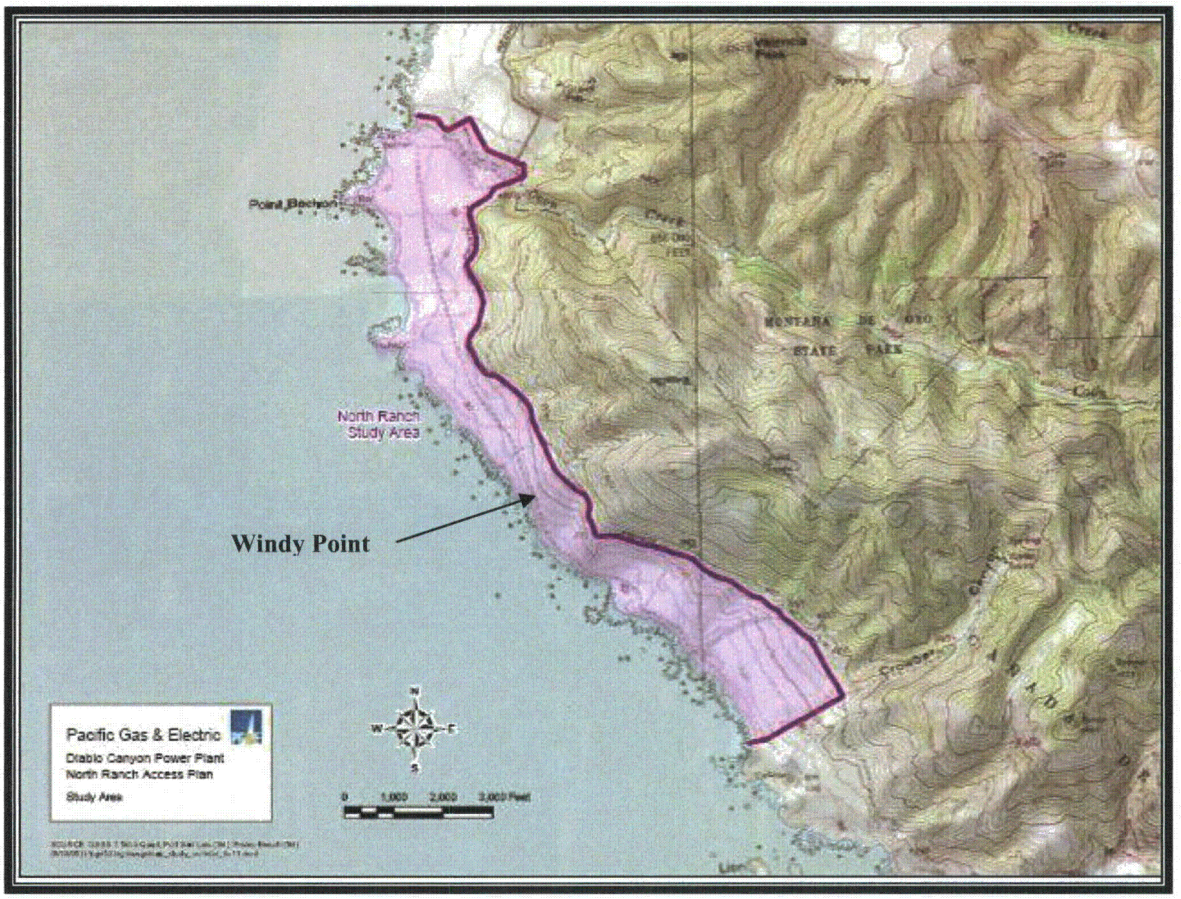
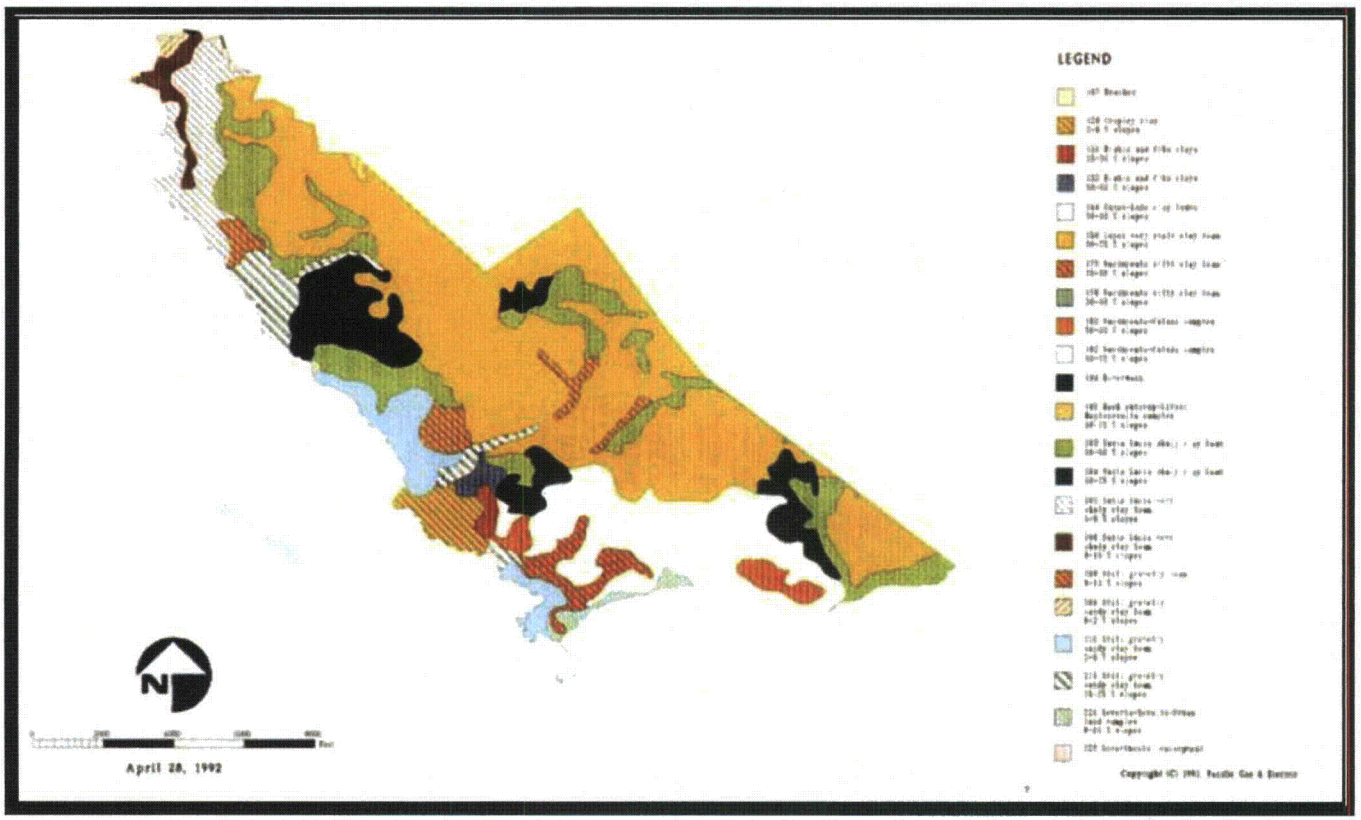


Figure 8.0-2. Soils of the NRSA.



8.1 Coastal Bluff Caves

As one aspect of the continuous process of coastal bluff erosion, coastal bluff caves (sea caves) can lead to sudden collapse, as occurred recently near the mouth of Coon Creek. A large sea cave occurs near Coon Creek and penetrates horizontally deep into the coastal bluff. The top of the cave suddenly collapsed, resulting in a sink-hole on the coastal terrace that was approximately 70 feet by 50 feet in size. The large hole drops vertically into the sea cave that is still open to the ocean. Also, an arch rock near Disney Point that was crossed to access a RWMP intertidal station collapsed, preventing further access to sample that station (see Section 5.1.3). Consequently, a coastal bluff trail routed over an arch rock or near a sea cave could be a potentially dangerous area of the trail.

To acquire more complete information on sea caves in the NRSA, PG&E performed additional photogrametric and field studies of seas caves in 2005 (Figure 8.1-1). Sea caves were considered to be any indentation in the face of the bluff or headland, sufficiently large for a person to fit inside. Sea caves included such features as arch rocks, formed by wave action cutting completely through a headland. Except for the mapping of coastal bluff caves, no other field studies pertaining to geology and soil stability in the NRSA were performed in 2005.

8.1.1 Methods

Oblique aerial photographs of the NRSA coast were used to map the locations of sea caves. The mapping could not be done in the field because much of the NRSA shoreline cannot be accessed, due to steep shore cliffs that drop vertically into the water. Also, the intertidal zone in many areas is narrow such that one cannot walk along the shore for long distances. Therefore, the only practical means to identify and map sea caves was through the use of oblique aerial photographs of the shore taken at a downward angle from over the ocean. A series of such photographs for the NRSA coastline taken in October of 2004 was available in the public domain at www.Californiacoastline.org.

Using these recent photographs, GIS technicians carefully digitized each cave structure within the NRSA to create a map of sea caves along the NRSA coast. These data were then incorporated into the project's mobile GIS platform to facilitate future directed studies and monitoring of cave structures that may have potential to affect trail use (Figure 8.1-2).

The dimensions of sea caves (height, width, depth, and distance from the top of the cave to the top of the bluff) were not cataloged because they could not be safely accessed for this purpose.

Figure 8.1-1. 2005 map of coastal bluff caves throughout the NRSA.

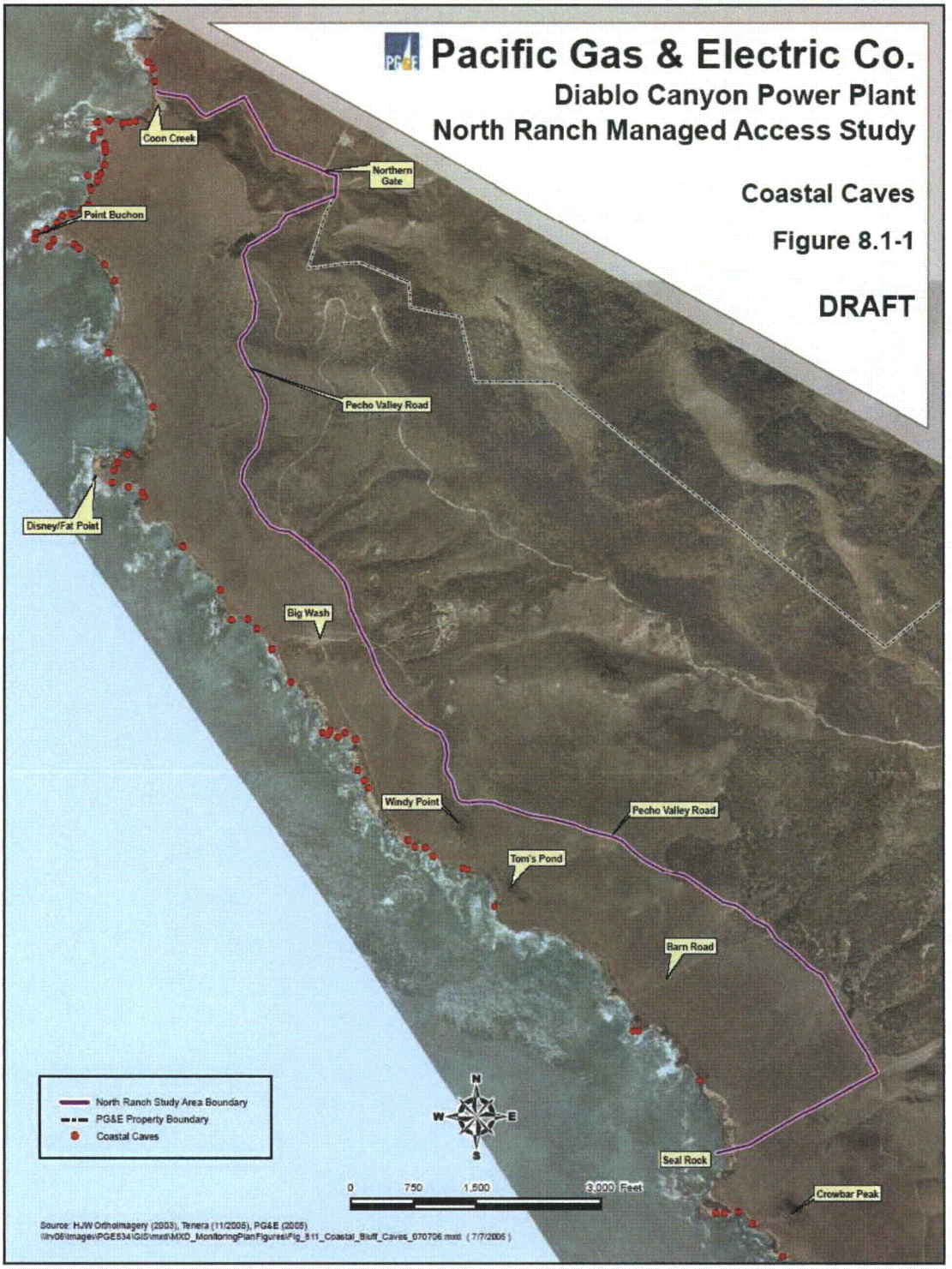
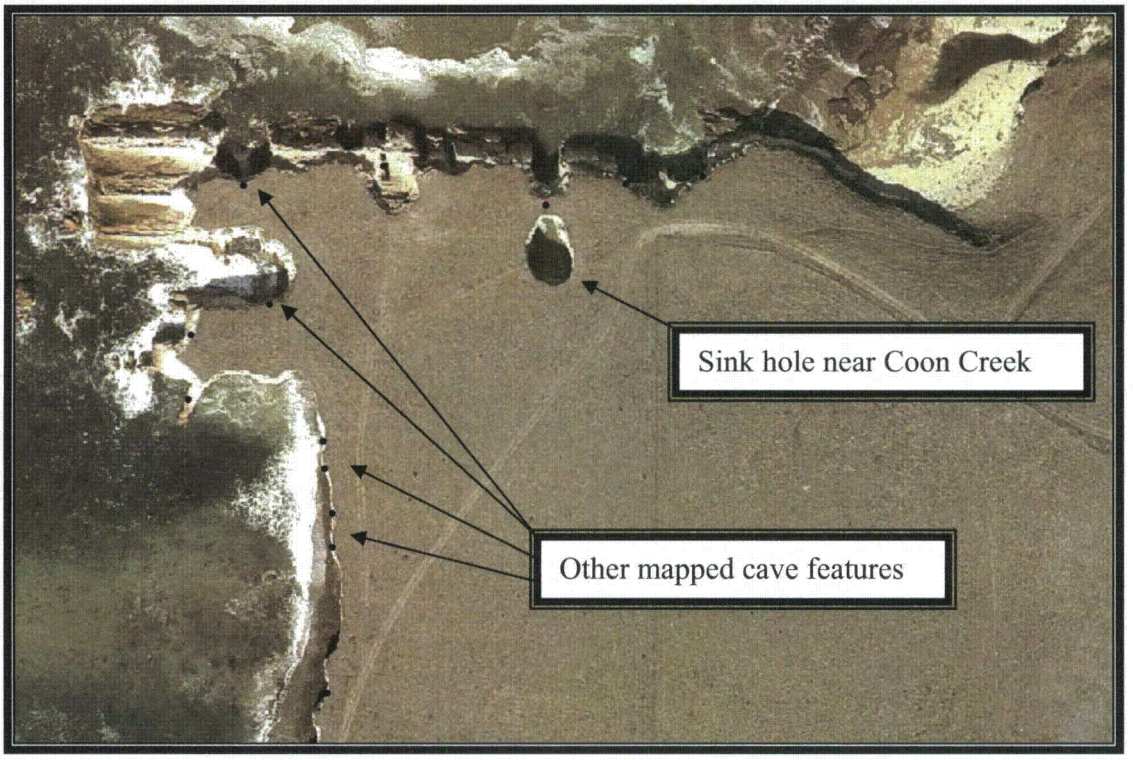


Figure 8.1-2. Mobile GIS platform coverage of coastal bluff caves mapped in 2005.



Transferring the locations of the sea caves in the photos to a base map was done manually by 'eye'. The photographs were first visually inspected for sea caves, and then the cave locations were transfered to the base map using visual reference points in the photos and base map imagery to guide manual positioning.

8.1.2 Results

Seventy-six sea caves were identified along the NRSA coast (see Figure 8.1-1), this included arch rocks. Some sea caves were likely not included in this survey, because they were not revealed in the photos, due to being on hidden sides of headlands.

There were more sea caves along the northern versus southern half of the NRSA coast. Although cave dimensions were not cataloged, sea caves were taller, wider, and deeper along the northern versus southern half of the NRSA. Also, all arch rocks were along the northern half of the NRSA, mainly at Point Buchon and Disney Point (Figure 8.1-3).

The photogrametric and field surveys documented many sea caves, with the majority distributed along the bluffs north of Windy Point. Harder, more resistant rocks in this portion of the NRSA likely explain this distribution pattern. Sea caves are largely absent in the southern half of the NRSA. This is because the sea cliffs are composed mainly of softer, unconsolidated sediments (Figure 8.1-4). Also, the bottom of the cliff in many of these areas is relatively high in elevation making the cliff base less exposed to wave erosion, compared to the northern section of coast line.

8.2 Coastal Bluff Erosion and Surficial Geologic Features

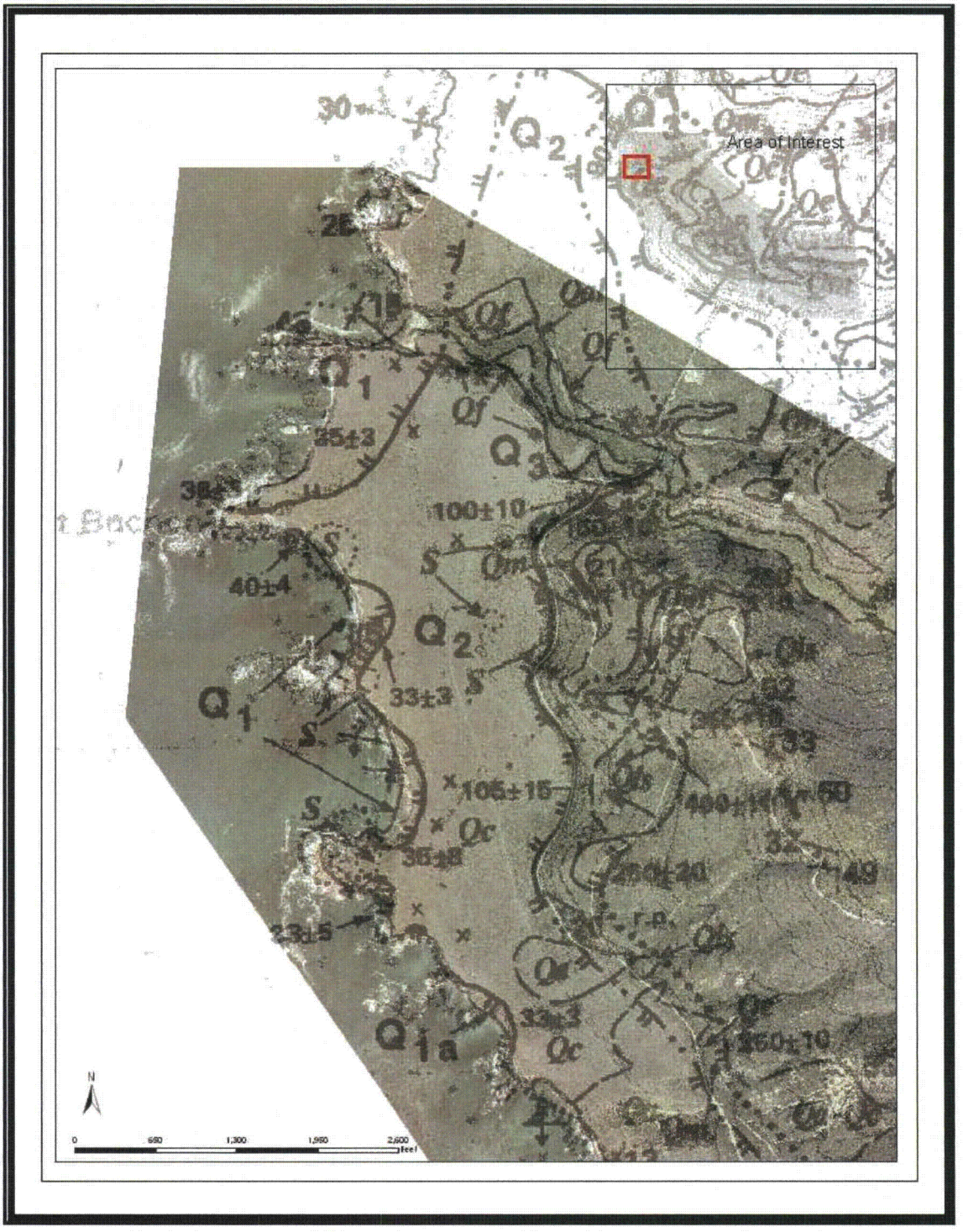
There is not sufficient existing information (local maps and photos) from which to document historic coastal bluff retreat in the NRSA. More modern technologies such as Light Detection and Ranging (LIDAR) are capable of the resolution (centimeter accuracy) necessary to show rates of coastal bluff erosion typical of the NRSA coast. However, readily available LIDAR coverage is far less accurate (one-meter accuracy).

Ground-based photography from permanently established sites chosen after a final trail route is selected will help manage trail safety while providing a baseline suitable for on-going monitoring studies. Surficial geologic features have been mapped throughout the NRSA (1970 source data) and incorporated into the mobile GIS platform (Figure 8.2-1). These data may be useful to the process of trail planning and monitoring, and also provide information of interest to the public.

Figure 8.1-3. Sea caves and arch rocks along the northern portion of the NRSA (north of Windy Point).

Figure 8.1-4. Soft sediment shore cliff along the southern section of the NRSA, south of Barn Road.

Figure 8.2-1. Surficial geologic features of the NRSA.



8.3 Stewardship BMPs Related to Soils

PG&E implemented a formal program of Land Stewardship on its fee-title lands surrounding DCPP in 1990, by creating a LSC. A detailed discussion of this program is included in the PEB, Vol. 2: Folder 7; PG&E 1993. The Stewardship Program is grounded on Best Management Practices (BMPs) developed for each of eight resource or land use categories. The BMPs established in 1993 to guide protection of soils are presented in Figure 8.3-1.

PG&E performed broad field surveys directed at identifying erosion problems on the Diablo lands, including the NRSA, in the early 1990s. Reports of these surveys were included in the PEB, Vol. 2: Folder 6; Erickson 1990, PG&E 1991; and Vol. 1: Folder 3; Fry 1990.

The most significant erosion issue identified is the feature locally known as Big Wash (Figure 8.3-2). This hill slope erosion feature involves steep topography and shaly soils where gullies formed more than one-half century ago, depositing materials down slope and onto the adjacent coastal terrace. Big Wash is described in detail in PG&E (1991), where it is identified also as Site 22. The following text taken from the 1991 report addresses the effect of Site 22 on areas west of the main ranch road (NRSA):

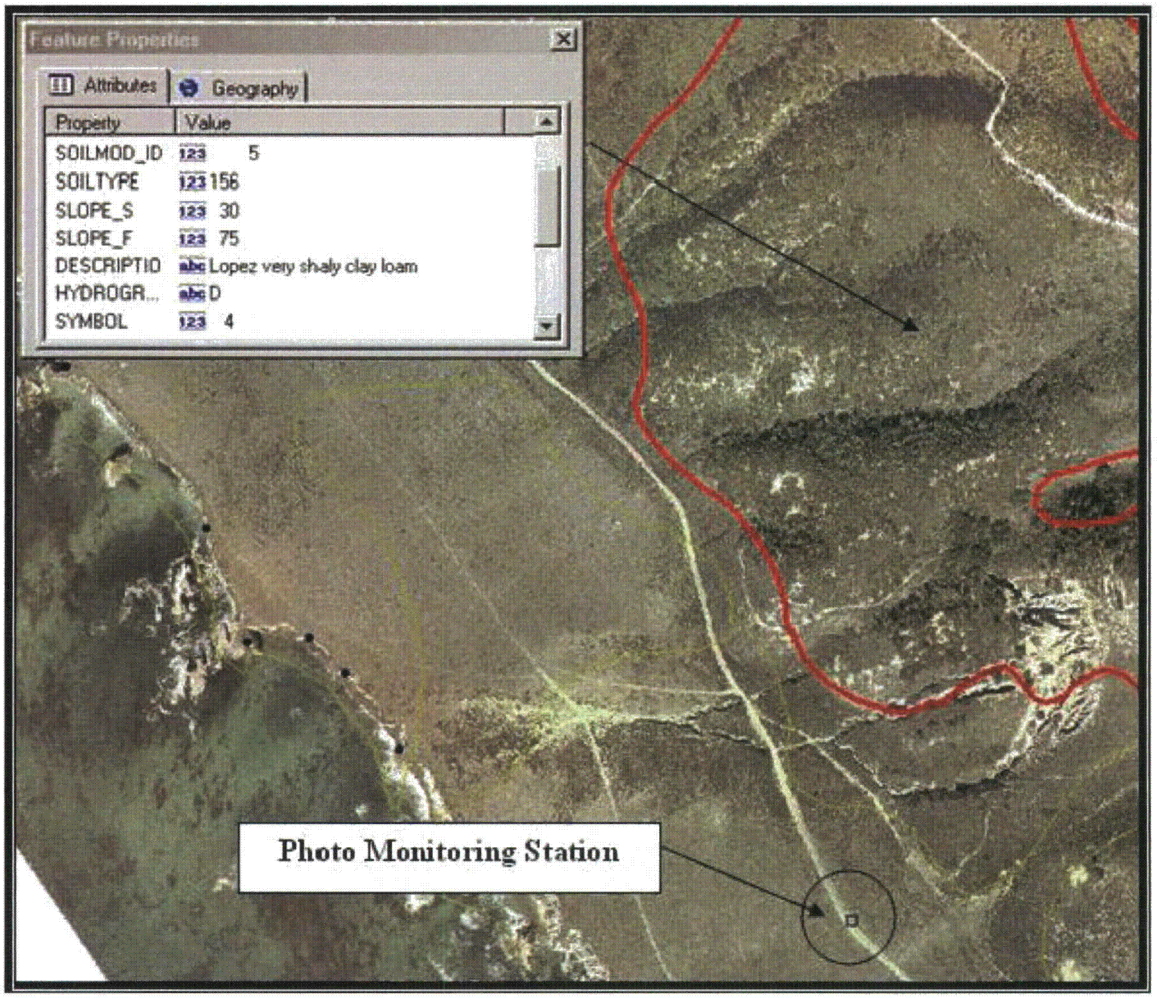
- **No erosion has occurred along the dirt access roads in the vicinity, except near the bottom of the hill, although no roadside drainage ditches or culverts are provided No erosion problems occur on the west side of the North Access Road, other than siltation.**

- **No other significant erosion occurs along the road between the emplacement and DCPP. Other areas appear heavily grazed, and have considerably less vegetation than at the former shore battery emplacement site.**

At the present time (15 years later), the gentle slope and extremely well drained soils of the terrace still appear to act as a buffer or "trap" preventing sedimentation from reaching sensitive marine intertidal habitats beyond the coastal bluff. Photo monitoring by the LSC over the last 15 years reveals no significant change in the appearance of this area.

Figure 8.3-1. Best Management Practices (BMPs) established in 1993 to guide protection of soils.

Figure 8.3-2. View of Big Wash taken from mobile GIS platform (2003 imagery) showing gully formation, also colluvial deposits on the terrace west of Pecho Valley Road.



8.4 Discussion

The PEB contained no maps of sea caves along the NRSA coast for use in bluff trail planning. Callapse of sea caves and arch rocks has occurred along this coast in the past (see Figure 8.1-3). The DTF specifically requested that this information be included in the CBI. PG&E believes that adequate information is now available to reduce risk of trail accidents and reduce the likelihood that the trail will need to be relocated as a result of an unforeseen bluff-wasting event.

Documents containing information on the geology and soils of the NRSA have been identified from the PEB and briefly discussed here. Comments received by the DTF concerning this portion of the baseline were focused at the issue of establishing a baseline for determining rate of coastal bluff erosion. This issue was addressed through discussions between PG&E's project team and the CCC staff, supported by PG&E's Geosciences department. As discussed earlier, there is not sufficient existing information (local maps and photos) from which to document historic coastal bluff retreat in the NRSA, and the cost of developing this data using modern LIDAR technology with suitable (centimeter) accuracy is clearly beyond the scope envisioned by the CCC for this effort. PG&E proposed instead to rely on ground-based photography from permanently established sites chosen after a final trail route is selected to monitor trail safety and inform the process of adaptive management of the access program. In addition, surficial geologic features have been incorporated into the mobile GIS platform to further inform trail planning and monitoring tasks.

PG&E and the CCC staff reached agreement on the adequacy of the geology and soils baseline as documented in electronic correspondence dated March 5 and March 8, 2006.

Other comments received from the DTF addressed the accuracy of soils mapping based on the 1984 soil survey of the county's coastal region. This issue was resolved in discussions between PG&E and DTF member, Brent Hallock (documented in electronic correspondence dated March 2 and March 16, 2006). PG&E in cooperation with Cal Poly will perform a field check of soil types associated with the trail route once the route plan has been developed. This will ensure that soil characteristics along the planned trail route are not misinterpreted based on any lack of precision that may exist in the 1984 map coverage.

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Appendices

Appendix A
DTF Comment Log

Item no.	Comment	CCC	PGE	Survey Results?	Current Status
1	ED to confirm DTF Feedback; PGE to ensure coordination with Native American community representatives.	contact Terry Jone	rpt on coord.	yes	A new beta test version GIS platform designed for annual monitoring of cultural resources is complete and has been successfully field tested. It presently contains the 1991 survey data. A contractor, Applied Earth Works, completed historical site research and field mapping studies in October, 2005. New submeter mapping was accomplished of all known sites on the North Property. The new layer will be added to, not replace, the original baseline data from 1991. Additional ethnographic studies will be performed in 2006. PG&E's cultural resources specialist, Glenn Caruso discussed these measures with Terry Jones during the week of Sept. 12, 2005 and Dr. Jones expressed his general satisfaction. Dr. Jones also visited the property with Mr. Caruso and the consultants during the field mapping effort in October. PG&E has completed a summary table of cultural resource survey work performed in 2005. Native American consultation was initiated January 6, 2006. Some responses have been received.
2	ok				
3	ok				
4	ok; PGE to pursue LIDAR if feasible (in coord. With Mark Johnsson;	coord. W.r.t. Lidar	Lidar; rpt in 2006	yes	PG&E will investigate the use of LIDAR technology applied to monitoring of coastal bluff retreat during development of the access monitoring plan.
5	ok; further specific seacave mapping to be done if necessary trail planning phase			yes	This work was performed in September, 2005. Sea cave locations were identified from recent oblique aerial photos and were digitized (georeferenced) to create an additional shapefile layer for use in constraints mapping. If the position of any sea caves are seen as having potential safety implications for the public, as judged by review of a specific access routing plan, further investigation of specific sea caves may be warranted. Larry Womack discussed PG&E's proposed approach with Mark Johnson on Sept. 15, 2005 in Eureka, California. Mark indicated that the plan was acceptable.
6	ok			yes	
7	ok				
8	ok				

9	ok				
10	ok				
11	ok				
12	ok				
13	ok				
14	ok				
15	ok with understanding that there will be a "land conditions" baseline for monitoring erosion				Stems from Blanchard comment re: fragile soils. No bare ground baseline exists currently. It has been suggested that once a route is determined additional baseline assessment may be warranted. Development of this baseline can be accomplished with existing mobile GIS platform.
16	ok				
17	ok				
18	ok, with understanding that land condition may be a constraint for purposes of trail siting/construction				Stems from Eliason comment re: protect pond and stream from trail erosion. PG&E has no intention of allowing access to impact wetland areas. PG&E considers this issue to be of high importance as does the Regional Water Quality Control Board. Every effort will be made during development of the access plan to reduce the potential for access-related erosion. Development of the monitoring plan will also emphasize detection/prevention of erosion issues.
19	ok				
20	ok				
21	ED to confirm DTF Feedback; awiting study results	Contact DTF	Report	yes	Stems from Eliason comment re: need to update preliminary baseline due to dated information on sensitive species. PG&E has no intention of allowing public access to impact sensitive species or habitats. DTF member, Julie Eliason, visited the NRSA on August 11 and met with consulting botanist, John Stebbins to discuss preliminary findings of the botanical surveys. Ms Eliason visited the NRSA again on October 6 and met with wildlife and marine biology consultants to review their study results and field methodologies. On these occasions Ms Eliason expressed her general satisfaction with the scope and approach taken in this work.

22	awaiting study results		Report	yes	Stems from Eliason comment re: Protection of vernal pool habitat. No vernal pool habitat was found to occur in the NRSA. This was independently confirmed by both John Stebbins and by Dr. Christopher Rogers. DTF member, Julie Eliason, visited the NRSA on August 11 and October 6. The first field trip included consulting botanist, John Stebbins and its purpose was to discuss preliminary findings of the botanical surveys and review field methodologies. Ms Eliason commented that in her opinion the studies were comprehensive and complete.
23	awaiting study results		Report	yes	Stems from Eliason comment re: Protection of sensitive plant, Edna manzanita. Edna manzanita does not occur in the NRSA. See also response to item 22 above.
24	awaiting study results		Report	yes	Stems from Eliason comment re: concern over invasive plants increasing as a result of access. PG&E has mapped noxious weed populations within the NRSA to provide a baseline for purposes of monitoring effects of public access. See also response to item 22 above.
25	awaiting study results		Report	yes	Stems from Eliason comment re: concern over direct impacts to sensitive plant communities from construction and maintenance of a trail. PG&E has mapped these areas. Our goal will be to reduce to the greatest extent possible, direct impacts from construction and maintenance activities on botanical resources of the NRSA. See also responses to items 22 and 18 above.
26	awaiting study results		Report	yes	Stems from Eliason comment re: protection of Coulter's saltbush. Field studies failed to identify Coulter's saltbush within the NRSA. Three other Atriplex species were found (2 native; 1 non-native) distributed broadly throughout the coastal bluff scrub community. The possibility exists that the reported location of Coulter's saltbush resulted from a misidentification. See also response to item 22 above.
27	awaiting study results		Report	yes	Stems from Eliason comment re: Protection of sensitive plant, Edna manzanita. Edna manzanita does not occur in the NRSA. See also response to item 23 above.

28	ok, comment:the adaptive management plan prepared and approved by the E.D. should include management measures, including potentially pest/weed control methods; need to integrate/leverage work of land stewardship committee into management plan effort			yes	Stems from Eliason comment re: prevention of noxious weeds. Of the 34 candidate noxious weed species identified as potentially occurring within the NRSA, 12 were present. All were represented by few, relatively small occurrences. Each has been mapped and some have already received control treatments. See also response to item 22 above. Control of noxious weeds is an on-going responsibility of the Land Stewardship Committee and part of our Best Management Practices since 1993.
29	awaiting study results; need to confirm definition/delineation of community types with DTF	Contact DTF	Report	yes	Stems from Eliason comment re: routing of access to avoid direct impacts to sensitive habitats. Coastal bluff scrub is the sensitive habitat most likely to be impacted by access. PG&E's goal will be to reduce to the greatest extent possible, direct impacts from construction and maintenance activities on botanical resources of the NRSA. See also response to item 22 above.
30	ok; comment: the management plan should include an Education/ interpretation component				PG&E will consider opportunities to provide educational information to the public during preparation of its plan of public access.
31	awaiting study results		Report	yes	Some of the sensitive plant species mentioned by Mr. Walgren were added to the survey list; others had no possibility of occurring within the NRSA because their special habitat requirements are not present there. Mr Walgren visited the NRSA on Sept. 29, 2005. He expressed general satisfaction with the study efforts.
32	awaiting study results		Report	yes	Compact cobwebby thistle was added to survey list, but was not found.
33	E.D. to follow up with DTF; def./delineation of habitat/vegetation/community types needs to be resolved			yes	Neither of the specific habitat types referred to (maritime chaparral/Bishop pine) by Deb Hillyard occur within the NRSA, but both occur to the east in the Irish Hills. Sensitive habitats within the NRSA include coastal bluff scrub and Central Coast willow riparian scrub. Both of these habitats were mapped in 2005 from recent high resolution aerial photography, ground truthed and independently validated at our request by Dr. David Keil, Biological Sciences Dept., Cal Poly.

34	awaiting study results; ED to follow up with DTF	Contact DTF	Report	yes	These areas are contained within the coastal bluff scrub mapping units. Attribute data assigned to specific polygons will be used to identify presence of significant wild flower populations.
35	see 33			yes	Coastal bluff scrub has been described, mapped and field checked.
36	see 33; are native bunchgrasses being mapped?		Respond	yes	Results of botanical studies this year showed native bunch grasses currently occupy too small a percentage of the coastal terrace grasslands to be effectively mapped. Several small study plots have been created and mapped to further assess the condition and growth trend of these plants. Within these plots, perennial grasses were counted to determine density per unit area. Some counts were made along linear belt transects and other plots received total area counts (estimate < 1% ground cover based on density of plants observed within study plots and assuming an average basal area of 2 inches per plant). Once a final route plan is developed for access, additional plots may be established to assess the specific impacts of access on these species. See also response to item 37 below.
37	see 33; what is the definition of CTP being used?		Respond		Further study of the grasslands this year, and additional information gathered on past agricultural practices affecting the coastal terrace, led to the conclusion that the NRSA does not contain significant coastal prairie remnants. This is consistent with the mapping done by BioSystems (1993) and included in the preliminary baseline data distributed to the DTF in March 2005. Coastal prairie grasses are generally believed to be displaced permanently by cultivation. The native grasses present today in the NRSA reflect restoration of more common Central Coast perennial grasses since the end of row crop agriculture and the onset of managed grazing. Contemporary definitions of coastal prairie (Ornduff, Faber, and Keeler-Wolf 2003) include certain key indicator species such as grasses of the genus *Festuca, Deschampsia, Danthonia,* and *Calamagrostis*. These grasslands also possess true grassland soils similar to those of the American Midwest. Our grasslands contain a mix of annual and perennial species with perennials representing much less than 50% cover, and absent are virtually all of the key indicator species that characterize the coastal prairie (e.g., *Festuca spp., Deschamsia caespitosa*, and *Danthonia californica)*.

38	awaiting study results		Report	yes	Several small study plots (100' x 100') have been created and mapped to further assess the condition and growth trend of these plants. Within these plots, perennial grasses were counted to determine density per unit area. Within plots, some counts were made along linear belt transects and other plots received total area counts. Once a final route plan is developed for access, additional plots may be established to assess impacts of access on these species.
39	awaiting study results		Report	yes	A record of grazing practices covering about the last 30 years on the North Property was included in the preliminary baseline and is contained in several report documents by Steckman and by Fry. Additional information on historical practices was gathered by the cultural resources consultant (Applied Earthworks), and more is currently being sought through a researcher at Cal Poly. These findings will be included in the final baseline report document.
40	ED to confirm with DTF	Contact DTF		yes	This work was performed in July and August 2005, by invertebrate ecologist Christopher Rogers, PhD. Results were negative for SBB, and no suitable habitat was found in the NRSA for other sensitive invertebrate species. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6 and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
41	ok				
42	ok; need legless lizard survey followup		Report	yes	Legless lizard and coast horned lizard surveys were conducted the week of July 25, 2005. Results were negative but air temperature was too cold for effective surveys. Additional surveys were performed on September 26 and 27 under suitable field conditions with negative results. The consultant confirmed that the area at mouth of Coon Creek is the only suitable habitat for these species in the NRSA. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6 and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
43	awaiting lizard survey followups		Report	yes	see comment above (item 42)
44	ok				

45	ok; awaiting survey results		Report	yes	This fact is one of the prime reasons for PG&E's decision to proceed with field studies even before review of the preliminary baseline by the DTF. All studies made use of the most recent agency-published lists for taxonomy and status of sensitive species potentially occurring in the NRSA.
46	ok				
47	ok				
48	ok, awaiting survey results; see 69		Report	yes	Thorough surveys have been completed for MSS throughout suitable habitat within the NRSA with negative results. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6 and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
49	ok				
50	ok, but need to confirm this observation at trail planning phase				
51	tenative ok; what is likelihood of the presence of these species? Is there roosting habitat near possible trail locations (potential constraint)		Respond	yes	Burrowing owls were confirmed in the NRSA at three locations in close proximity to the bluff road during night spotlight surveys in October.
52	tentative ok; what is likelihood of the presence of these species? Is there roosting habitat near possible trail locations (potential constraint)		Respond		Neither short-eared nor long-eared owls were detected during field studies.

53	tentative ok; what is likelihood of the presence of these species? Is there roosting habitat near possible trail locations (potential constraint)		Respond		Horned lark and grasshopper sparrow were identified during field surveys this year and are believed to be breeding in the grasslands of the NRSA. PG&E has requested a proposal from GANDA for further focused surveys of these species in spring 2006 after development of a routing plan. Loggerhead shrike and Bell's sage sparrow were not detected, and are not thought to occur in the NRSA. The results of surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6 and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
54	tentative ok; what is likelihood of the presence of these species? Is there roosting habitat near possible trail locations (potential constraint)		Respond		Yellow warbler was found occupying habitat in the Coon Creek riparian area. Nesting by this species also occurred. Yellow-breasted chat and least Bell's vireo were not detected during surveys in the Coon Creek area. Two willow flycatchers (subspecies not known) were seen in the Coon Creek area in April. These are thought to be transients of the *brewsteri* subspecies. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6 and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
55	awaiting study results		Report	yes	Tri-colored blackbirds were not detected in the NRSA. Habitat near the mouth of Coon Creek supports a breeding population of red-winged blackbirds. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6 and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
56	tentative ok; what is likelihood of the presence of these species? Is there roosting habitat near possible trail locations (potential constraint)		Respond		San Diego desert woodrats occur in suitable habitat throughout the NRSA. Nests were found in coastal bluff scrub habitat. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6 and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.

57	ok; see 74				Day and night surveys were performed during the week of July 25, 2005. Additional night surveys were conducted in August and September. Two badgers were observed within the NRSA, and numerous burrows were identified in the southern portion. Burrow mapping was begun using the mobile GIS platform. More than 50 badger burrows thought to be active or recently active were mapped in a single paddock (Red Barn 1). No additional mapping of badger dens has been performed.
58	tenative ok; what is likelihood of the presence of these species? Is there habitat near possible trail locations (potential constraint)		Respond		Invertebrate surveys were performed in July and August 2005, by invertebrate ecologist Christopher Rogers, PhD. Results were negative for SBB, and no suitable habitat was found in the NRSA for other sensitive invertebrate species. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6 and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
59	ok; se 69				Thorough surveys have been completed for Morro shoulderband snail throughout suitable habitat within the NRSA with negative results. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6 and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
60	ok (impact observation)				
61	ok (impact observation)				
62	ok (impact observation)				
63	ok (impact observation)				
64	awaiting study results		Report	yes	The need to prevent disturbance of nesting birds is the intent behind the Federal Migratory Bird Treaty Act and other state/federal laws that protect wildlife. PG&E is aware of its responsibility in this area and will take all necessary precautions to avoid direct or indirect impacts to nesting birds during and after development of the access plan. See Workshop PPT.
65	ok (impact observation)				

66	awaiting study results		Report	yes	San Diego desert woodrats were trapped at all locations identified as possible habitat in the NRSA. They are generally distributed throughout the Coastal Bluff Scub, and also are associated with most rock outcrops in the NRSA.
67	ok; see 74				
68	ED to followup with DTF	Contact DTF		yes	NRSA was thoroughly examined for evidence of k-rat burrows before trapping studies were planned. Only one small area within the coastal bluff scrub was thought to possibly have k-rat burrows. Trapping there did not produce this species. Dune-like habitat near mouth of Coon Creek was found unsuitable as habitat for MBKR. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6, and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
69	awaiting survey results		Report	yes	Thorough surveys have been completed for MSS throughout suitable habitat within the NRSA with negative results. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6, and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips. See also response at item 48.
70	ok; ED to followup with DTF	Contact DTF		yes	Additional amphibian species: Suitable breeding habitat for these species was examined during protocol-level surveys for red-legged frogs at Trout Pond and at Coon Creek. No eggs, larvae, metamorphs, or adults were observed at either location.
71	ok				
72	awaiting "final study"; ED to followup with DTF	Contact DTF	Report	yes	The results of wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6, and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips. All agreed that the scope of work and methods used were sufficient for informing the process of access and monitoring plan development.
73	ok (impact observation)				

74	awaiting survey results		Report	yes	Day and night surveys were performed during the week of July 25, 2005. Additional night surveys were conducted in August and September. Two badgers were observed within the NRSA, and numerous burrows were identified. Burrow mapping resulted in more than 50 badger burrows being documented in a single paddock (Red Barn 1). No additional mapping of badger dens has been performed.
75	awaiting survey results		Report	yes	All seabird breeding colonies were surveyed and mapped during spring and summer 2005. Higher numbers of nest sites occurred on bluff cliffs, off-shore rocks and sea stacks north of Trout Pond. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6 and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
76	awaiting survey results		Report	yes	Surveys performed in 2005 mapped and updated information for all pinniped and sea otter haulout and pupping areas, as well as offshore and intertidal habitats utilized by these species.
77	awaiting survey results		Report	yes	Apart from one sea palm population mapped near Disney Point, intertidal organisms within the NRSA were found to consist of regionally common species. Some additional quantitative sampling was performed along horizontal band transects within the NRSA in 2005 to augment routine sampling carried out annually under the power plant's thermal effects monitoring program. A complete mapping of all intertidal substrates was completed under minus tide conditions and added to the mobile GIS.
78	awaiting survey results		Report	yes	All seabird breeding colonies were surveyed and mapped during spring and summer 2005. Higher numbers of nest sites occurred on bluff cliffs, off-shore rocks and sea stacks north of Trout Pond. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6 and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
79	ok; comment: consider as part of monitoring/adaptive management plan				PG&E has identified this potential impact to seabird nesting colonies (See results from thresholds workshop). Suitable measures for protection of these nest sites from visitor disturbance will be developed during route planning.

80	awaiting survey results		Report	yes	The work performed by Tenera in 2005 included mapping of primary and secondary haulout sites used by harbor seals, sea lions, and sea otters within the NRSA. These sites have been included in the project GIS, and will be considered along with other resource data during constraints analysis and development of the access plan.
81	ok				
82	ED to followup with DTF	Contact DTF			The existing marine resources data from PG&E's 30-year thermal effects monitoring database will be adequate to inform the process of developing a plan of access. Once the route plan is developed additional sampling at one or more specific sites may be required to support access-related impacts monitoring. PG&E will ask that the proposed approach for such sampling be reviewed by the DTF.
83	ED to followup with DTF	Contact DTF			The existing marine resources data from PG&E's 30-year thermal effects monitoring database will be adequate to inform the process of developing a plan of access. Once the route plan is developed additional sampling at one or more specific sites may be required to support access-related impacts monitoring. PG&E will ask that the proposed approach for such sampling be reviewed by the DTF.
84	ED to followup with DTF	Contact DTF			The existing marine resources data from PG&E's 30-year thermal effects monitoring database will be adequate to inform the process of developing a plan of access. Once the route plan is developed additional sampling at one or more specific sites may be required to support access-related impacts monitoring. PG&E will ask that the proposed approach for such sampling be reviewed by the DTF.
85	ED to followup with DTF	Contact DTF			The existing marine resources data from PG&E's 30-year thermal effects monitoring database will be adequate to inform the process of developing a plan of access. Once the route plan is developed additional sampling at one or more specific sites may be required to support access-related impacts monitoring. PG&E will ask that the proposed approach for such sampling be reviewed by the DTF.
86	ok				

87	ED to followup with DTF; comment: issue of "controls" needs to be addressed in monitoring plan	Contact DTF			The use of controls (aka reference areas) was examined in some detail during the thresholds workshop. PG&E's monitoring plan will incorporate the concept of control or reference areas for use in distinguishing naturally occurring variation from changes that result from public access impacts. Selection of suitable control/reference sites and careful documentation of these will begin on completion of a route plan.
88	awaiting survey results		Report	yes	The existing marine resources data from PG&E's 30-year thermal effects monitoring database will be adequate to inform the process of developing a plan of access. Once the route plan is developed additional sampling at one or more specific sites may be required to support access-related impacts monitoring. PG&E will ask that the proposed approach for such sampling be reviewed by the DTF.
89	awaiting survey results		Report	yes	The existing marine resources data from PG&E's 30-year thermal effects monitoring database will be adequate to inform the process of developing a plan of access. Once the route plan is developed additional sampling at one or more specific sites may be required to support access-related impacts monitoring. PG&E will ask that the proposed approach for such sampling be reviewed by the DTF.
90	ok				
91	awaiting survey results		Report	yes	All seabird breeding colonies were surveyed and mapped during spring and summer 2005. Higher numbers of nest sites occurred on bluff cliffs, off-shore rocks and sea stacks north of Trout Pond. The results of these and other wildlife surveys performed this year were discussed in the field with DTF members J. Eliason and D. Hillyard on October 6, and with M. Walgren on Sept. 29. Consulting biologists from Tenera and GANDA were also present on these trips.
92	awaiting survey results		Report	yes	The work performed by Tenera in 2005 included mapping of primary and secondary haulout sites used by harbor seals, sea lions, and sea otters within the NRSA. These sites have been included in the project GIS, and will be considered along with other resource data during constraints analysis and development of the access plan.

93	under review				This issue was identified and taken into account during the thresholds workshop. Functional resource attributes identified for managed grazing included habitat structure and function, essential animal behaviors, soil and site stability, hydrologic function, and biological integrity. The outcome of the threshold workshop was presented to Mr. Blanchard on November 2 at Diablo Canyon power plant. He expressed general satisfaction with the approach taken toward development of a resource monitoring plan.
94	under review				See response, item 93 above
95	ok; but need to discuss relation to baseline "constraints" for purposes of monitoring change over time			Yes	Potential impacts from public access were evaluated during the October 5, 2005 thresholds workshop. Eight resource categories were addressed including managed grazing. Impacts identified as potentially effecting managed grazing included this impact along with 8 others. All identified impacts to all resource categories will be considered during development of the final monitoring plan.
96	ok; but need to discuss relation to baseline "constraints" for purposes of monitoring change over time				Potential impacts from public access were evaluated during the October 5, 2005 thresholds workshop. Eight resource categories were addressed including managed grazing. Impacts identified as potentially effecting managed grazing included this impact along with 8 others. All identified impacts to all resource categories will be considered during development of the final monitoring plan.
97	ok; but need to discuss relation to baseline "constraints" for purposes of monitoring change over time				Potential impacts from public access were evaluated during the October 5, 2005 thresholds workshop. Eight resource categories were addressed including managed grazing. Impacts identified as potentially effecting managed grazing included this impact along with 8 others. All identified impacts to all resource categories will be considered during development of the final monitoring plan.
98	ok; but need to discuss relation to baseline "constraints" for purposes of monitoring change over time				Potential impacts from public access were evaluated during the October 5, 2005 thresholds workshop. Eight resource categories were addressed including managed grazing. Impacts identified as potentially effecting managed grazing included this impact along with 8 others. All identified impacts to all resource categories will be considered during development of the final monitoring plan.
99	ok; (impact observation)				

100	ok; (impact observation)				
101	ok; (impact observation)				
102	ok; (impact observation)				
103	ok; (impact observation)				
104	ok; (impact observation)				
105	ok; (impact observation)				
106	ok; (impact observation)				
107	ok; (impact observation)				

Appendix B
Plant Species List for the North Ranch Survey Area.

Botanical Species List for the NRSA 2005-2006

Family	Scientific Name (natives in bold)	Common Name	Form	Status	Collection date/number	Habitat	Wetland Ind.
Blechnaceae	***Woodwardia fimbriata***	Giant chain fern	Per.	Native	Herbarium	Riparian	
Dryopteridaceae	***Dryopteris arguta***	Wood fern	Per.	Native	Herbarium	Coastal scrub/rparian	
Dryopteridaceae	***Polystichum munitum***	Western sword fern	Per.	Native	Herbarium	Riparian	
Pteridaceae	***Adiantum aleuticum***	Five-finger fern	Per.	Native	Herbarium	Riparian	
Aizoaeae	*Tetragonia tetragonoides*	New Zealand spinach	Per., Herb	Exotic	3/18/2005/001	Beaches, bluffs	*
Aizoaeae	*Carpobrotus edulis*	Ice plant	Per., Herb	Exotic	Need Sample	Beaches, bluffs	*
Aizoaeae	*Carpobrotus chilensis*	Sea fig	Per., Herb	Exotic	Need Sample	Beaches, bluffs	*
Anacardiaceae	***Rhus ovata***	Sugar bush	Shrub	Native	Herbarium	Enclosure	
Anacardiaceae	***Toxicodendron diversilobum***	Poison oak	Per., Vine	Native	Herbarium	Coastal scrub	
Apiaceae	*Apium graveolens*	Celery	Ann., Per.	Exotic	3/18/2005/002	Wetlands, pond	FACW
Apiaceae	***Berula erecta***	Cutleaf water parsnip	Per., Herb	Native	3/18/05/003	Wetlands, pond	OBL
Apiaceae	*Conium maculatum*	Poison-hemlock	Per., Herb	Exotic		Riparian	FACW
Apiaceae	*Foenniculum vulgare*	Fennel	Per.	Exotic	Herbarium	Disturbed, scrub	
Asteraceae	***Achillea millefolium***	Common yarrow, milfoil	Per., Herb	Native		Grassland/Many habitats	FACU
Asteraceae	***Agoseris heterophylla***	Agoseris	Ann.	Native	Herbarium	Coastal scrub, grasslands	
Asteraceae	***Ambrosia acanthicarpa***	Bur sage	Ann.	Native	Herbarium	Disturbed/road side	
Asteraceae	*Ambrosia chammissonis*	Beach bur sage	Per., Herb	Native	Herbarium	Beaches	
Asteraceae	***Anaphalis margaritacea***	Pearly everlasting	Per., Herb	Native	Need Sample?	Chaparral, disturbed areas	*
Asteraceae	*Anthemis cotula*	Mayweed	Ann.	Exotic	Herbarium	Disturbed / Roadsides	
Asteraceae	***Artemesia californica***	California sagebrush	Shrub	Native	3/18/05/004	Coastal scrub, chaparral	UPL
Asteraceae	***Artemesia dracunculus***	Tarragon	Per., Herb	Native	Herbarium	Riparian	

Asteraceae	***Bacharis pilularis***	Coyote bush	Shrub	Native	Herbarium	Coastal scrub, chaparral	UPL
Asteraceae	***Camomilla suaveolens***	Pineapple weed	Ann.	Native	Herbarium	Disturbed/ Roadsides	
Asteraceae	*Carduus pycnocephalus*	Italian thistle	Ann.,Herb	Exotic	Need Sample?	Coastal scrub, chaparral, grassland	UPL
Asteraceae	*Carthamus lanatus*	Wooly distaff thistle	Per., Herb	Nox. Weed- "B"	Herbarium	Corral area	
Asteraceae	*Centaurea melitensis*	Tocalote	Ann.	Nox. weed	Herbarium	Grassland, disturbed	
Asteraceae	*Cirsium vulgare*	Bull thistle	Ann., Herb	Exotic	Herbarium	Coastal scrub, grassland	FACU
Asteraceae	*Cotula coronopifolia*	Brass-buttons,	Ann., Herb	Exotic	3/18/05/005	Wetlands, pond	FACW+
Asteraceae	***Erigeron glaucus***	Seaside daisy	Per., Herb	Native	3/18/05/006	Beaches, coastal scrub	FACU
Asteraceae	***Eriophyllum confertiflorum var. confertifolium***	Golden-yarrow	Sub., Shrub	Native	Herbarium	Coastal scrub, chaparral	*
Asteraceae	***Eriophyllum staechadifolium***	Seaside wooly sunflower	Sub., Shrub	Native	4/22/O5	Coastal scrub, bluffs, beaches	*
Asteraceae	***Gnaphalium californicum***	Green everlasting	Bien.,Herb	Native	3/18/05/007	Coastal scrub , grassland	*
Asteraceae	***Hazardia squarrosa var. squarrosa***	Sawtooth golden bush	Shrub	Native	Herbarium	Coastal scrub	*
Asteraceae	***Helenium bigelovii***	Bigelow sneeze weed	Per., Herb	Native	Herbarium	Grassland, seeps	
Asteraceae	*Hypochaeris glabra*	Smooth cat's-ear	Ann.	Exotic	Herbarium	Grasslands	*
Asteraceae	***Isocoma menziesii***	Goldenbush	Per., Sub., Shrub	Native	Herbarium	Coastal, shrub	
Asteraceae	***Lasthenia macrantha ssp.macrantha***	Perrenial goldfields	Per.	Native CNPS 1B	3/18/05/008	Beaches, coastal bluffs	*
Asteraceae	***Lasthenia californica***	Goldfields	Ann.	Native		Grasslands	FACU
Asteraceae	***Layia platyglossa***	Tidy-tips	Ann.	Native	3/18/05/009	Grasslands	*
Asteraceae	*Picris echioides*	Bristly ox-tongue	Ann.	Exotic	Herbarium	Coastal scrub, disturbed	
Asteraceae	*Senecio vulgaris*	Common groundsel	Ann.	Exotic	Herbarium	Grasslands	*
Asteraceae	*Silybum marianum*	Milk thistle	Ann., Bien.	Exotic	Need Sample	Grasslands, coastal scrub	*
Asteraceae	*Sonchus asper*	Prickly sow	Ann.	Exotic	4/21/05/010	Grasslands	*

		thistle					
Asteraceae	*Xanthium spinosum*	Spiny cocklebur	Ann.	Native	Herbarium	Pond	
Boraginaceae	***Amsinkia menziesii var. menziesii***	Rancher's fireweed	Ann.	Native	3/18/05/011	Grasslands	*
Boraginaceae	***Heliotropum curassavicum***	Alkali heliotrope	Per.	Native	Herbarium	Pond, seeps	
Brassicaceae	*Brassica nigra*	Black mustard	Ann.	Exotic	Need Sample	Grasslands	*
Brassicaceae	*Brassica rapa*	Fields mustard	Ann.	Exotic	Herbarium	Grassland, coastal scrub, disturbed	
Brassicaceae	*Cackile maritima*	Sea rocket	Ann.	Exotic	4/21/05	Beaches	*
Brassicaceae	*Raphanus sativa*	Wild radish	Ann.	Exotic	3/18/05/012	Grasslands, coastal scrub	*
Brassicaceae	***Rorripa nasturtium-aquatica***	Water cress,	Ann.	Native		Pond	OBL
Brassicaceae	*Sisymbrium officinal*	Hedge mustard	Ann.	Exotic	Herbarium	Grassland	
Cactaceae	*Opuntia ficus-indica*	Indian fig	Per.	Exotic	Herbarium	Riparian, fence line	
Caprifoliaceae	***Lonicera involucrata***	Twin berry	Per., Vine	Native	Herbarium	Chaparral	
Caryophyllaceae	*Silene gallica*	Windmill pink	Ann.	Exotic	Need Sample	Grasslands	*
Caryophyllaceae	*Spergula arvensis ssp. arvensis*	Stickwort	Ann.	Exotic	Herbarium	Disturbed	
Caryophyllaceae	***Spergularia macrotheca var. macrotheca***	Beach sandspurry	Per.	Native	Check sp.3/18/05/013	Coastal scrub, bluffs, beaches	FAC+
Caryophyllaceae	*Spergularia rubra*	Sandspurry	Ann.	Exotic	4/22/05	Disturbed grasslands	*
Caryophyllaceae	*Stellaria media*	Chickweed	Ann.	Exotic	3/18/05/014	Grassland	*
Chenopodiaceae	***Atriplex californica***	Saltbush	Per.	Native	3/18/05/015	Bluffs, rocky outcrop	FAC+
Chenopodiaceae	*Atriplex semibaccata*	Australian salt bush	Per.	Exotic		Bluffs, rocky outcrop	
Chenopodiaceae	*Chenopodium album*	Sheep sorrel	Ann.	Exotic		Disturbed grasslands	
Chenopodiaceae	***Chenopodium californicum***	California chenopod	Per.	Native		Coastal bluffs	*
Convolvulaceae	***Calystegia macrostegia***	Wild morning glory	Per., Vine	Native	3/18/05/016	Coastal scrub	*
Cornaceae	***Cornus stolinifera***	Creek dogwood	Tree	Native	Herbarium	Riparian	
Crassulaceae	***Dudleya cymosa ssp. paniculata***	Stone crop	Per.	Native		Bluffs, rocky outcrop	

Crassulaceae	***Dudleya lanceolata***	Stone crop	Per.	Native	Herbarium	Coastal scrub, chaparral	
Cucurbitaceae	***Marah fabaceae***	California manroot	Per., Vine	Native	4/21/05	Coastal scrub, chaparral	*
Euphorbiaceae	***Croton californicus***	Croton	Per., Herb	Native	Herbarium	Beaches, sandy areas	
Fabaceae	***Astragalus nuttallii var. nutallii***	Central coastal postal weed	Per., Herb	Native CNPS 4	3/18/05/017	Bluffs, rocky outcrop	*
Fabaceae	***Lathyrus jepsonii***	Jepson's pea	Per.	Native		Coastal scrub	
Fabaceae	*Lotus corniculatus*	Birdsfoot treefoil	Per. Herb	Exotic	Herbarium	Pond, seeps	
Fabaceae	***Lotus strigosus***	Treefoil	Ann.	Native	Herbarium	Coastal scrub, chaparral	
Fabaceae	***Lupinus arboreus***	Yellow bush lupine	Per.	Native		Coastal bluffs	
Fabaceae	***Lupinus bicolor***	Miniature lupine	Ann.	Native	Need Sample	Grasslands	*
Fabaceae	***Lupinus chamissonis***	Silver dune lupine					
Fabaceae	***Lupinus hirusutissimus***	Stinging lupine	Ann.	Native	3/18/05/18	Coastal scrub	*
Fabaceae	***Lupinus truncatus***	Wood lupine	Ann.	Native	Need Sample	Coastal scrub, chaparral	*
Fabaceae	*Medicago polymorpha*	Bur clover	Ann.	Exotic	3/18/05/019	Grasslands	*
Fabaceae	*Melilotus indica*	Sweet clover	Ann.	Exotic	3/18/05/020	Grasslands	*
Fabaceae	*Spartium junceum*	Spanish broom	Per.	Nox. Weed		Disturbed, roadsides	
Fabaceae	*Trifolium aureum*	Hop clover	Ann.-Bien..	Exotic	Herbarium	Grasslands	
Fabaceae	*Trifolium dubeum*	Little hop clover	Ann.	Exotic	Herbarium	Disturbed	
Fabaceae	***Trifolium fucatum***	Sour clover	Ann.	Native	3/18/05/021	Grasslands	FAC
Fabaceae	***Trifolium wormskioldii***	Bull clover	Per. Herb.	Native	Herbarium	Grassland	
Fabaceae	***Vicia americana var. americana***	Vetch	Per.	Native	Herbarium	Riparian	
Frankeniaceae	***Frankenia salina***	Alkali heath	Sub. Shrub	Native	4/21/05	Coastal bluffs	FACW
Geraniaceae	*Erodium cicutarium*	Red stem filaree	Ann.	Exotic	Sample?	Grasslands	*
Geraniaceae	*Erodium moschatum*	White stem filaree	Ann.	Exotic	Sample?	Grasslands	*
Geraniaceae	*Geranium dissectum*	Cutleaf geranium	Ann.	Exotic	Herbarium	Disturbed, grasslands	
Haloragaceae	*Myriophyllum aquaticum*	Parrots feather	Per.	Exotic	Herbarium	Pond	
Hydrophyllaceae	***Pholistoma auritum***	Fiesta flower	Ann.	Native	Herbarium	Chaparral, riparian	

Lamiaceae	*Marrubium vulgare*	White horehound	Shrub	Exotic	Need Sample	Grasslands	*
Lamiaceae	***Salvia mellifera***	Black sage	Shrub	Native	4/21/05	Enclosure	
Lamiaceae	***Stachys bullata***	California hedge nettle	Per., Herb	Native	3/18/05/022	Coastal scrub, chaparral	*
Lemnaceae	***Lemna minor***	Duck weed	Per.	Native	Herbarium	Pond	
Malvaceae	*Malva parviflora*	Cheese weed	Ann.	Exotic		Grasslands	
Myoporaceae	*Myoporum laetum*	Myoporum	Per. Tree	Exotic	Herbarium	Pond, ornamental house sites	
Nymphaceae	*Nymphaea odorata*	Fragrant water lily	Per.	Nox. Weed- "B"	Herbarium	Pond	
Onagraceae	***Epilobium brachycarpum***	Panicled willow herb	Ann.	Native	Herbarium	Grassland, riparian, disturbed	
Oxalidacea	*Oxalis corniculata*	Oxalis	Per.	Exotic		Disturbed	
Papaveraceae	***Eschscholtzia californica***	California poppy	Ann., Bien.	Native	Need Sample	Grasslands, coastal scrub	*
Pinaceae	***Pinus radiata***	Monterey pine	Tree	Native	Herbarium	Chaparral	
Plantaginaceae	***Plantago erecta***	Plantago	Ann., Herb	Native	Need Samples	Chaparral	
Plantaginaceae	*Plantago coronpus*	Cutleaf plantago	Ann., Bien.	Exotic	Herbarium	Grassland, coastal scrub, disturbed	
Plantaginaceae	*Plantago lanceolata*	English plantain	Per.	Exotic	Herbarium	Grassland, coastal scrub, disturbed	
Polygonaceae	***Eriogonum parvifolium***	Sea cliff buckwheat	Shrub	Native	3/18/05/023	Bluffs, rocky outcrops, coastal scrub	*
Polygonaceae	***Eriogonum fasiculatum***	California buckwheat	Shrub	Native	Herbarium	Chaparral	
Polygonaceae	*Rumex acetosella*	Sheep sorrel	Per., Herb	Exotic	Herbarium	Grasslands	
Polygonaceae	*Rumex crispus*	Sour dock	Per. Herb.	Exotic	Herbarium		
Polygonaceae	***Pterostegia drymariodes***	Dryad saddle	Per.	Native	Herbarium	Chaparral, rocky outcrops	
Polemoniaceae	***Navarretia squarrosa***	Skunkweed	Ann.	Native	Herbarium	Coastal scrub, disturbed, roads	
Portulacaceae	***Claytonia perfoliata***	Miner's lettuce	Ann.	Native	Need Sample		*
Primulaceae	*Anagallis arvensis*	Scarlet pimpernel	Ann.	Exotic	3/18/04/024	Coastal scrub, grasslands	*
Ranunculaceae	***Thalictrum fenderli var. fenderli***	Meadow rue	Per., Herb.	Native	Herbarium	Chaparral	
Rhamnaceae	***Rhamnus***	California	Shrub	Native	Herbarium	Chaparral	

	californica	coffee berry	Tree				
Rhamnaceae	***Rhamnus crocea***	Spiny redberry	Shrub	Native	4/21/05	Coastal scrub	*
Rhamnaceae	***Ceonothus thyrsifolius***	Blue blossom	Shrub	Native	Herbarium	Enclosure	
Rosaceae	***Aphanes occidentalis***	Aphanes	Ann.	Native	4/22/05	Grasslands	
Rosaceae	***Heteromeles arbutifolia***	Toyon	Shrub Tree	Native	Herbarium	Chaparral, enclosure	
Rosaceae	***Rubus ursinus***	California blackberry	Per. Vine	Native	Herbarium	Riparian, seeps	
Rubiaceae	***Gallium sp.***	Bedstaw			Need Sample		
Salicaceae	***Salix lasiolepis***	Arroyo willow	Tree	Native	Herbarium	Pond, riparian	
Scrophulariaceae	***Castelleja applegatii***	Paintbrush	Per.	Native	Herbarium	Chaparral	
Scrophulariaceae	***Collinsia heterophylla***	Chinese houses	Ann.	Native	Herbarium	Chaparral	
Scrophulariaceae	***Mimulus aurantiacus***	Bush monkey flower	Per. Shrub	Native	Herbarium	Coastal scrub, chaparral	
Scrophulariaceae	***Mimulus guttatus***	Monkey flower	Ann.-per.	Native	Herbarium	Pond, riparian	
Scrophulariaceae	***Schrophularia californica***	California bee plant	Per.	Native	Herbarium	Coastal scrub, chaparral	
Scrophulariaceae	***Veronica americana***	American brookline	Per.	Native	Herbarium	Pond, riparian	
Scrophulariaceae	*Veronica catenata*	Chain speedwell	Per.	Exotic	Herbarium	Pond	
Solanaceae	***Solanum douglassii***	Nightshade	Per.	Native	Herbarium	Chaparral	
Tamaricaceae	*Tamarix ramossissima*	Tamarisk	Per.	Nox. weed	Need Sample	Riparian	
Tropaeolaceae	***Tropaeolum majus***	Garden nasturtium	Per. Herb.	Native	Herbarium	Coastal scrub, riparian moist	
Urticaceae	***Urtica dioica*** **ssp. *holosericea***	Stinging nettle	Per.	Exotic	Herbarium	Coastal scrub, riparian	
Urticaceae	***Urtica urens***	Dwarf stinging nettle	Ann.	Native	Herbarium	Chaparral, disturbed	
Verbenaceae	***Verbena lasiostachys***	Verbena	Per.	Native	Herbarium	Coastal scrub, riparian moist	
Vitaceaa	***Parthenocissus vitaceae***	Virginia creeper	Per.	Native	Herbarium	Riparian	
Violaceae	***Viola sp.***				Need Sample		
Cyperaceae	***Scirpus californicus***	California bulrush	Per.	Native	3/18/05/025	Wetlands, pond	OBL
Juncaceae	*Juncus capitatus*	Capped rush	Ann.	Exotic	3/18/05/02/026	Wetlands, pond	
Juncaceae	***Juncus bufonius***	Toad rush	Ann.	Native	Herbarium	Pond	
Poaceae	***Avena barbata***	Slender oats	Ann.	Exotic	Sample?		

Poaceae	***Bromus carinatus***	California brome	Per.	Native	3/18/05/027	Grasslands	*
Poaceae	***Bromus hordeaceous***		Ann.		Sample		
Poaceae	*Cenchrus echinatus*	Southern sandbur	Ann.	Exotic	Herbarium	Grasslands, coastal scrub	
Poaceae	*Dactylis glomerata*	Orchard grass	Per.	Native	Herbarium	Grassland, disturbed, moist areas	
Poaceae	***Deschampsia danthonioides***		Per.	Native	Herbarium	Grassland, moist areas	
Poaceae	***Distichlis spicata***	Saltgrass	Per.	Native	Herbarium	Pond	
Poaceae	*Ehrharta calycina*	Veldt grass	Per.	Nox. weed	Herbarium	Grassland, disturbed	
Poaceae	***Hordeum brachyantherum***	Meadow barley	Per.	Native	Herbarium	Grasslands	
Poaceae	*Lamarckia aurea*	Goldentop	Ann.	Exotic	Herbarium	Coastal scrub, disturbed	
Poaceae	***Leymus pacificus***	Pacific wild rye	Per.	Native	Herbarium	Bluffs, grassland, south	
Poaceae	*Lolium multiflorum*	Italian ryegrass	Ann.	Exotic	3/18/05/028	Grasslands	Fac*
Poaceae	***Nassella pulchra***	Purple needle grass	Per.	Native	3/18/05/029	Grasslands	*
Poaceae	*Phalaris aquatica*	Harding grass	Per.	Exotic	3/18/05/030	Grasslands	
Poaceae	***Phalaris arundinacea***	Reed canary grass	Per.	Native	Herbarium	Coastal scrub	
Poaceae	*Poa annua*	Annual bluegrass	Ann.	Exotic	3/18/05/031	Grasslands	
Poaceae	*Polypogon monspeliensis*	Rabbitsfoot grass	Ann.	Exotic	3/18/05/032	Grasslands	FACW+
Poaceae	*Vulpia bromoides*	Slender fescue	Ann.	Exotic	3/18/05/033	Grasslands	FACU*
Poaceae	***Vulpia microstachys***			Native	Herbarium	Grasslands	
Typhaceae	***Typha angustifolia***	Narrow-leaved cattail	Per.	Native	Need Sample	Pond	
Typhaceae	***Typha latifolia***	Cattail	Per.	Native	Herbarium	Riparian	

Appendix C
List of Bird Species Observed on the North Ranch Survey Area.

Bird Species Observed During 2005-2006 Surveys

Brown pelican (*Pelecanus occidentalis*)
Double-crested cormorant (*Phalacrocorax auritus*)
Brandt's cormorant (*Phalacrocorax penicillatus*)
Black-crowned night heron (*Nycticorax nycticorax*)
Great blue heron (*Ardea herodias*)
Mallard (*Anas platyrhynchos*)
Surf scoter (*Melanitta perspicillata*)
Turkey vulture (*Cathartes aura*)
Red-tailed hawk (*Buteo jamaicensis*)
Peregrine falcon (*Falco peregrinus*)
California quail (*Callipepla californica*)
Killdeer (*Charadrius vociferus*)
Black oystercatcher (*Haematopus bachmani*)
Western sandpiper (*Calidris mauri*)
Red-necked phalarope (*Phalaropus lobatus*)
California gull (*Larus californicus*)
Western gull (*Larus occidentalis*)
Mourning dove (*Zenaida macroura*)
White-thraoted swift (*Aeronautes saxatalis*)
Anna's hummingbird (*Calypte anna*)
Allen's hummingbird (*Selasphorus sasin*)
Northern flicker (*Colaptes auratus*)
Black phoebe (*Sayornis nigricans*)
Hutton's vireo (*Vireo huttonii*)
Western scrub-jay (*Aphelocoma californica*)
American crow (*Corvus brachyrhynchos*)
Common raven (*Corvus corax*)
Tree swallow (*Tachycineta bicolor*)
Cliff swallow (*Petrochelidon pyrrhonota*)
Barn swallow (*Hirundo rustica*)
Wrentit (*Chamaea fasciata*)
Bushtit (*Psaltriparus minimus*)
Pygmy nuthatch (*Sitta pygmaea*)
House wren (*Troglodytes aedon*)
Bewick's wren (*Thryomanes bewickii*)
Western bluebird (*Sialia mexicana*)
Swainson's thrush (*Catharus ustulatus*)
Hermit thrush (*Catharus guttatus*)
Northern mockingbird (*Mimus polyglottos*)
California thrasher (*Toxostoma redivivum*)
European starling (*Sturnus vulgaris*)
Orange-crowned warbler (*Vermivora celata lutescens*)

Yellow warbler (*Dendroica petechia*)
Wilson's warbler (*Wilsonia pusilla*).
Common yellowthroat (*Geothlypis trichas*)
California towhee (*Pipilo crissalis*)
Spotted towhee (*Pipilo maculatus*)
Rufous-crowned sparrow (*Aimophila ruficeps*)
Grasshopper sparrow (*Ammodramus savannarum*)
Fox sparrow (*Passerella iliaca*)
Song sparrow (*Melospiza melodia*)
Nuttall's white-crowned sparrow (*Zonotrichia leucophrys nuttallii)*
Lazuli bunting (*Passerina amoena*)
Western meadowlark (*Sturnella neglecta*)
Red-winged blackbird (*Agelaius phoeniceus*)
Purple finch (*Carpodacus purpureus*)
House finch (*Carpoducus mexicanus*)
American goldfinch (*Carduelis tristis*)
Lesser goldfinch (*Carduelis psaltria*)

Appendix D
Riparian Bird Species Observations and Status Summary Results (May-July 2005).

Common Name	Scientific Name	Coon Creek Status	Regional Status	22-Apr		23-Apr		3-May		17-May		7-Jun		25-Jun		5-Jul		16-Jul		28-Jul		Estimated Number of Breeding Pairs
				#	code	#	code	#	code	#	code	#	code	#	code	#	code	#	code	#	code	
Great Blue Heron	*Ardea herodius*	T	RB			2	fo													3	1sub-adult	ND
Great Egret	*Ardea alba*	W	W																			NA
Black-crowned Night-heron	*Nycticorax nycticorax*	T	RB							2	2hy							1	juv			ND
Killdeer	*Charadrius vociferus*	B[B]	RB							2	n					1	v	1	t	1	juv	1
Turkey Vulture	*Cathartes aura*	T	RB			4	fo	1	fo													ND
Northern Harrier	*Circus cyanus*	T	RB																	2	juv	ND
Red-tailed Hawk	*Buteo jamaicensis*	T	RB	1	fo			1	fo					1	fo							ND
American Kestrel	*Falco sparverius*	T	RB									1	v	1	v			2	fo			ND
California Quail	*Callipepla californica*	B[C]	RB			x		1	s							1	v			3	c	ND
Mourning Dove	*Zenaida macroura*	B	RB	x	s	5	3s	4	s,pr	5	fl,2s	5	1s	4		5	v,v	5	c			2
Barn Owl	*Tyto alba*	T	RB																	1	v	ND
Great Horned Owl	*Bubo virginianus*	PB	RB													1	c	1	v	1	v	ND
White-throated Swift	*Aeronautes saxatalis*	T	RB			20	for															ND
Anna's Hummingbird	*Calypte anna*	B	RB	x		3	2s	1	s	1	v	2	v	2	1s	3	1s	1	v			3-4
Allen's Hummingbird	*Selasphorus sasin*	B	SB			1	for	1	v	3	1pr	4	1pr	5	2pr	6	1s, 1juv	4	v	2	v	3
Rufous Hummingbird	*Selasphorus rufus*	M	M					3	pr													NA
Costa's Hummingbird	*Calypte costae*	T	SB			1	fb	1	v													ND
Belted Kingfisher	*Ceryle alcyon*	T	RB	x		1	for	1	for													ND
Northern Flicker	*Colaptes auratus*	B	RB			x		2	pr	2	1t	2	1t	2		3		3	1t,1fl	3	c	1
Downy Woodpecker	*Picoides pubescens*	PB	RB									1	v					2	c	1	v	1
Nuttall's Woodpecker	*Picoides nuttallii*	PB	RB									1	v	2	pr,t			3	1t			1
Black Phoebe	*Sayornis nigricans*	PB	RB	x				1	for	1	v	2	pr	1	v	1	v	3	1juv	1	c	1
Pacific-slope Flycatcher	*Empidonax difficilis*	PB	SB					7	7s	1	c	2	2s	4	2s,1juv	3	1s	2	1s	2	2s	2-3
Willow Flycatcher	***Empidonax traillii***	M	SB			**1**	**for**															**0**

Empidonax sp.	unknown species	M	SB			1	for															
Ash-throated Flycatcher	*Myiarchus cinerascens*	T	SB			1	for															ND
Cassin's Kingbird	*Tyrannus vociferans*	T	SB													1	v					ND
Tree Swallow	*Tachycineta bicolor*	PB	SB			2	for							8	for	13	1fl					1
Violet-green Swallow	*Tachycineta thalassina*	T	SB			2	for	4	for													ND
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	T	SB	x		4	for	2	for	2	for	7	for	2	for	4	for			3	fo	ND
Barn Swallow	*Hirundo rustica*	T	SB	x		2	for	6	for	1	for	4	for	18	for	10	for	4	for	18	fo	ND
Cliff Swallow	*Petrochelidon pyrrhonota*	T	SB	x		40	for	8	for	2	for	1	for			2	fo	2	for	2	fo	ND
Western Scrub-Jay	*Aphelocoma californica*	B	RB	x		3	1pr	2	pr	3	fl	3	v	2	v	1		2	v	2		1
Wrentit	*Chamaea fasciata*	B	RB	x	s	6	4s	4	4s	3	3s	8	4s,2fl	11	5s	12	5s,2n	7	3s	5	2s	5-6
Ruby-crowned Kinglet	*Regulus calendula*	W	W			1	for	1	v											1	v	NA
Chestnut-backed Chickadee	*Poecile rufescens*	PB	RB					8		5	1s	5	fam	4	v	2	v	5	c	11	v	ND
Bushtit	*Psaltriparus minimus*	PB	RB			9	2fam	6		4	fam	4	fam	5		1	v	13	v			ND
Bewick's Wren	*Thryomanes bewickii*	B	RB	x	s	5	4s	3	3s	2	2s	2	2s	10	4s,3fl	9	4s	15	1n,4s,1j fl	9	3s	5
House Wren	*Troglodytes aedon*	B	RB											1	v	1	v	4	n	1	v	2
Swainson's Thrush	*Catharus ustulatus*	B	SB							4	4s	3	3s	4	4s	4	3s	1	cf	1	v	3-4
California Thrasher	*Toxostoma redivivum*	B[C]	RB	x	s			2	1s	2	1s	3	2s	3	1s	3	v	2	1s	3	2juv	3
European Starling	*Sturnus vulgaris*	T	NRB							30	v											0
Hutton's Vireo	*Vireo huttonii*	B	RB											2		3	pr,n	3	1s	4	2fl	3
Warbling Vireo	*Vireo gilvus*	T	SB			7	for	2	1s									4	v			ND
Orange-crowned Warbler	*Vermivora celata*	Bc	RB/M			9	4s	1	s	3	fl,2s	2	2s	3	1s,1fl			1	v			ND
Nashville Warbler	*Vermivora ruficapillis*	M	M																			NA
MacGillivrays Warbler	*Oporornis tolmiei*	M	M	x	v	2	fb															NA
Yellow Warbler	*Dendroica petechia*	B	SB			8	6s	7	5s,2pr	4	4s	4	3s	3	1s,fl	1	v	1	v			3-5
Wilson's Warbler	*Wilsonia pusilla*	B	SB	x	s	17	7s	12	6s, 1pr	6	4s	4	3s	2	2s			5	v	5	1fl	2-3
Common Yellowthroat	*Geothlypis trichas*	B	RB	x	s	4	1pr,1s	5	3s	5	3s,pr	6	1s,2fl,n	2	1s	2	v	5	3juv	6	4c	4-5
Western Tanager	*Piranga ludoviciana*	M	M			3	for															NA
Summer Tanager	*Piranga rubra*	V	M									1	v									NA

Black-headed Grosbeak	*Pheucticus melanocephalus*	PB	SB			1	s	1	s			2	2s	1	1s	1	1s				1
Lazuli Bunting	*Passerina amoena*	T	SB															2	v	1	c	0
Spotted Towhee	*Pipilo maculatus*	B	RB	X	s	3	2s,n?	5	2s	3	2s	4	2s,fl	5	3s	8	3s,1cf	10	4s, 1fl	2	c	3-4
California Towhee	*Pipilo crissalis*	B	RB	X	s	5	3s	6	2s,fl	3	2s	2	2s	2	2s	2	1s			3	1s	3
Song Sparrow	*Melospiza melodia*	B	RB	X	s	10	9s,1cf		s,fl-4	19	5fl,cf,5 s	13	5s,4fl,2 n	23	8s,6fl,1j uv,2n	14	5s,2n,1j uv	12	1s,5juv	7	c,v	10-12
White-crowned Sparrow	*Zonotrichia leucophrys*	B[C]	RB					2	1s			1	s	1	juv	2	1s			1	v	ND
Red-winged Blackbird	*Agelaius phoeniceus*	B	RB	X	n	22	2cf	22	2n, 3cf	22	2cf	17	fl,4t	13	fl			1	v			12
Brown-headed Cowbird	*Molothrus ater*	T	RB					1	male	2	1s											0
Brewer's Blackbird	*Euphagus cyanocephalus*	T	RB													1	v					0
Hooded Oriole	*Icterus cucullatus*	T	SB			3	for															0
Bullock's Oriole	*Icterus bullockii*	T	SB															1	v			0
American Goldfinch	*Carduelis tristis*	B	RB	X		2	pr	1	s			2	1s	5	fam	5	1s,3juv	5	v	8	4juv	2
Lesser Goldfinch	*Carduelis psaltria*	T	RB															7	v			0
Purple Finch	*Carpodacus purpureus*	B	RB									1	1s	2	1s,1cf	3	2s					2
House Finch	*Carpodacus mexicanus*	PB	RB					1	v			3	v	3		8	1juv	14	v	7	3juv	ND

	Total	site visit	survey 1	survey 2	survey 3	survey 4	survey 5	survey 6	survey 7	survey 8
# species	**66**	**20**	**35**	**36**	**37**	**36**	**34**	**33**	**34**	**34**
# individuals	NA	NA	210	136	142	122	157	137	154	120

Codes: s=singing, t=territorial behavior

pr=pair, cf=carrying food, cn=carrying nest material, n=nest, fl=fledglings with adults, fam = family group, hy = hatching year birds (independent), v= visual detection only

NA: Not Available

ND: Not Detected

Status Codes: B=Confirmed Breeder; BC = Nesting in adjacent chaparral; BB = Nesting on beach; PB=Probable Breeder;T=Transient; W=Winter Visitor; M=Migrant, V=Vagrant

Individuals were confirmed as breeders (B) based on the discovery of an active nest, adults carrying food to a nest location, or the presence of "locals" (recently fledged juveniles) within a known territory. Confirmed breeding species were further divided into "resident breeders" (RB) and neotropical migrant "summer breeders" (SB). Continued territorial presence of a male or pair for six weeks or more warranted a "probable breeder" (PB) status. Non-breeding birds were also rated according to the potential of the species to breed in the area and habitat. Species that were potential breeders based on these criteria but were not confirmed as breeders within the survey area were designated "transients" (T). Species that migrate to northern latitudes were designated as "migrants" (M). Over-wintering species that breed at higher latitude or elevation were designated as "winter species" (W). A single detection of an unusual species observed outside the typical migratory period was given "vagrant" status.

Appendix E
Minerals Management Service (MMS): Shoreline Classification GIS

Minerals Management Service (MMS): Shoreline Classification GIS

E.1.1 Data Description

In the 1970s and 1980s, a team of scientists, under contract to the Minerals Management Service (MMS), mapped shoreline physical and biological information of the entire California coast from helicopter videotape flyovers. A limited number of ground-truth surveys were completed to check and refine the mapping results from the flyovers. Each USGS quadrangle map was divided into shore segments (Unit Identifiers) according to predominant substrate type. Biological and physical information was then recorded for each shore segment in an associated table. The habitat types and species assemblages from the videotapes and ground-truth surveys were described for the coast on 165 USGS quad maps covering all of California, including the Channel Islands.

The purpose of the MMS surveys was to develop a statewide set of coastal maps with shoreline biological and substrate information to classify areas most sensitive to oil spills. The information provides a unique historical data set on shoreline characteristics for all of California that can be used for resource management and biological research.

In 2005, Tenera converted all of the information from a subset of the statewide set of maps and tables into GIS (Tenera 2005). The current GIS describes shoreline habitat characteristics and biological assemblages for the Monterey Bay National Marine Sanctuary (MBNMS), Gulf of the Farallones National Marine Sanctuary (GFNMS), and Channel Islands National Marine Sanctuary (CINMS).

E.1.2 MMS Description of Habitat Types Along the NRSA Coast

While the MMS maps and tables of physical and biological information for the NRSA coast have not been converted into the GIS, the information was reviewed and summarized directly from the maps and table hardcopies for the area. Below, the MMS information is compared to the habitat maps prepared for the NRSA baseline study described in Section 5.1.

Shoreline habitats on the MMS maps for the NRSA appear in Figures E.1-1 and E.1-2. Descriptions of the physical and biological data appear in Table E.1-1. The MMS effort describes the NRSA coast shoreline as being a mix of substrate types that includes bench rock, rocky outcroppings, and mixed substrates in various proportions, including sand/gravel beaches that are continuous or occur as pocket beaches. Wave exposure was rated as high in all areas.

The biological information includes the occurrence of select conspicuous intertidal algal and invertebrate species. All of the data reflect what was observed directly from the helicopter and what was revealed on the videotapes. In some cases, however, a species occurrence was noted based on habitat association or extrapolation from locations of known occurrence (M. Hill, MMS, Pacific OCS Region, pers. com.).

E.1.3 Comparison of the MMS Maps and Habitat Maps Prepared for the NRSA Baseline Inventory

For some coastal sections along the NRSA, there is relatively close agreement in habitat descriptions between the MMS maps and maps that were specifically prepared for the NRSA baseline study. However, for some coastal sections, the MMS maps are less accurate or detailed than those prepared for the NRSA baseline study. An example of inconsistent results between map sets is the reach from Disney Point through and including Windy Point (MMS shore segments C and D, Table E.1-1). The MMS shoreline map portrays MMS segment C as a continuous granule beach while the NRSA baseline mapping survey found this section of coast to be mainly a shore of mixed substrates. Immediately downcoast is MMS segment D, which the MMS survey described segment D as being mainly mixed sediment pocket beaches. The NRSA coast baseline mapping survey noted this same section as being mostly vertical wall habitat with ledges that drop steeply into the ocean. Pocket beaches were infrequent.

In species descriptions, both map sets are generally similar in describing species occurrences and relative abundances, with the exception of sea palms (*Postelsia palmaeformis*) and the *Odonthalia/Neorhodomela* species complex. These species differences are explained in Section 5.1. There are likely other differences in the physical and biological descriptions between the map sets. A large reason may be that the purpose of the MMS mapping surveys was to obtain general information to assess the area's sensitivity to oil spills, and was not done to obtain details necessary for visitor access planning. Furthermore, most of the MMS information for the NRSA coast was from helicopter observations and videotapes. Some areas may not have been observed closely, and videotapes may not have had clear detail in certain areas. While the MMS maps provide sufficient information to describe habitats and species occurrences over broad areas, the maps prepared specifically for the NRSA coast in 2005 should be considered more detailed and current.

E.1-4 Literature Cited

Tenera Inc. 2005. DVD of California coastal marine habitats GIS for the Monterey Bay, Gulf of the Farallones, and Channel Islands National Marine Sanctuaries, submitted to the Monterey Bay National Marine Sanctuary. February 2005.

Table A.1-1. Summary of physical and biological information from the MMS shoreline classification maps.

MMS/USGS Quad Map	CNC 47 Morro Bay South	CNC 47 Morro Bay South	CNC 47 Morro Bay South	CNC 47 Morro Bay South	CNC 47 Morro Bay South	CNC 46 Port San Luis	CNC 46 Port San Luis	CNC 46 Port San Luis	CNC 46 Port San Luis	CNC 46 Port San Luis	CNC 46 Port San Luis	CNC 46 Port San Luis	CNC 46 Port San Luis
MMS Unit Identifier (Shore section)	M	N	O	P	Q	A	B	C	D	E	F	G	H
General Shore Section (north-south)	Coon Creek	Coon Creek to Pt. Buchon	Pt. Buchon to Lover's Beach	Unnamed Promontory	Unnamed Promontory to Lover's Beach 2	South end of Lover's Beach 2	Disney Pt.	Disney Pt. to Windy Pt. reach	Windy Pt. reach	Tom's Pond Beach	Tom's Pond Beach to Barn Rd.	Barn Rd. to Crowbar	Crowbar to Field's Cove
Substrates (based on MMS summary codes in associated map tables)	Sand beach, ephemeral	Rocky, wide platform, with pockets of mixed substrates & boulders in low intertidal, offshore rocks	Gravel beach	Rocky narrow intertidal, offshore rocks	Gravel beach	Rocky narrow intertidal with continuous gravel beach	Rock narrow intertidal	Gravel beach, offshore rocks	Pockets of mixed sediments	Gravel beach	Rocky wide platform with mixed substrates	Rocky wide platform with continuous sand beaches	Rocky narrow, offshore rocks
Wave Exposure (scale of 1-10 with 10 highest)	1-10	10	10	10	10	10	8	10	10	10	10	10	8
Intertidal Algae													
Endocladia muricata		C-A	C-A	C-A	C-A	C	C	C	C	C	C	C	C
Silvetia compressa		O	O	O	O	O	O	O	O	O	O	O	O
Fucus gardneri		O	O	O	O	O	O	O	O	O	O	O	O
Chondracanthus spp.		C	C	C	C	C	C	C	C	C	C	C	C
Corallina spp./*Chondracanthus* spp.							O-C	O-C	O-C	O-C	O-C	O-C	V
Postelsia palmaeformis		C-A	C-A	C-A	C-A	C	C						
Halosaccion glandiforme						C	C	C	C	C	C	C	C
Mazzaella spp.		C	C	C	C	C	C	C	C	C	C	C	C
Odonthalia/ Neorhodomela larix		O	O	O	O	O	O	O	O	O	O	O	O
Coralline algae		C-A	C-A	C-A	C	C	C	C	C	C	C	C	C
Phyllospadix spp.		C	C	C	C	O	O	O	O	O	O	O	O
Alaria marginata		C	C	C	C								
Egregia menziesii		C	C	C	C	C	C	C	C	C	C	C	C
Laminaria spp.		C	C	C	C	O-C	O-C	O-C	O-C	O-C	O-C	O-C	O-C
Kelp Beds													
Macrocystis spp.						O	O	O	O	O	O	O	O
Nereocystis luetkeana		O-C	O-C	O-C	O-C	O-C	O-C	O-C	O-C	O-C	O-C	O-C	O-C
Intertidal Invertebrates													
Acorn barnacles		O	O	O	O	O	O	O	O	O	O	O	O
Mytilus californicus		O-C	O-C	O-C	O-C	C	C	C	C	C	C	C	C
Pollicipes polymerus		O-C	O-C	O-C	O-C	C	C	C	C	C	C	C	C
Marine Mammals													
Harbor seal									O				O-C
Stellar sea lion													O
California sea lion													O-A
Seabird Nesting Colonies													
Brandt's comorant		O-C											
Pelagic comorant						C	C	C	C				
Black oystercatcher		O				O	O	O	O				O
Western gull						C	C	C	C				C
Pigeon guillemot		O				A	A	A	A				
Endangered Species													
Southern sea otter	C	C	C	C	C	C	C	C	C	C	C	C	C

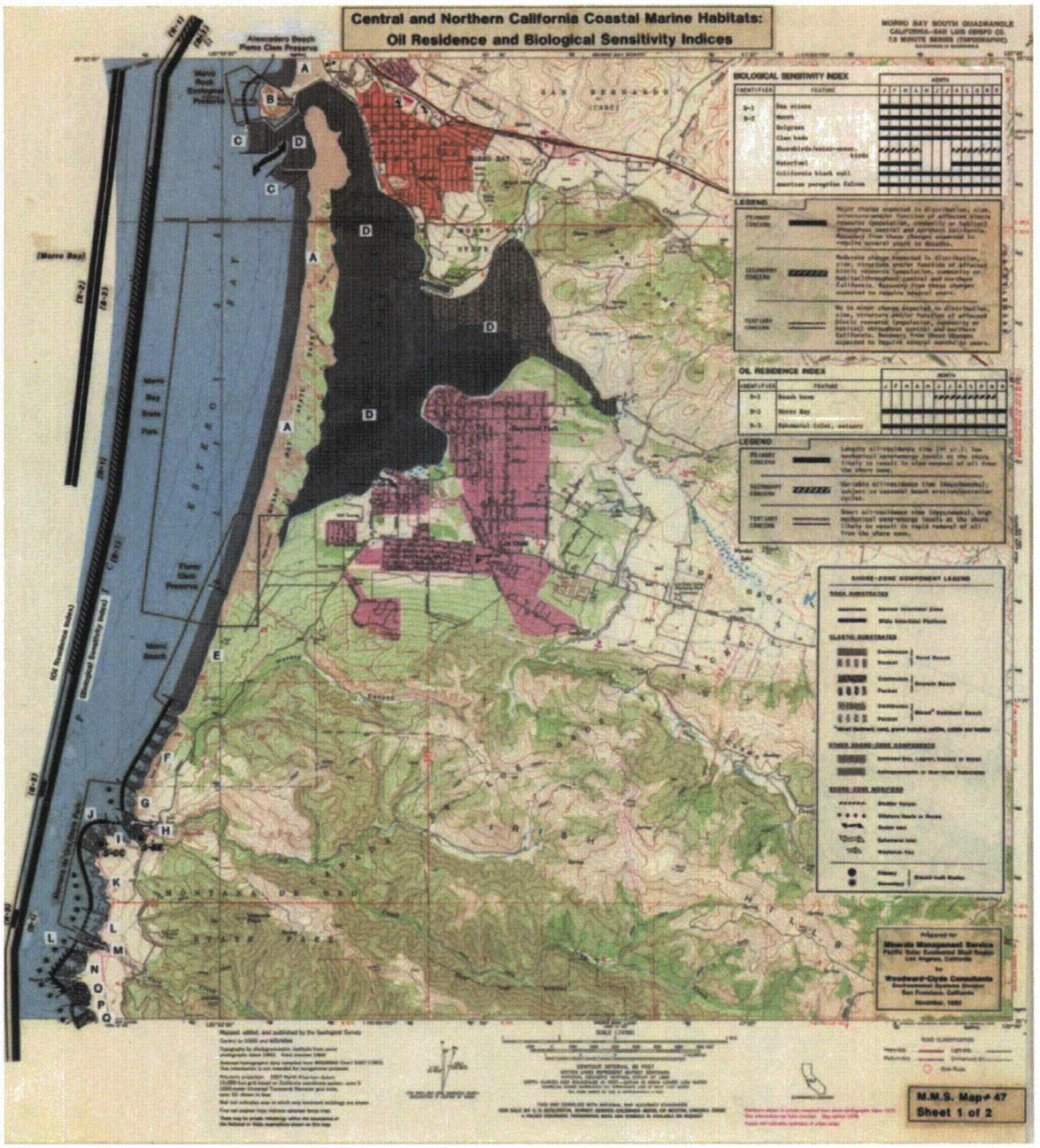

Figure E.1-1. USGS Morro Bay South quadrangle map portraying MMS shore characteristics.

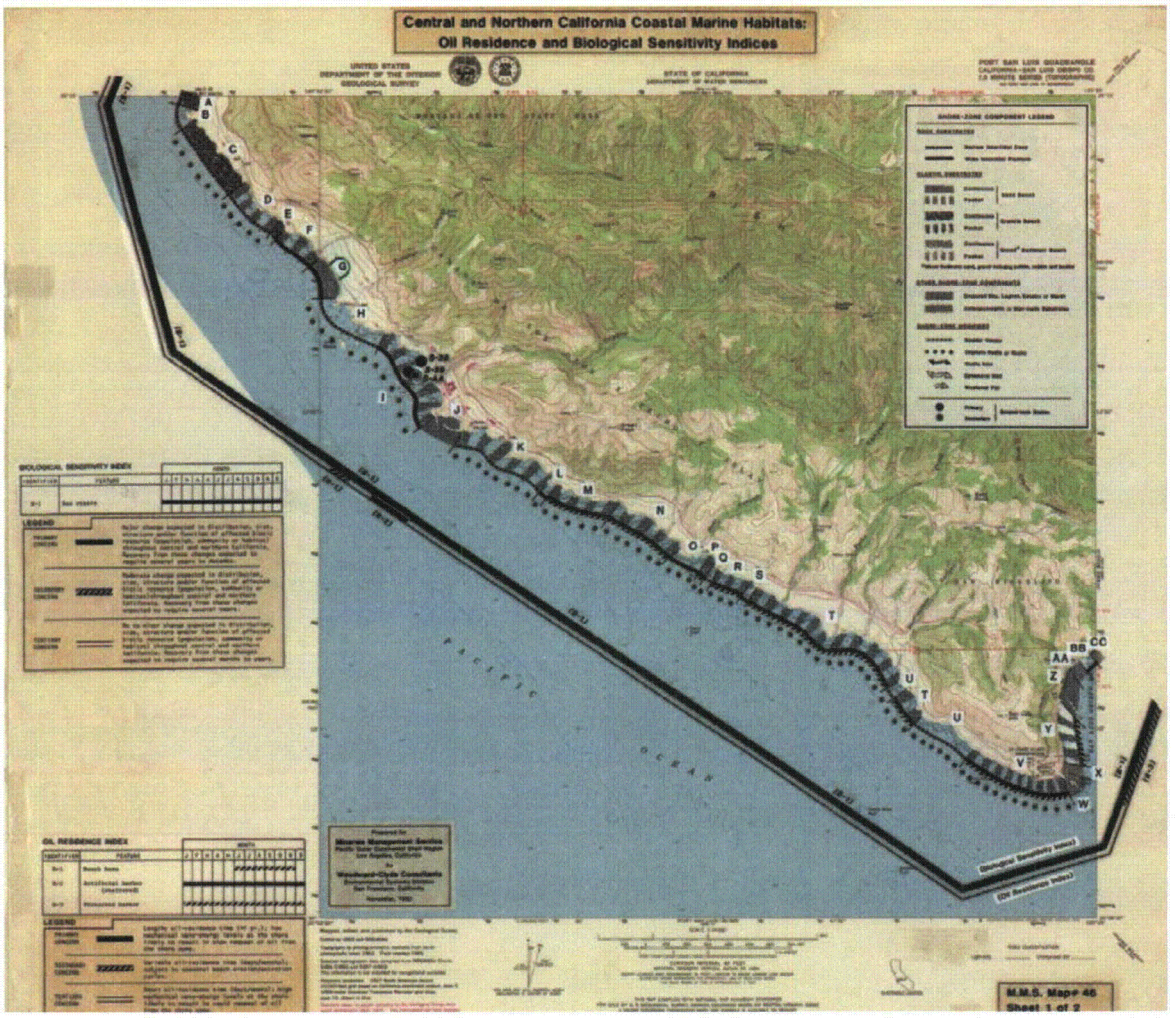

Figure E.1-2. USGS Port San Luis quadrangle map portraying MMS shore characteristics.