

POINT REYES NATIONAL SEASHORE WATER RESOURCES MANAGEMENT PLAN

National Park Service
Water Resources Division
1201 Oakridge Drive, Suite 250
Fort Collins, CO 80525

and

Point Reyes National Seashore
Point Reyes Station
Point Reyes, CA 94956


Technical Report NPS/NRWRD/NRTR-95/___

SECOND DRAFT

January, 1995

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EXECUTIVE SUMMARY

Point Reyes National Seashore (PORE) is located in Marin County in north-central California, approximately 30 miles north of San Francisco. The Seashore is comprised of slightly more than 71,000 acres including 45 miles of seashore, backed by rolling hills, grasslands, and forested areas. The rich marine life and unique biological and historical features offered by the Point Reyes peninsula make for an ideal setting for a unit of the National Park System located near a major metropolitan area. The National Seashore is triangular in shape and is bounded by the Pacific Ocean, Drakes Bay, and the San Andreas Fault/Tomales Bay.

The water resources of Point Reyes National Seashore are both diverse and unique. The Gulf of the Farallones National Marine Sanctuary is contiguous to the Seashore boundary -- one quarter mile offshore. Tomales Bay, Drakes Estero, Estero de Limantour, and Abbotts Lagoon are considered some of the finest examples of ecologically intact West Coast estuaries. Freshwater resources include 36 streams (21 perennial/15 intermittent), several natural lakes and numerous springs, as well as substantial wetlands and riparian areas. The National Seashore also contains a large number of man-made impoundments most of which are used for stock watering, but many of which have evolved into important habitat for species of concern. The protection and maintenance of these valuable resources is essential to the purpose of the National Seashore.

The purpose of the Point Reyes National Seashore Water Resources Management Plan include: 1) identifying water resource-related issues and management concerns; 2) providing a summary of the existing hydrological information pertaining to these issues; and 3) providing park management with a recommended "action plan" for addressing water-related issues within the National Seashore over the next five to seven years.

Water resource-related issues discussed in this report include:

- inventory and status of water resources;
- land use issues relating to watershed management within the Pastoral Zone;
- Lagunitas Creek and Tomales Bay management issues;
- Drakes Estero and Estero de Limantour Protection issues;
- anadromous fish re-establishment;
- issues related to National Park Service operations and development; and
- issues related to the Coastal Zone Management Amendments of 1990.

Water-related management actions recommended within this "action plan" include identifying the need for additional inventory and assessment activities, implementation of a limited water quality monitoring program, and implementation of a number of resource management activities developed to address resource protection, watershed management, fisheries, and related needs. Twelve project statements relating to these activities have been developed for incorporation into the National Seashore's Resource Management Plan (RMP).

INTRODUCTION

Point Reyes National Seashore (PORE) was established by the United States Congress in 1962 in order to "save and preserve, for the purpose of public recreation, benefit and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped." (P.L.87-657). It is located in north central California, approximately 30 miles north of San Francisco, in Marin County (Figure 1).

Point Reyes National Seashore is comprised of slightly more than 71,000 acres including 45 miles of seashore, backed by rolling hills, grasslands, and forested areas. The rich marine life and, biological and historical features offered by the Point Reyes peninsula make for an ideal setting for a unit of the National Park System located near a major metropolitan area. The National Seashore is triangular in shape and its boundaries include the Pacific Ocean, Tomales Bay, Drakes Bay, and the San Andreas Fault. Mount Wittenberg, at 1,407 feet is the highest point in the park.

Land use within Point Reyes National Seashore is managed in four distinct zones. These include the Natural Zone (approximately 47,000 acres), the Special Use Zone (approximately 23,500 acres), the Historic Zone (157 acres), and the Development Zone (85 acres). The Natural Zone consists primarily of legislatively designated wilderness or potential wilderness area (32,700 acres), but also includes two marine reserves (Point Reyes Headlands Reserve and the Estero de Limantour Reserve), as well as a natural environment sub-zone where lands are managed in order to maintain their natural appearance while allowing compatible visitor uses. The Special Use Zone consists primarily of pre-existing pastoral uses, including, dairy and beef ranching (approximately 17,000 acres), a 5 acre oyster farm, and a small radio range station. The Historic Zone preserves a number of major historic buildings or groups of buildings including the Point Reyes Lighthouse Complex, the Olema Lime Kilns, the Point Reyes Lifeboat Station Area, the Teixeira Ranch Complex, the Home Ranch Complex, the Pierce Point Ranch Complex, and the Drake Monument, as well as many of the archeological sites contained within the National Seashore. The Development Zone includes park visitor and administrative facilities such as park headquarters, parking and maintenance facilities and other park buildings (NPS, 1990a).

The water resources of Point Reyes National Seashore are diverse and unique. The Gulf of the Farallones National Marine Sanctuary is contiguous to the Seashore boundary -- one quarter mile offshore. Tomales Bay, Drakes Estero, Estero de Limantour, and Abbotts Lagoon are considered as among the few remaining areas along the California coast where man has not had a significant impact on the estuarine and lagoonal environment (Anima, 1990). Freshwater resources include 36 streams (21 perennial/15 intermittent), several natural lakes (located primarily within the wilderness zone), and numerous springs, as well as significant wetlands and riparian areas. In addition the National Seashore also contains a large number of man-made impoundments and stock watering ponds (Self et al., unpublished). The protection and maintenance of these and other valuable resources are considered essential to the management goals of the National Seashore (NPS, 1994).

FIGURE 1. MAP OF POINT REYES NATIONAL SEASHORE

DESCRIPTION OF WATER RESOURCES

1. Tomales Bay Drainage

Tomales Bay, which forms the northeast boundary of Point Reyes National Seashore is reported to be one of the most critical natural resources of the California Coast (State of California, 1983). The Bay is a valuable estuary which provides marine habitat, recreational amenities, and commercial shellfishing, as well as supporting a tremendous diversity of wildlife.

Maintaining adequate seasonal quantities, and a reasonably good quality, of freshwater input from the surrounding watersheds is important in protecting the long term environmental health and viability of any estuarine system. Freshwater input into Tomales Bay is derived from the Lagunitas Creek, Walker Creek, and East and West Bay Margin Watersheds. Storm (1972) estimated that, in 1972, approximately 22% of the average, long-term, unimpaired runoff from streams flowing into Tomales Bay was being lost annually to in-basin consumptive use, out-of basin export, or reservoir storage.

The quality of the freshwater flow into Tomales Bay is also a concern. Smith (1986) reported that the policy of the Regional Water Quality Control Board at the time was to prohibit the discharge of untreated or treated wastewaters to Tomales Bay. While this policy will go far in protecting the waters within Tomales Bay, potentially deleterious influences of non-point source pollutants from urban and agricultural sources remain a concern.

The Lagunitas Creek watershed consists of private and state and federally protected lands that contribute to Tomales Bay inflow. These contributing drainages (Lagunitas, Olema and Bear Valley Creeks) contain a number of watershed management issues which are of concern to Point Reyes National Seashore.

Lagunitas Creek

Lagunitas Creek with its tributary streams (Nicasio Creek, San Geronimo Creek, Devil's Gulch, Deadman's Gulch, and Olema Creek) provide the major source of freshwater inflow into Tomales Bay. Lagunitas Creek begins on the northern slopes of Mt. Tamalpais and flows in a northerly direction approximately 25 miles before entering the Pacific Ocean at the southern end of Tomales Bay.

The streams within the Lagunitas Creek watershed once supported substantial runs of anadromous fish including steelhead trout (Oncorhynchus mykiss) and coho (silver) salmon (Oncorhynchus kisutch). Water development, urbanization, and other activities have severely depleted these resources and their habitats throughout California, including the Lagunitas Creek watershed (Smith, 1986). This system also provides habitat for one endangered species, Syncaris pacifica, a freshwater shrimp.

The flow within the Lagunitas Creek watershed is highly regulated. While flows in San Geronimo Creek and Olema Creek are unregulated, the watershed supports a number of reservoirs which provide a significant proportion of the water supply

for the Marin Municipal Water District (MMWD). Four of these reservoirs (Kent Reservoir, Alpine Reservoir, Bon Tempe Reservoir, and Lagunitas Reservoir) are located in the upper Lagunitas Creek Watershed while the Nicasio Reservoir is located on Nicasio Creek, approximately 1 mile upstream of its confluence with Lagunitas Creek. There are also a number of additional water diversions which service water supply and agricultural water rights within the basin (Smith, 1986). An additional small impoundment is created annually by the placement of a temporary gravel dam placed across the lower end of Lagunitas Creek. This dam, known locally as the Giacomini Summer Dam, is located just below the confluence of Lagunitas and Olema Creeks. It is constructed annually for the purpose of limiting salt water intrusion into nearby municipal and local diversions. The 16.7 acre impoundment formed by the dam has also become a popular swimming area. The dam is breached each fall by storms or the landowners (Kelley et al., 1992).

Olema Creek

Olema Creek, a perennial tributary of Lagunitas Creek, flows through a northwest trending rift valley of the San Andreas fault zone, intersecting with Lagunitas Creek near its inflow point to Tomales Bay. The Olema Creek watershed consists of an unusually linear drainage basin which is approximately 9 miles long and 2 miles across at its widest point. Olema Creek crosses the San Andreas Fault near Five Brooks, and again about 1/2 mile downstream. At this location there are substantial natural land slides occurring on both sides of Olema Creek (Hantzsche and Peters, 1990). Numerous short tributaries enter Olema Creek from the east and west sides.

Extensive logging occurred within portions of the Olema Creek watershed prior to 1964. Predominant land use over the 42 year period of air photo coverage has been and continues to be largely one of grazing of the grasslands on the east side of the Olema Valley (Hantzsche and Peters, 1990). Agricultural runoff from these lands has been observed to result in elevated nutrient levels, turbidity, hardness, and coliform density (Schwenneker, 1979). Most of Olema Creek's watershed is contained within the boundaries of the Northern Unit of Golden Gate National Recreation Area or Point Reyes National Seashore.

Bear Valley Creek

Bear Valley Creek is a small coastal stream tributary to Lagunitas Creek. It is somewhat unusual in that it contains a relatively large delta swamp and marsh in its lower reaches which may inhibit access to upper stream reaches by adults and/or outmigration by young fish (smolts). The creek drainage has been substantially altered in the past by both land movements along the San Andreas Fault Rift Zone, by road building, grazing activities, and floods (Evans, 1990; NPS, 1990b). Due to the presence of sediment and a sandy bottom composition, Bear Valley Creek has been designated as secondary importance as fish spawning habitat. However, it receives heavy visitor use and attempted restoration as an anadromous fish run is being considered. Recommendations suggested for the area include bank restoration, livestock exclusion fencing from the middle reach of the stream, provide better fish passage at deficient culvert sites, artificial

gravel cleaning, remove debris that inhibits flood flow, and riparian zone replanting (Evans, 1990).

Other Drainages

Several other small drainages flow into the Tomales Bay. On the west side of the bay there are 3 perennial and 6 ephemeral streams. The eastern drainage consists of 7 perennial and 5 ephemeral streams. Most of the streams are outside of the National Seashore boundary, but do have an effect on the bay. The eastern streams may soon become part of the Marin Land Trust (MALT) program which sets the goal of limiting future development by purchasing development rights for certain lands within the drainages.

One of the streams that lies outside the National Seashore is Grand Canyon Creek. A concern of the Grand Canyon watershed involves the potential expansion of the West Marin Landfill located about 1.5 miles north of Point Reyes Station. The landfill, which began operations in 1965 was used by the local community over the years, but is currently being considered for expansion to support other county users. Concerns over the landfill range from past dumping permit violations to the possibility that leachate could be degrading nearby Grand Canyon Creek, raising concerns that water quality could be impacted in Tomales Bay. Also, there are fears that earthquakes could intensify the threat.

2. Drakes Bay Drainage

The Drakes Bay drainage consists of lands draining the central and southern areas of the National Seashore into Drakes Bay. This coastal area extends from Chimney Rock on the west to approximately Bolinas Point to the southeast. The watershed contains several bays, streams, lakes and beaches.

Drakes Estero

The most prominent feature of this area is Drakes Estero. Drakes Estero (2,381 acre surface area) consists of a large central area and four finger embayments. The finger embayments include Barries Bay and Creamery Bay along the western side of the estero and Schooner Bay and Home Bay along the northern and northeastern side of the estero (Figure 1). A total of six streams flow into Drakes Estero including four perennial and 2 ephemeral streams. The drainage area of the estero is approximately 46.9 square miles (Anima, 1990).

Land use in the Drakes Estero watershed consists mainly of ranching (six ranches) supporting about 1,200 head. Several man-made freshwater ponds have also been created as part of the ranching operations. A large oyster operation (Johnson Oyster Company) has operated in Drakes Estero since 1940 (other oyster companies occupied the area in earlier years). The Johnson operation consists of 26 oyster racks, 20 beds of staked oysters and an unknown number of bagged oysters located on subtidal channels and intertidal flats. Recreation is popular in the estero in the forms of canoeing, kayaking and clam digging. The National Seashore also

maintains a trail system throughout the area. Issues that concern the National Seashore regarding Drakes Estero include effects of land use on water quality (especially non-point source pollutants) in the estero's watershed, and the influence of oyster operations on sedimentation rates in the estero (Anima, 1990).

Estero de Limantour

To the east of Drakes Estero is the Estero de Limantour and a smaller unnamed bay. The Estero de Limantour (818 acres surface area) lies between the pastoral zone and the Philip Burton Wilderness Area (Figure 1). Local drainage into this estero is characterized by several small impoundments with no perennial fresh water source. The impoundments were built by ranchers over the years. Many of the impoundments cover the natural tidal flat areas of the estero (Page, et al., 1983). The bay to the east is contained within the wilderness area and receives inflow from which is drained by Glenbrook, Summit, and Muddy Hollow Creeks.

The estero complex is a slowly filling system that is being supplied with sediment from the open maritime environment, streams, aeolian deposition and erosion. Tidal action plays a dominant role in sediment distribution, erosion of the surrounding bedrock, and flushing of the system. The rate of sedimentation has varied over the past 8,000 years, however rates may have significantly increased in the last 150 years due to land use and increasing population. The estero appears to be filling at a rate similar to other west coast lagoons (Anima, 1990).

Other Drainages

Further south east along the coast, the Drakes Bay drainage has several small sub-drainages including Coast, Santa Maria and Alemere Creeks, and Arroyo Hondo. Several small lakes are also located in the southeastern side of the drainage. These lakes include Bass and Pelican Lakes both with outlets to Drakes Bay and Ocean, Crystal, Wildcat, and Mud Lakes which occupy closed basin drainages. Bass and Wildcat Lakes are the largest and deepest lakes (54 and 30 feet respectively) on the peninsula (NPS, 1976). With the exception of some fishery data (Strohschein, 1972), little information exists on the drainages and lakes to the southeast. Limnology studies of Bass and Wildcat Lakes indicate that a primary limitation to fish stocking is the production of high concentrations of hydrogen sulfide in the summer hypolimnion which mixes throughout the lake during fall turnover causing extensive fishkills (Johnston, 1985; Widmer, 1976).

3. Pacific Ocean Drainage

The Pacific Ocean Drainage within the National Seashore extends from Tomales Point in the north to the Point Reyes Lighthouse which occupies the most western point of land in the National Seashore (Figure 1). This drainage contains several features including the Tule Elk Preserve on Tomales Point, McClures Beach, Kehoe Beach, North and South beaches, Abbotts Lagoon, and the Point Reyes

Lighthouse Complex (Lighthouse, Visitor Center, and NPS Housing Area). Much of the land is located within the National Seashore's "Pastoral Zone" although wilderness area extends along some of the shore area and inside the Tule Elk Reserve. The shore areas are important visitor attractions including the sea lion habitat area in the vicinity of the lighthouse.

Abbotts Lagoon

One of the most prominent features of the Pacific Drainage is Abbotts Lagoon. The lagoon lies in the central portion of the watershed and is surrounded by a mixture of wilderness, ranching and private lands (Figure 1). The lagoon consists of three pools: a main basin (204 acre surface area) and two freshwater ponds (79 acre combined surface area) connected to the main basin (Page, et al., 1983). The drainage area of Abbotts Lagoon is approximately 10.5 square miles (Anima, 1990). The topography of the watershed consists of rolling lands varying from sea level to about 400 feet in elevation. The lands to the south and east of the lagoon are primarily used for dairy operations and include cultivated pasture and crop lands. Much of this pasture has been plowed in recent years and converted to feed in grain production. At the western end of Abbotts Lagoon a barrier bar isolates the lagoon from tidal influence in most years. On occasion, this barrier bar is breached from heavy rains causing a temporary tidal influence. Under these conditions brackish water may back up into the lagoon pools (Page, et al., 1983). Sand dunes and an extensive sand flat lie on the southwest border of the lagoon.

Abbotts Lagoon, is a slow filling system but experiences a lower rate of fill than does Drakes Estero. Sediment supply is mainly from aeolean (dune encroachment), open coastal processes and stream input. The basement rock (Monterey Formation) is fairly resistant to erosion. Concerns in the lagoon are eutrophication due to high nutrient input and a high residence time, especially in dry years, as well as the timing of nutrient input (Anima, 1990).

4. Bolinas Bay Drainage

The Bolinas Bay and Lagoon drainage is located at the southeastern-most end of the National Seashore. The drainage area consists of private lands to the west, the North Unit of the Golden Gate Recreational Area (which is administered by Point Reyes National Seashore) to the north and east, and the Audubon Canyon Ranch to the east. The Bolinas Lagoon (1450 acre surface area) has been administered by the Marin County Department of Open space since 1988 (Page, et al., 1983).

Logging, farming, development, and overgrazing in the watershed in the 19th and early 20th centuries has created devastating patterns of erosion and sedimentation within the watershed. This has affected the lagoon's natural functioning. In recent years several activities including watershed management techniques, erosion control, sediment settling basin construction and grazing control, and range management have nearly stopped the progression of damage (Committee to Save Bolinas Lagoon, 1994). However, damage has been done. It is

estimated that on lands affected by past logging, sediment yields are up to five times greater than on undisturbed lands (Biswell and Agee, 1973).

The Bolinas Bay drainage area issues include coastal processes causing potential closure the mouth of the Lagoon, beach/bluff erosion, human and animal disturbance, land management practices (private land), water quality, dredging/navigation, recreation, oil spill protection, and seismic concerns (U.S. Army Corps of Engineers, 1978).

5. Groundwater Resources

The local water source for residents in and near Point Reyes National Seashore are wells and much of what is known about the ground water resources in the area is based upon well usage. Several wells for North Marin County Water District are located adjacent to Lagunitas Creek. These wells serve 473 connections including the National Seashore headquarters. Supply in this area is primarily dependent on amount available in the creek and its aquifer. The creek component is assumed the dominant source of supply. The district maintains three wells at two sites in the Lagunitas Creek drainage. The two primary wells are located on the U.S. Coast Guard housing property and a 3rd back-up well is about 0.5 miles upstream. The first primary well is drilled to the depth of 60 feet with 12 inch diameter casing and a 300 gallons per minute (gpm) pump. The second primary well has an 8 inch pipe and is not gravel packed and has been observed to have a severe sand problem. The back-up well is 25 feet deep with 12 inch casing and a 140 gpm pump. During periods when salt water intrusion at the primary site is a problem, the back-up well site is used. Since well water supply is primarily dependent on creek flow, dry conditions have caused yield problems. One practice that is used to keep the wells in operation is to trade release water from upstream reservoirs with other sources of supply in the county (North Marin County Water District, 1979).

Elsewhere in the National Seashore several shallow low producing wells are in use. Shallow vertical and horizontal wells have been drilled over the years and reportedly are barely meeting the demand needs for campgrounds and in-park residences. (John Ryan, NPS Facilities Manager, Personal Communication). Well yields in the Seashore generally yield from less than 1 gpm in shale deposits to 70 gpm in sandy substrate (NPS, 1976).

Raw well water in the area is generally of good quality but usually contains high levels of iron and manganese. Color and taste are the usual reported problems. In areas of more concentrated population, local treatment facilities usually mitigate these problems. Potassium permanganate is used a precipitant and is captured in filters. Minor chlorination is also used. The primary water supply wells occasionally exhibit salt water intrusion. It is speculated that the annual construction of the Giacomini summer dam just below the confluence of Lagunitas and Olema Creeks is important to the protection of the wells from salt water intrusion during summer low flow periods. Occasionally, the dam has been built in winter when salinity concentrations are high (North Marin County Water District, 1979).

In the more remote areas of the National Seashore, well water is tested monthly. Quality varies from place to place with the best water reported at Sky Camp. Based on a recent inspection of several wells in the National Seashore, the California Department of Health may recommend additional disinfection via chlorination (John Ryan, NPS Facilities Manager, Personal Communication).

There are eight Public Non-Community and nine Non-Public potable water systems in the National Seashore that are dependent on groundwater. The following represents a summary of those systems:

- a. Point Reyes Lighthouse: This is a Public Non-Community water system. The source of water is a 400 foot well with a capacity of 1.5 gallons per minute. The water is chlorinated before being pumped to a 50,000 gallon redwood lined tank. Water is then gravity fed to the visitor center and 4 residential apartments. The system is supplemented, when needed, by hauling water, on an almost annual basis.
- b. Laguna Ranch Area: This is a Public Non-Community water system. The source of the water is two wells. Water is chlorinated and pumped to a 50,000 gallon underground storage tank. From this tank the system is fed by gravity to a hostel, education center, Limantour Beach and two government homes.
- c. Drakes Beach: This is a Public Non-Community water system. The source of the water is two wells, both 40 feet deep. Each well has a capacity of 70 gallons per minute. The water is pumped to a chlorinator located about a mile from the wells. Following chlorination, the water is pumped to two separate underground concrete storage tanks. One tank holds 50,000 gallons and the other 20,000 gallons. The system provides water to Drakes, North, and South Beach.
- d. Glen Camp Campground: This is a Public Non-Community system. The source of the water is a horizontal well. Pumped water is conveyed by gravity to a 25 gallon reservoir, chlorinated by tablet and gravity fed to a faucet. Water availability is minimal.
- e. Wildcat Campground: This is a Public Non-Community system. The source of the water is a horizontal well. Water is passed through a potassium filter which is manually back washed. The water is not chlorinated and is gravity fed to a faucet in the campground.
- f. Coast Campground: This is a Public Non-Community system. The source of the water is a horizontal well that is gravity fed to a faucet in the campground.
- g. Sky Campground: This is a Public Non-Community system. The source of the water is a horizontal well that is gravity fed to an unrestricted faucet and horse trough. The water flows constantly and is not chlorinated. This is reported to be the best source of good quality water in the National Seashore (John Ryan, NPS Facilities Manager, Personal Communication).
- h. North District Office: This is a Non-Public system. The source of the water is a 250 foot well with a capacity of 5 gallons per minute. The pneumatic system is chlorinated and serves the ranger station and one residence.

i. Building 164: This is a Non-Public system. This system serves one residence. The source of the water is a well and storage is provided by a 5,000 gallon wooden tank.

j. Pierce Ranch: This is a Non-Public system. This system serves the Pierce ranch. A new well provided potable water to the ranch home. Another well used by the home previously had a low yield. It is now used to provide water for fire protection.

k. Five Brooks: This is a Public Non-Community water system. The source of the water is a new well that serves three residences.

l. Former U.S. Coast Guard Life Boat Station: This is a Non-Public water system. The source of this water is a 94 foot well that has a capacity of 3 gallons per minute. The water is chlorinated before being pumped to two wooden tanks (5,000 and 20,000 gallon capacities). Both storage tanks have plastic liners. The water is gravity fed to a residence and the Life Boat Station.

The survey of the above groundwater uses and recommendations for improvement was compiled by the a Public Heath Consultant to the Western Regional Office (Baldwin, 1994). One of the more pressing issues identified is the condition of the supply and wastewater systems located at the Point Reyes Lighthouse.

WATER RESOURCES PLANNING ISSUES AT POINT REYES NATIONAL SEASHORE

Scoping sessions were held at Point Reyes National Seashore on four occasions. A Natural Resources Management Plan scoping session was held from May 13-16, 1991. As a result of this initial scoping session, it was determined that additional scoping sessions to consider specific water resource issues should be held. The additional water resources scoping sessions were held on June 24-27, 1991, October 3-5, 1994 and November 7-10, 1994. The discussions during the scoping meetings, were held with resource management and range conservation staff of the National Seashore, local ranchers, and local land use committees including the Marin Resource Conservation District (MRCDD), the Marin Watershed Enhancement Advisory Committee and the Marin-Sonoma Animal Waste Committee. These contacts identified several water resource-related issues and management concerns. Several of these concerns have become dominant themes in identifying water resource needs in the Seashore. The first of these was the need to complete a thorough inventory and status of water resources for the National Seashore. The second, was to insure protection of water quality in the streams lakes, wetlands, and esteros of the Seashore. Associated with these concerns was the desire to insure that land uses within the pastoral zone of the park did not lead to water quality degradation. Specific water resource issues identified at the scoping sessions include the following.

1. Inventory and Status of Water Resources

Before detailed work can begin on resolving many of the of the problems

identified in this Water Resources Management Plan, additional knowledge must be obtained regarding what water resources exist in the National Seashore, the legal status of these water resources, where water-related conflicts may exist, and priorities should be established for addressing the various water resources issues. The following two sections contain discussions on the need for obtaining this knowledge in the form of a detailed inventories of water resources and a baseline inventory of water quality data.

a. Water Resources Inventory

Completion of a thorough identification of all water resources within Point Reyes National Seashore and their legal status is a very high priority. Since the establishment of the National Seashore, a great deal of time and energy has been spent in acquiring lands. Unfortunately, a comprehensive inventory of both the water resources which were acquired along with the lands and their legal status, has not yet been completed. Such an inventory is essential to assure the proper management of the National Seashore. This inventory should include identification of streams, lakes (natural and manmade), wetland and riparian systems, groundwater, and coastal systems. To complete such an inventory, several levels of effort will be required. First, a legal investigation of the land titles which were passed to the Seashore at the time of purchase is necessary in order to understand the ownership of various water amenities (i.e. springs, stockponds, wells, lakes, and flow in various streams). This inventory should include a completed water rights assessment of the Seashore including related water right issues. Second, a thorough field verification of the water resources which were purchased is necessary in order to insure that these resources are being properly managed. After these two steps have been performed a thorough cataloging and mapping of the National Seashore's water resources should occur. This inventory should also include an effort focusing on identification and evaluation of "high value" riparian and wetland systems in the National Seashore.

BILL SHOOK: CAN YOU INCLUDE TWO TO THREE PARAGRAPHS HERE SUMMARIZING WHAT WORK HAS BEEN COMPLETED TO DATE??? IT WILL HELP IMMENSELY IF WE ARE BROUGHT UP TO DATE IN PLANNING WHERE TO GO FROM HERE IN PROJECT STATEMENT PORE-N-001. * MDF**

Project Statements PORE-N-001 and PORE-N-002 (Appendix A) address the need for the completion of a comprehensive inventory of Point Reyes National Seashore's water and wetland resources. Project Statement PORE-N-006 further emphasizes the need for an assessment and evaluation of high value riparian and wetland systems in the Seashore.

b. Water Quality Status and Trends Evaluation

In association with the field verification phase of this inventory, a water quality inventory and monitoring program should be initiated in order to evaluate the baseline quality and trends of the Seashore's waters. Water quality information is an important feature which is required in order to understand the direction in which management priorities and activities should be conducted.

Permanent water quality sampling stations should be established, and monitored on a routine basis in order to assemble a base of data on which to determine existing quality and long term trends. The location, frequency, type of data collected should be determined by the National Seashore, with the assistance of National Park Service's Water Resources Division and the State of California Regional Water Quality Control Board. It is also recommended that the water quality inventory include an assessment of park facilities with potential problems such as water quality and quantity needs, wastewater capacities and problems (i.e. failing septic systems).

Project Statement PORE-N-003 (Appendix A) addresses the need for a comprehensive inventory of Point Reyes National Seashore's water quality.

2. Water and Land-Use Related Issues

The Point Reyes National Seashore is one of the most unique units in the National Park System. The National Seashore is characterized by a conglomeration of pastoral lands, forested areas, bays, beaches, and estuaries. Because each of these components effects others, a better understanding of each of these components and their effect on each other is needed.

a. Pastoral Operations

Pastoral land-use at Point Reyes National Seashore fall into three general categories: dairy operations; beef cattle operations; and oyster cultivation operations. Water quality problems may result from each of these activities. Pastoral activities occur on approximately 17,000 acres, nearly 25% of the lands within Point Reyes National Seashore.

Dairy and beef cattle operations comprise the vast majority of the pastoral zone in the Seashore. These operations have the potential to impact water quality in several ways. Overgrazed lands may create erosional problems through lack of vegetative cover. Erosion may then lead to increased sedimentation of streams, lakes, and estuaries. It is also possible for manure which results from cattle ranching activity to lead to nitrogen enrichment, eutrophication, and bacterial contamination of water resources. These are very critical issues in Point Reyes National Seashore which was established, in part, to protect the ocean, estuaries and marine life which thrive therein.

Seven dairies operate in the park under either leases, special use permits, or through reservation of possession. Dairy operations are an extremely intensive land use. Dairy cattle are generally brought back to the milking facilities twice per day; as a result, grazing and feeding activities are concentrated within a very small area. This intense use generally leads to denuded land which is highly erodible. Dairy wastes also build up very quickly which may allow for the contamination of both surface and ground waters.

Point Reyes National Seashore needs to survey and map each dairy to determine the location and condition of animal holding areas, stormwater detention facilities,

and waste disposal facilities. A water quality monitoring program should be instituted for the dairies to insure that water quality is protected through the management activities of the park and the dairy operators. Fortunately, the park does have a range conservationist on staff to assist in the preparation of ranch plans to achieve these needs.

Fourteen beef cattle ranches operate in the park under either leases, special use permits, or through reservation of possession. These ranches, while comprising a less intensive land use than the dairies, can create serious water quality problems if improperly managed. Riparian area grazing is evident in several areas of the park although some progress has been made in some areas to fence off riparian areas from cattle (JoAnn and Boyd Stewart, Ted McLissac, PORE Ranch Lease Holders, Personal Communication). Continued protection of riparian zones is critical to wildlife, and water quality, as well as aesthetic and scenic values. If grazing is properly managed, it is possible to protect riparian area values related to wildlife and water quality, while supporting a limited amount of grazing activity.

In association with the beef and dairy operations, a number of the ranches also cultivate portions of the pastoral zone in order to raise forage. Cultivation of the soil may lead to erosion if proper tillage practices are not followed. In some areas, grass buffer strips have been employed along with more intensive tillage management to control erosion. These practices have shown good response to limiting erosion on sloped land during heavy rainfall events. Additionally, the use of fertilizers and pesticides (very limited pesticide use on cropland) to protect and enhance crops is a common practice. If improper use of pesticides and fertilizers occurs, these substances (some of which are toxic to aquatic organisms and marine life) will continue to find their way to the waters of the National Seashore.

The Point Reyes National Seashore Range Conservationist has already made a strong effort in the direction of ranch/dairy planning. However, the National Seashore still needs to perform more detailed surveys for each ranch and determine proper grazing and waste management strategies which will protect the values of the park while allowing beef and dairy ranching to continue. Particular attention should be paid to stocking rates, riparian system protection, watering facilities, and overall range condition and treatment. The survey should also review existing tillage practices, and pesticide and fertilizer usage, and make recommendations about changes in management practices which may be necessary to protect water quality. The National Seashore's range conservationist will be of great assistance in helping to complete such a survey.

Project Statements PORE-N-004 and PORE-N-005 (Appendix A) address the need for a comprehensive inventory of Point Reyes National Seashore's Pastoral Zone operations and implementation of grazing management measures in the future. As part of these efforts, close coordination between PORE and GOGA will be required in the Lagunitas Creek watershed. Project Statement PORE-N-011 focuses on the development of an MOU between the two parks to accomplish better coordination.

b. Erosion Control Issues

Point Reyes National Seashore instituted an erosion control program in the early 1980's in order to deal with seriously eroding areas in the National Seashore. This effort has dealt with problems resultant from ranching activities (erosion control activities on Olema Hill and on the Grossi and Evans ranches), road construction (MCI road restoration), and naturally eroding areas such as streambank areas (NPS, 1987).

The development of a formal National Seashore erosion control plan could further benefit this program. Such a plan should include an inventory of eroding areas, present information about available erosion control techniques, and propose priorities for future control projects. Cooperation between erosion control specialists (perhaps from Redwoods National Park) and Point Reyes National Seashore staff would be essential to the process of developing and implementing site specific action plans, as National Seashore staff have been instrumental in implementing a number of limited, but effective erosion control projects to date. Additional assistance may be available through the Natural Resource Conservation Service (NRCS - formerly the Soil Conservation Service), local soil conservation districts and State and County sources. Much of the information necessary to create this plan may become available if other efforts proposed in this scoping report are conducted.

An inventory of critical erosion areas specific to one important drainage (Tomales Bay) has been proposed as a "pilot" study in Project Statement PORE-N-007 (Appendix A).

3. Lagunitas Creek/Tomales Bay Management Issues

Competition for local water supplies and land use impacts are at the crux of the problem in the Lagunitas Creek and Tomales Bay watersheds. The Lagunitas Creek watershed provides the majority of the water supply for Marin County. The development of several water projects resulted in the loss of approximately half of the anadromous salmonid habitat once available in the Lagunitas Creek system. Sewage and grey water concerns involving inadequate, faulty, or poorly maintained individual septic systems serving residences and businesses in the watershed are also a concern for the quality and shellfish production in Tomales Bay (Price, 1990). Also, seven oyster firms in the area have raised concerns that water quality degradation and excessive pollution may be affecting their operations (Jang, 1990). In addition, the remaining fisheries habitat, below the Kent and Nicasio dams, has been severely degraded by the reduction of summer flow and by sedimentation reducing the spawning and rearing habitat for both steelhead trout (Oncorhynchus mykiss) and coho (silver) salmon (Oncorhynchus kisutch).

Several studies have been completed pertaining to water resource-related issues within the Lagunitas Creek watershed. Many of these studies have focused upon erosion and sedimentation issues (Hecht and Enkeboll, 1979; Esmaili and Associates, 1980; Hantzsche and Peters, 1990), and instream flow/habitat restoration efforts to enhance anadromous salmonid spawning and rearing (State of California, 1983; Smith, 1986; Evans, 1990; and Kelly & Associates, 1992).

Geomorphological studies conducted by Hecht and Enkeboll (1979) and H. Esmaili and Associates (1980) indicated that scouring and sedimentation patterns within the Lagunitas Creek watershed have been greatly affected by reservoir construction, and that water release and sedimentation patterns did affect significant spawning and rearing habitat.

Hantzsche and Peters (1990) investigated the sediment dynamics of Olema Creek. They concluded that Olema Creek, although being a major source of sediment loading in the Lagunitas Creek watershed, is primarily producing sediment due to natural geomorphological conditions. The San Andreas Fault crosses Olema Creek and is the major source for creating and storing sediment in the system.

The instream flow requirements necessary to support anadromous salmonid spawning and rearing activities have been studied. Smith (1986) reported that approximately 37% of the average annual runoff of the Lagunitas Creek system was required to support spawning and rearing needs. Existing summer flows required augmentation while existing winter flows appeared adequate. Kelly & Associates (1992) recommended flow and temperature regime recommendations to mitigate steelhead population problems which were reviewed on how flows would influence related Coho and steelhead habitat. Kelley & Associates (1992) stated that before the construction of Kent and Nicasio Reservoirs, fish could compensate for low flow conditions by using habitat upstream (now blocked by the dams). In addition, the construction of the Giacomini summer dam inhibits the fishery. Other flow related problems in the Lagunitas Creek watershed are high competition for limited redd sites, effects of scouring flows, high temperatures and a poor supply of woody debris limiting overwintering habitat conditions. In addition, recommendations that current operations be modified to augment streamflow were cited. Presently, the Marin Municipal Water District is using Nicasio Reservoir to augment supply, however, these releases have caused increases in turbidity (fine organic silt) when compared to the period when Kent Reservoir was used for the flow augmentation. It has been recommended that Marin Municipal Water District release Nicasio Reservoir water during the period of November through May but attempt to refrain from releasing Nicasio Reservoir water from June through October. Further monitoring of the situation is recommended upstream of the San Geronimo Creek confluence. Hecht and Woysner (1988), further recommend a reduction in coarser sediment material by 10-20% from San Geronimo Creek would offset diminished flushing capacity of the MMWD proposed operations. One method recommended is to trap sediment in San Geronimo Creek, or use erosion control methods.

At the urging of a broad-based constituency, the Marin Resource Conservation District (MRCD), the State Coastal Conservancy, National Park Service, and others have supported proposals for watershed restoration activities designed to reduce erosion and sedimentation and enhance anadromous salmonid habitat in the Lagunitas Creek system.

In 1983, work was begun through the Marin Resource Conservation District to install checkdams and protective vegetation along gullies, repair and stabilize erosion from poorly designed roads, protect eroding stream banks, and educate the public on simple measures that could be conducted to reduce erosion into the Lagunitas Creek System (State of California, 1983). More recent efforts have

been made in the area of gully and streambank fencing combined with native grass plantings on ranches in the watershed. On one ranch, the development of a field watering system for cattle as an alternative to streambank watering has been employed. Efforts in improving pasture conditions based on Residual Dry Matter (RDM) surveys combined with various grazing-rest rotations of pastures have proven successful components of erosion resistance and cattle production. National Park Service personnel and ranchers leasing land from the National Seashore, in cooperation with other agencies and private groups, have been developing ranch planning efforts as a means to alleviate some of the land use effects on water resources. Many of the local landowners are participating in watershed enhancement and waste management programs that will ultimately benefit conditions in the Tomales Bay watershed.

The watershed areas contained in the Point Reyes National Seashore and the Northern Unit of the Golden Gate Recreation Area comprise only a fraction of the lands tributary to Lagunitas Creek and Tomales Bay. While it is likely that land uses within the NPS units probably provide for a lower overall impact than the surrounding, more intensively used lands, it is important that the National Seashore continues to play a active role in erosion control and habitat enhancement both within the National Seashore and throughout the Tomales Bay Watershed. Activities should include the development of specific erosion control/habitat enhancement projects, where needed, within the National Seashore as well as providing guidance and support to local and regional efforts throughout the watershed. It is also important that the efforts of Point Reyes National Seashore be carefully coordinated with those of Golden Gate National Recreation Area.

Project Statement PORE-N-007 (Appendix A) addresses the need for implementation of management measures in the Tomales Bay and Lagunitas Creek areas, while Project Statement PORE-N-011 addressed close coordination between Point Reyes National Seashore and Golden Gate National Recreation Area.

4. Drakes Estero Issues

Several sources of information indicate that there is a concern about the water quality in Drakes Estero. The estero provides habitat for an immense array of marine animals, as well as the oyster operation. The California Department of Health Services, (State of California, 1991), noted sources of non-point source pollution which could lead to water quality and resultant oyster cultivation problems. An oyster farm, located on the Schooner Bay arm of Drakes Estero, occupies about two acres of land and operates under a special use permit. The farm operates in 975 acres of estero tidelands under a permit from the State of California which manages all marine fishing operations in the state. The farm produces 15% of the oyster crop in California (NPS, 1993a). Concerns over failing septic systems, fecal coliform, ammonia, and resultant contamination of the oyster beds have arisen (Noda, 1994). Potential contamination from heavy metals leaching from treated wood, and zinc eroding from metal components of oyster racks are also of concern (Sarah Allen, NPS Western Regional Office, Personal Communication). Other problems that have been raised include sediment distribution as a result of the oysters' natural filter feeding systems leaving

fine sediment deposits and the effects of runoff from upslope the dairy and beef cattle operations possibly leading to potential bacterial contamination in the estero.

A study of Drakes Estero needs to be undertaken in order to establish procedures for better management of the water quality of the estero, and the resultant health of marine life. Such a study requires the assistance of either consultants, other governmental agencies, or universities with experience and knowledge in estuarine systems, water quality, and marine biology. As part of this study, an inventory of all potential water impacts due to water and land activities should be done. Individual projects could be suggested and prioritized depending on needs and costs.

Project Statement PORE-N-009 focuses on the need for addressing water quality issues and the biological health of the estero.

5. Abbotts Lagoon Issues

One of the most prominent water-related concerns within Point Reyes National Seashore is the condition and future management of Abbotts Lagoon. The lagoon is surrounded by a mixture of wilderness, ranching (3 ranches totalling 950 head) and private lands (Anima, 1990). The lands to the south and east of the lagoon are primarily used for dairy operations including pasture. Much of this pasture has been plowed in recent years and planted in grains. Concerns in the lagoon are eutrophication due to high nutrient input from the ranching lands, the "timing" of nutrient inputs into the lagoon, and the high residence time of water in the lagoon, especially during dry years.

Because so little is known about the impact of man on this resource, it is recommended that a detailed limnological assessment of the lagoon and inventory of habitat surrounding the lagoon be carried out. These activities would also include an assessment of adjacent land use impacts on water quality and habitat characteristics in and around Abbotts Lagoon, as well as the delineation/assessment of wetlands and identification of listed, threatened or endangered species in the area. It is envisioned that this inventory/assessment would serve as a basis for the eventual development of a management plan for the lagoon and surrounding watershed which could propose land management modifications such as the continued use of grass buffer strips to limit topsoil erosion) and/or ranch management modifications, such as more efficient pesticide usage or dairy waste management that would be designed to provide needed protection for the lagoon. Any recommendations developed as part of the management plan would ultimately be required to be addressed in the surrounding ranch plans. Additional land use alternatives (i.e. converting critical areas to wilderness status) should also be considered as part of the plan. Appropriate project statements relating to protection of critical areas should also be a part of the plan.

Several Project Statements that involve Abbotts Lagoon are located in Appendix A. Project Statements PORE-N-002 and PORE-N-003 would be used to inventory the lagoon and its water quality. Statement PORE-N-006 would include evaluation of

the lagoon if it is considered to be a "high value" water resource and Project Statement PORE-N-010 would address specific studies needed to develop a lagoon management plan.

6. Re-establishment of Anadromous Fish Populations

At one time, a number of the streams in Point Reyes National Seashore probably supported steelhead trout (Oncorhynchus mykiss) and coho (silver) salmon (Oncorhynchus kisutch) populations, prior to intensive development within the local watershed. In particular, a number of the streams have been dammed to provide for municipal water supply, stock watering, etc. These dams have effectively prevented the upward migration of spawning salmon. A long-term goal of the National Seashore is the re-establishment of anadromous fish populations.

The National Seashore has experimented with re-establishment of habitat in Coast Creek, a small stream located in the pastoral zone which flows to the Pacific Ocean. A concrete dam was removed, in an attempt to allow passage of fish both up and downstream. The results of this effort have not yet been fully evaluated. However, plans for similar actions should be developed for other streams as a cooperative effort with California Fish & Game and local private conservation groups such as Trout Unlimited.

At this time, it is recommended that a survey be completed to identify and classify candidate stream reaches within the National Seashore whose habitat could be restored in a manner that would support anadromous fish populations. Such a survey could be undertaken by National Seashore Resources Management staff supported by a fisheries biologist supported by the state or a private conservation entity. Once high potential candidate stream reaches are identified, site specific assessments of habitat potential, seasonal flow conditions, water quality, and other limiting features of the stream reaches could be undertaken cooperatively, eventually leading to the development and cost analysis of site specific restoration plans. Finally, a decision-making system which will provide for the ranking of stream reach restoration implementation priorities would be developed, and additional sponsors/cooperators sought to assist the NPS in the restoration of habitat and reintroduction of historic anadromous fish species.

The National Seashore will require assistance to prepare the above recommended plan. Support of fisheries biologists from the NPS, other governmental agencies, universities, or private sources will be solicited, but it is important that Point Reyes National Seashore staff be involved in decision making about which streams are appropriate for re-establishment activities.

Project Statement PORE-N-008 (Appendix A) addresses the issue of dealing with re-establishment and enhancement of anadromous fish populations in Point Reyes National Seashore.

7. Water Resource Issues Related to NPS Operations and Development

Several issues related to the current operation of the National Seashore and

their effect on water resources are of concern. These include the need for a full assessment of the current operational procedures, identification of priority problems, and park development issues including floodplain management.

a. Status of Current Operations

If not properly planned and managed, park operations and facilities, can adversely affect the water resources within a unit of the National Park System. Activities of concern in Point Reyes National Seashore include: road and trail construction and maintenance, provision of water supply and wastewater treatment, hazardous materials handling, and park maintenance facilities.

Roads and Trails

Road and trail construction and maintenance is of particular concern in the National Seashore. Many of the roads and trails are old farm, ranch or logging roads which were constructed with minimal environmental planning and safeguards. As a result, many of the roads and trails have created erosion problems and require excessive maintenance, as well as posing potential water quality problems for area streams, lakes, and estuaries. A survey which provides an inventory of the condition of the National Seashore's road and trail system is recommended. This inventory should provide information about the existing condition of the roads and trails, estimated erosion from these facilities, impacts of the erosion to water resources in the park, opportunities for improvement of roads and trails, and the costs involved in improving these facilities. The park maintenance and resource management staff should be involved in the preparation of this survey, which could be implemented on a drainage basin by drainage basin basis as a component of the proposed "Inventory and Control of Erosion" Project Statement (PORE-N-007).

Water Supply and Wastewater Management

Water and wastewater facilities are found in many locations throughout the Seashore. In general, drinking water is provided by wells located near park facilities, although several springs and one surface water source are also utilized. The quality of these sources have not, to date, presented any significant problem for drinking water purposes. Most of the wells located on the Point Reyes peninsula are low production wells. In at least one location (Point Reyes Lighthouse Visitor Center and housing area), well production is so low and water distribution facilities are in such disrepair that water must be hauled to the site in order to meet peak demands. Additionally, a leak in the water storage tank liner limits supply due to losses. A plan to investigate the potential for corrective action should be prepared by the Seashore. This action is recommended as part of Project Statement PORE-N-012.

Other issues of concern related to Seashore operations involve wastewater facilities which are provided through septic tank and leach field systems, or vault toilets located near visitor facilities. One sewage treatment lagoon is

located near Drakes Bay. In general, all of these facilities appear to be working well; however, a number of the septic tank and leach field systems are quite old and probably do not meet current standards. One example of this problem is at the Point Reyes Lighthouse housing area, where black water has appeared at the ground surface indicating a septic tank leak or failure or the leach fields. The Seashore should prepare an inventory of the septic tank systems as part of the Project Statement PORE-N-003. Primary areas in which this inventory should be focused are South Beach, the North District Rangers office, and the Education Center (Baldwin, 1994). This inventory should include: the mapping of the location of all existing systems; a description of each system; and of the working condition of each system.

Maintenance Facilities

Maintenance facilities in the Seashore consist of a shop located in the Bear Valley. The shop facility is very near Bear Creek. Measures to insure that water resources are protected from activities at the shop should be taken. National Seashore staff should address this concern by providing for the inspection of the facility and making recommendations, if necessary, for improved management of the facility.

b. Floodplain Identification and Management Issues

Floods occur in parts of Point Reyes National Seashore during the rainy season which usually occurs between the months of November and March. The topography of the park generally provides for fairly short, high gradient streams, with relatively narrow floodplains. Land and mud slides are common occurrences on the Point Reyes peninsula.

Mandates and guidance for floodplains within units of the National Park System are found in Executive Order 11988, Floodplain Management (42 FR 26951 (May 24, 1977)). This order emphasizes the public safety and environmental aspects of floodplain management and requires that all Federal agencies avoid to the extent practicable, the adverse impacts associated with the occupancy and modification of floodplains, and also avoid direct and indirect support of floodplain development if there is a practicable alternative. The preferred method of satisfying these requirements is to avoid development on the 100 year floodplain. The 500 year floodplain is also to be avoided for critical actions (e.g., the storage of irreplaceable artifacts, major fuel storage, etc.) undertaken as part of park operations or facilities management.

Guidance for floodplain management in the National Park Service is available as part of the National Park Service Floodplain Management Guideline (NPS, 1993b). It is recommended that this guidance be thoroughly reviewed previous to initiating floodplain planning.

The Seashore needs to summarize available information regarding flooding within the park as part of Project Statement PORE-N-001. A reconnaissance of all developed visitor-use sites within the park should be undertaken to evaluate

those sites most likely to be in flood-prone areas. If necessary after this initial investigation, a separate project statement should be prepared to provide the Park with additional study, or actions that will ensure compliance with the Executive Order, in order to protect the amenities of, and visitors to the park.

8. Coastal Zone Management Act Amendments of 1990

The Coastal Zone Management Act of 1972 established a program for States and Territories to voluntarily develop comprehensive programs to protect and manage coastal resources. In order to receive federal approval and implementation funding under the program, States and Territories must demonstrate that programs, including enforceable policies, that are sufficiently comprehensive and specific to regulate land uses, water uses, and coastal development, and to resolve conflicts among competing uses are in place. In addition, they must have the authorities to implement the enforceable policies. California is one of 29 States or Territories with approved programs. Despite the differences among these approved state programs, each must protect and manage important coastal resources, including; wetlands, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitats.

While water quality protection is integral to the management of coastal resources, it was not specifically cited as a purpose or policy of the original statute. The Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 specifically charged State coastal programs, and non-point source water quality programs, with addressing nonpoint source water pollution affecting coastal water quality. The amendments to the Act call for states with approved coastal zone management programs to develop and submit, to EPA and NOAA, Coastal Nonpoint Pollution Control Programs (CNPCP). States are then required to submit CNPCP's within 30 months of the issuance of the final guidance.

The Park should be very careful to focus on the potential requirements which may fall upon Point Reyes National Seashore as a result of the amendments to Coastal Zone Management Act. The Park has established contact with the State of California Water Quality Control Board, Bay Area Regional Branch, and is participating in determining the management measures, and practices which will be required for coastal protection. These measures and practices will become integral to water quality protection efforts at the park once they are adopted by the state.

SUMMARY & RECOMMENDATIONS

In many respects, Point Reyes National Seashore an unusual unit of the National Park System. While containing superb natural resources, including diverse and highly significant water-related resources, as well as a substantial wilderness area, much of the park is managed for intensive commercial uses which include dairy operations, cattle grazing, and commercial oyster cultivation. As might be expected, these circumstances have often led to conflict which has often required extensive management attention. Consequently, at Point Reyes National Seashore, management efforts and resources have been more heavily focussed towards land acquisition and conflict response than towards proactive resource protection and management.

A recent assessment of resource management requirements for NPS units within the Western Region, identified similar resource management staffing needs and requirements for Golden Gate NRA and Point Reyes National Seashore (Jay Goldsmith, NPS Western Regional Office, personal communication). However, assets currently dedicated towards resources management at Golden Gate NRA are approximately three times greater than those allocated towards resource management issues at Point Reyes National Seashore. These differences in resource allocation have allowed Golden Gate NRA to more effectively respond to critical water-related resource management needs. The addition of both a staff hydrologist and additional resources management staff with experience in wetlands restoration have allowed Golden Gate NRA to more effectively promote and implement necessary water resources inventory, wetlands assessment and restoration, and water quality management activities than has been possible at Point Reyes National Seashore.

Therefore, this Water Resources Management Plan recommends the following management actions:

- 1) Point Reyes National Seashore has an immediate need to add a GS-11/12 Water Resources Professional to its staff. This person should be capable of:
 - professionally representing the National Seashore at local/regional/state forums and/or negotiations dealing with water use and consumption, water quality, and watershed management;
 - developing and managing the recommended water-related inventory, monitoring, assessment and resource management activities outlined in this Water Resources Management Plan (Appendix A);
 - effectively interfacing water and watershed management-related activities with the National Seashore's existing resource management and grazing management activities;
 - identifying and evaluating research needs and priorities in order to effectively administer research proposals and permit requests for cooperative water- and watershed-related research activities proposed for the National Seashore;

- exploring opportunities for cooperatively implementing water- and watershed management-related resource management activities such as stream restoration, water quality monitoring, erosion control, etc.

Knowledge, skills and abilities necessary to successfully accomplish these tasks are commonly found in a professional possessing a M.S. in Water Resources or Watershed Management (or a closely related discipline) and five or more years of related professional experience.

2) This Water Resources Management Plan has identified and developed twelve project statements addressing water-related inventory, monitoring, assessment, and resource management needs facing Point Reyes National Seashore (Appendix A). It is recommended that Point Reyes National Seashore aggressively pursue resources to initiate Project Statements PORE-N-001 through PORE-N-005 and Project Statement PORE-N-011 as soon as possible in order to obtain baseline information that will be necessary to adequately evaluate management alternatives for the longer term protection and management of the National Seashore's water resources. These high priority project activities include:

- completion of an inventory of water resources, including investigation of land titles and water rights to determine location, status, and ownership of water resources within the National Seashore (Project Statement PORE-N-001);
- completion and field verification of an inventory and classification of wetland systems within the National Seashore and addition of this information to a GIS system (Project Statement PORE-N-002);
- initiation of a routine water quality monitoring program to establish water quality baseline conditions and trends (Project Statement PORE-N-003);
- completion of a multi-disciplinary "rapid assessment" of the impacts of pastoral operations upon the water-related resources within the National Seashore (Project Statement PORE-N-004);
- development and implementation of appropriate Grazing Management Measures/ Management Practices to control non-point source pollution (Project Statement PORE-N-005);
- establishment of the recommended Memorandum of Understanding between Point Reyes National Seashore/Golden Gate National Recreation Area for cooperative management of water-related issues within the Lagunitas Creek Watershed (Project Statement PORE-N-011).

3) Point Reyes National Seashore should consider adding TERM APPOINTMENT Range Technician/Hydrologic Technician or Soil Science Technician to staff for a two-three year period in order to coordinate (under the direction of

the Range Conservationist) a multidisciplinary "Rapid Range Assessment" (See Project Statement PORE-N-004: Assessing the Impacts of Pastoral Operations on the Water-related resources of Point Reyes National Seashore). These field assessments are conducted by a multi-disciplinary team consisting of a Range Conservationist, Soil Scientist, Fisheries Biologist and a Hydrologist and provide a thorough review of upland and riparian vegetation, soil compaction conditions, riparian zone impacts, erosion modelling, and water quality/fisheries habitat impacts of grazing practices. This multi-disciplinary approach has been developed by the Bureau of Land Management and successfully employed on a federal lands managed by a variety of federal land management agencies (Gary Rosenlieb, NPS Water Resources Division, personal communication).

4) Other important goals are defined in Project Statements PORE-N-006 through PORE-N-010 and the National Seashore should aggressively pursue support to implement the following activities over the next 5 - 7 years:

- undertake a habitat assessment and establish priorities for the re-establishment of anadromous fish (Project Statement PORE-N-008);
- implement a wetland assessment, prioritization, and protection/restoration assessment (Project Statement PORE-N-006);
- complete an inventory and plan to control critical areas of erosion in the Tomales watershed within the National Seashore (Project Statement PORE-N-007);
- undertake a study of Drakes Estero and Estero de Limantour to determine the water quality and habitat quality in order to develop appropriate protection/management criteria (Project Statement PORE-N-009);
- develop a plan for the protection and management of sensitive resources in and around Abbotts Lagoon (Project Statement PORE-N-010);
- undertake an assessment for resolving water and wastewater issues at the Point Reyes Lighthouse Complex (Project Statement PORE-N-012).

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The authors would further like to acknowledge the Marin Resource Conservation District, the Marin-Sonoma Animal Waste Committee and the Marin Coastal Watershed Enhancement Project Advisory Committee whose valuable input was crucial to the completion of this document.

TO BE ADDED: APPROPRIATE ACKNOWLEDGEMENTS OF MANUSCRIPT REVIEWERS

APPENDIX A

Proposed Water Resources-related Project Statements

*** BILL SHOOK: THE NATIONAL SEASHORE NEEDS TO REVIEW THEIR EXISTING RMP AND ASSIGN CORRECT PROJECT STATEMENT NUMBERS (CONSISTENT WITH THE RMP) TO THE FOLLOWING 12 PROJECT STATEMENTS ***

PORE-N-001	Inventory of Water Resources and Water-Related Park Facilities in Point Reyes National Seashore
PORE-N-002	Wetland Inventory of Point Reyes National Seashore
PORE-N-003	Water Quality Status & Trends - Point Reyes National Seashore
PORE-N-004	Non-Point Source Pollution or Management Inventory of Pastoral Operations in Point Reyes National Seashore
PORE-N-005	Implementation of Grazing Management Measures/Management Practices to Control Non-point Source Pollution in Point Reyes National Seashore
PORE-N-006	Wetland Assessment, Prioritization, Protection/Restoration in Point Reyes National Seashore
PORE-N-007	Inventory & Control of Critical Erosion Areas within the Tomales Bay Drainage in Point Reyes National Seashore
PORE-N-008	Re-establishment of Anadromous Fish Populations in Point Reyes National Seashore
PORE-N-009	Development of a Management Plan for the Protection of Drake's Limantour Esteros at Point Reyes National Seashore
PORE-N-010	Protection & Management of Sensitive Resources in and around Abbott's Lagoon in Point Reyes National Seashore
PORE-N-011	Point Reyes National Seashore/Golden Gate National Recreation Area Memorandum of Understanding for Lagunitas Creek Watershed Management
PORE-N-012	Point Reyes National Seashore Lighthouse Potable Water Supply and Waste Management

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-001

TITLE: INVENTORY & STATUS OF WATER SOURCES IN POINT REYES NATIONAL SEASHORE

FUNDING STATUS: Funded: \$30K Unfunded: TBD

SERVICEWIDE ISSUE CODES: N13 Water Rights
 N20 Baseline Data

CULTURAL RESOURCE TYPE CODE: N/A

PACKAGE NUMBER:

PROBLEM STATEMENT:

A thorough identification and inventory of all water resources within the Point Reyes National Seashore (PORE) is a high priority and should be completed as soon as possible. Since the establishment of PORE, a great deal of time and energy has been spent acquiring lands. Unfortunately, no comprehensive inventory of the water resources, which were acquired along with the lands, has ever been completed. In order for the PORE Resource Management and Range Conservation staff to be effective in dealing with the water-related issues of the National Seashore, the location and characteristics of various water bodies and facilities (such as supply and distribution systems) must be known. A number of other natural resource issues, including threatened and endangered species management, wildlife habitat protection and local economic activities (such as those related to water quality) are also directly dependent upon a full inventory of the National Seashore water resources. Until these water resource features are fully documented and mapped, including baseline characteristics of quality (see Project Statement PORE-N-003) and quantity, the ability for Seashore Resource Managers to make informed management decisions, comply with regulations, and carry out other water related resources projects will be severely limited.

The urgency of this problem lies in the fact that the even though the Point Reyes National Seashore is recognized as having a one of the most unique blends of water resources in the National Park System, little is known about the location, quantity and extent of these resources. The National Seashore contains range/dairy land, forested areas, streams, lakes, bays, estuaries, and beaches. Also, the National Seashore contains a blend of water facilities including wells, storage tanks, stockponds, waste detention facilities and septic systems. The challenge presented to the National Seashore staff is to be able to monitor and manage these features while adhering to all federal and state regulations including the stringent requirements of the Coastal Zone Management Act of 1990. Conforming with these regulations and laws is difficult without full knowledge

of the water resources of the National Seashore.

In order for the Point Reyes National Seashore resource management staff to properly manage all of the National Seashore's water resources and have the capability to plan for the future, a comprehensive inventory which includes identification of streams, lakes (natural and man-made), wetland and riparian systems, groundwater, coastal systems, and park supply/wastewater systems is required. This inventory should complement an ongoing water rights assessment of the Seashore which documented and mapped state appropriated water rights (this assessment will be complete when raw data is imported into the Seashore Geographic Information System and is cross-checked against legal descriptions and State of California references). The inventory should also include a field verification of the water resources.

A water resources inventory is a crucial first step in implementing a comprehensive water resources monitoring and management program for the National Seashore.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Because some of the basic data to develop a full Water Resources Inventory has already been collected as part of the Water Rights assessment work still on-going at the Point Reyes National Seashore, all efforts to combine this data and limit the future effort needed as part of the following activities should be attempted.

1. Develop a physical inventory of the following:
 - a. Description and location of all water bodies in the National Seashore to include all springs, stockponds, streams, and lakes. Wetlands will be identified and mapped as part of Project Statement PORE-N-002.
 - b. Description and location of all PORE water-related facilities. Such an inventory should include water supply system components (i.e., wells, storage reservoirs for human and livestock use, distribution and treatment systems) and waste water systems (i.e. septic tanks and leach fields).
2. Describe all water resource issues or management concerns associated with the water resource or facility identified above.
3. Identify the need for follow-up assessment or corrective actions.
4. Field verify the location of individual resources/facilities including coordinates for inclusion in a park Geographic Information System database.
5. Prepare a final map displaying all inventoried items and be field verified. The map should also provide information as to location of resources in relation to the 100 and 500 year flood plain so that National Seashore managers can better assess the effect of flood risks on future planning.

Coordination with the ongoing water rights assessment should occur to assure that inventoried water resources and water-related facilities have licensed water rights. Compliance reports (i.e., reports of licensee, progress reports) will need to be filed with the California Water Resources Control Board to meet the conditions of water right licenses. Change applications will need to be filed for facilities requiring a change in beneficial use, point of diversion, or point of use. A final report documenting the inventory and location of each Seashore water resource item and should be submitted to the Point Reyes National Seashore upon completion of this project.

*** BILL SHOOK/BILL HANSEN ... THE "DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY" PROPOSED HERE IS STILL A LITTLE "SQUISHY". CAN SPECIFIC ACTIONS BE EXPANDED UPON FURTHER? WHAT IS THE ULTIMATE (IDEAL??) PRODUCT THAT YOU ENVISION FROM THIS WORK? ANY IDEAS ON FUTURE COSTS? ***

BUDGET AND FTE's:

-----FUNDED-----				
Recommended Action:	Source	Act Type	Budget(\$1000s)	FTE's
Year 1:	Field Inventory	Completion	15	.6
Year 2:	Mapping/Final	Report	15	.6
			<hr/> 30	1.2

-----UNFUNDED-----				
Recommended Action:	Source	Act Type	Budget(\$1000s)	FTE's

TO BE DETERMINED

*** BILL SHOOK/BILL HANSEN ... CAN YOU ESTIMATE "UNFUNDED" COSTS NEEDED TO COMPLETE THE REMAINING INVENTORY WORK???***

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Under a NO ACTION ALTERNATIVE water resource planning would be limited to the present knowledge of the Seashore staff. In the absence of the actions outlined above, the Seashore will continue to make management decisions without the benefit of realizing the full impacts to water resources. Impacts upon water resource dependent species and habitats will be unknown, with potential impacts upon federal and state of California listed species. Also, the degree of compliance with regulations such as the Clean Water Act, the Coastal Zone Management Act, the Safe Drinking Water Act, and Executive Orders No. 11988, 11990 and 12088 would not be fully known.

COMPLIANCE:

This project is categorically excluded from NEPA compliance, Departmental Categorical Exclusions, 516 DM, Chapter 2, Appendices 1 and 7, U.S. Department of the Interior. Compliance under Section 106 of the NHPA is likewise not required for this project. Changes in management practices undertaken as a result of this project may require compliance actions.

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-002.000

TITLE: WETLAND INVENTORY OF POINT REYES NATIONAL SEASHORE

FUNDING STATUS: FUNDED: UNFUNDED: \$ 34.6K

SERVICEWIDE ISSUES: N12 - Water Flow
N20 - Baseline Data

CULTURAL RESOURCE TYPE CODE: N/A

PACKAGE NUMBER:

PROBLEM STATEMENT:

The Point Reyes National Seashore was established "to save and preserve, for the purpose of public recreation, benefit and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped" (PL87-657). A important component of this undeveloped seashore is in the form of marine and freshwater wetlands. Within the Point Reyes National Seashore, a rare mix of numerous wetland habitat types exist, some of which are scientifically recognized as pristine and rare. Examples of these areas include Abbotts Lagoon, wetlands in the Tomales Bay area and wetland features of the Drakes Estero and Estero de Limantour drainages.

Abbotts Lagoon is characterized by freshwater wetland features which occasionally are affected by marine processes. The lagoon is home to several endangered plant species (***) BILL SHOOK - CAN YOU LIST SOME OF THESE SPECIES ... IT ADDS CREDIBILITY WHEN PROPOSAL IS BEING EVALUATED FOR FUNDING ... GENUS/SPECIES, PLEASE) which are threatened by nearby land use practices such as grazing, herbicide and pesticide applications and non-point source nutrient additions (Bill Shook, PORE Resources Management Specialist, Personal Communication). In the Tomales Bay area, both man-made and natural wetland areas exist and are potentially threatened by dairy operations, the relocation of a summer dam used to limit saltwater intrusion to municipal wells and toxic waste spills, such as occurred in Olema Creek in 1993 (Bill Shook, PORE Resources Management Specialist - Personal Communication). A restoration of former wetland areas is also in the planning stages in this area (Nadeau, 1994; and Philip Williams & Associates, 1993) and could potentially be threatened by the same problems. In the vicinity of Drakes Estero and Estero de Limantour, several natural and man-made wetlands exist. The man-made wetland areas exist as a result of stockwater storage development and small dam construction and have since become home to several species of special concern (Bill Shook...CAN YOU PROVIDE SPECIES NAMES HERE???) (Bill Shook, PORE Resources Management Specialist - Personal

Communication). These areas are all affected by land use practices in the Seashore Pastoral Zone (primarily beef and dairy operations).

Several known threats to the wetlands of the Point Reyes National Seashore have been identified. These include impacts of oil spills, failing septic systems, hazardous material spills, grazing and dairy operation impacts. However, the full extent of these impacts has yet to be studied in detail. Other lesser known impacts to wetlands in the Seashore include impacts from visitors, mariculture operations, future Seashore facility development, and external land uses. Also, little is known of the abundance or sensitivity of flora and fauna species inhabiting most of the wetlands within the Seashore.

Because a good basic knowledge of Seashore wetlands would be needed before any management, planning or problem solving activity can be carried out, an inventory of all wetlands is critical to beginning the assessment, prioritization, and protection/restoration of wetlands in the Point Reyes National Seashore (see PORE-N-006). An inventory of wetlands is also urgently needed in order to facilitate compliance with existing legislation (i.e., Section 404 of the Clean Water Act) and regulations (National Park Service Floodplain Management and Wetland Protection Guidelines) and to help guide management and planning within the park.

The Seashore has obtained National Wetland Inventory (NWI) digital data from the U.S. Fish and Wildlife Service (USFWS). The park also has 19xx aerial photography at a scale of 1:xxxx (***) BILL SHOOK: CAN YOU FILL IN INFO ON THIS? (***)). Geographic information system (GIS) layers exist for vegetation and soils within the park. This information would provide the basis for developing an adequate inventory and delineation of wetlands within Point Reyes National Seashore.

DESCRIPTION OF RECOMMENDED PROJECT/ACTIVITY:

Obtain recent (within the last 5 years) color infrared aerial photography of the Point Reyes National Seashore, on a scale of at least 1:12,000. Incorporate digitized NWI mapping data and hydric soils data as GIS layers. Produce hard-copy maps that outline wetlands and other waters of the U.S. as identified by USFWS and classified according to the Cowardin system (Cowardin et al., 1979) along with polygons of hydric soils mapping units and other units with hydric soil inclusions. Using the aerial photos and maps, field verify all indicated wetlands, alter classifications as appropriate, and classify and indicate (using global positioning technology) wetlands not previously mapped. As part of this effort, field check and map areas of hydric soils that may be candidates for wetland restoration. Produce amended maps in GIS and hard-copy formats. All field data should be retained by the National Seashore as part of its wetland data base for future reference as needed.

REFERENCES CITED:

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. FWS/OBS-79/31. US Fish and Wildlife Service, Office of Biological Services, Wash., D.C., 131 pp.

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Philip Williams and Associates, Ltd. 1993. An Evaluation of the Feasibility of Wetland Restoration on The Giacomini Ranch, Marin County. National Park Service Contract #CX 8140-1-0024. October 1993. 77 pp + appended material.

BUDGET AND FTE'S:

Source		Unfunded Act Type	Budget (\$1,000s)	FTEs
Year 1	SNWR or SNIM	MON	17.0	
Year 2			17.6	
		Total	34.6	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

a. No Action. A no action alternative is not viable because it would fail to provide the baseline information needed to proceed to the next step of assessment, prioritization and protection/restoration of wetlands within the Seashore (see PORE-N-006). Management and response to threats would be based on incomplete or inadequate basic knowledge which could jeopardize the natural resources and ecology of the wetlands. Management actions may result in noncompliance with Section 404 of the Clean Water Act and NPS Floodplain Management and Wetland Protection Guidelines.

b. Inventory Wetlands Only When Necessary for Compliance Purposes Associated with Proposed Actions. Determinations of wetland status for compliance would be made on a project by project basis. This could result in disruption of projects that have progressed to the final stages of planning only to find that wetlands would be adversely impacted. This would also delay progress on wetland assessment (see PORE-N-006).

c. Correct with Existing Funds. Begin mapping and inventory of wetlands as current staffing and funding allow. This will be a lengthy process due to lack of adequate staffing. This alternative will also delay progress on wetland assessment (see PORE-N-006).

COMPLIANCE:

This project is categorically excluded from NEPA compliance, Departmental Categorical Exclusions, 516 DM, Chapter 2, Appendices 1 and 7, U.S. Department of the Interior. Compliance under Section 106 of the NHPA is likewise not required for this project. Changes in management practices undertaken as a result of this project may require compliance actions.

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-003.000

TITLE: WATER QUALITY STATUS AND TRENDS - POINT REYES NATIONAL SEASHORE

FUNDING STATUS: FUNDED: UNFUNDED: TBD

SERVICEWIDE ISSUES: N11- Water Quality
N20 - Baseline Data

CULTURAL RESOURCE TYPE CODE: N/A

PACKAGE NUMBER:

PROBLEM STATEMENT:

The Point Reyes National Seashore has been observed to have a wide range of water quality issues. Issues concerning existing water quality and potential threats to water quality in streams, lakes, bays, lagoons, estuaries and wetlands have been of concern to managers since inception of the National Seashore. Enabling legislation provided that the National Seashore was established "to save and preserve, for the purpose of public recreation, benefit and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped" (PL 87-657). As part of the ability to save and preserve the water related components of the National Seashore, adequate knowledge of the quality of its waters must be known in order to understand the magnitude of potential threats.

Problems that are known to exist in the Point Reyes National Seashore concerning water quality are effects of dairy operations, beef cattle production (grazing issues effecting sedimentation in and the health of the Riparian Zone along streams and lakes) (Anima, 1990; Serpa, 1991), failing septic systems (Point Reyes Lighthouse septic system (John Ryan, PORE Facilities Manager - Personal Communication), recent problems with the Johnson Oyster Company septic system (Hansgen, 1994), forage production effects (use of herbicides and pesticides), toxic spills (Olema Creek spill in 1993) (Bill Shook, PORE Resources Management Specialist - Personal Communication), offshore oil spills (Point Reyes Bird Observatory, 1985), offshore bilge pumping, etc. Other problems that are perceived as a potential threat include expansion of the West Marin County Landfill near Grand Canyon Creek (Sarah Allen, National Park Service Western Regional Office - Personal Communication), relocation of the Giacomini Summer Dam on Lagunitas Creek effecting groundwater well quality (North Marin County Water District, 1979) and operations of several reservoirs in the Lagunitas Creek watershed (Kelley & Associates, 1992).

Despite these known and perceived threats to the Seashore's water resources, no

water quality monitoring program is currently in place to provide data about the existing quality of the waters in Point Reyes National Seashore, to determine water quality trends, or to provide reference to the magnitude of future threats. Such data are critical to proper resource management decision-making and park planning. It is therefore recommended that a water quality monitoring program be developed and be tailored to the specific needs of the National Seashore and would likely include, flow, water chemistry (specific conductance, DO, pH, alkalinity, nutrients, trace metals, and organics), temperature, turbidity, development of a rapid bioassessment baseline (EPA/State protocols involving fish and macroinvertebrates), and, possibly, a toxic contaminants assessment to better allow the Seashore to more accurately assess current quality conditions and allow for analysis of trends and impacts regarding future threats to the quality of its waters.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

A water quality monitoring system designed to provide baseline information on the ambient condition of the major water resources in the National Seashore and to provide the reference for determining water quality trends is recommended as a high priority need in the 1995 Point Reyes Water Resources Management Plan prepared jointly by the NPS Water Resources Division and the Point Reyes National Seashore. Currently, no water quality monitoring system is place to provide data about the existing quality of the waters of the park. Such data is critical to management decisions in regards to water resources planning. A monitoring system which provides adequate data at a reasonable level of financial and human resource commitment should be the goal of establishing such a system; such a system should become a permanent part of the Seashore's management structure. It is recommended that a combination of chemical, physical, and biological methods be established and maintained.

In order to develop and oversee this long-term effort, the Water Resources Management Plan recognizes the need for a water resources professional to be added to the staff of Point Reyes National Seashore. This person would have the lead in implenting a cooperative effort among the National Seashore, the california Regional Water Quality Control Board, NPS Water Resources Division and other cooperating agencies in designing and implenting the proposed monitoring effort, as well as providing lead and expertise in addressing a number of other pressing water resource issues (See Point Reyes National Seashore Water Resources Management Plan).

A cost effective, long-range water quality monitoring program is also proposed and would be based on information gathered in the initial water quality inventory phase, the potential threats to resources, and the level of financial/human resource commitments necessary for long-term implementation. This program would be modelled on existing monitoring programs developed to measure the impacts of grazing activities on water quality (Sellgren and McEachern, 1993; Great Basin National Park, 1994) as well as other appropriate guidelines in evaluating impacts of land use (MacDonald, 1991). The actual design of the monitoring program would be developed by an interagency team of water quality professionals, and include adequate provisions for proper quatily control/quality assurance.

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- Great Basin National Park. 1994. Water Resources Management Plan - Great Basin National Park. National Park Service. Great Basin National Park. Baker, NV 150 pp.
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- Kelley & Associates and ENTRIX, Inc. 1992 Habitat Recommendations for ~~Lagunitas~~ Creek. Prepared for the Marin Municipal Water District. Corte ~~Madera~~, CA.
- MacDonald, L.H. 1991. Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska. US Environmental Protection Agency EPA 910/91-001. Seattle, WA 166 pp.
- Point Reyes Bird Observatory. 1985. The Impacts of the T/V Puerto Rican Oil Spill on Marine Bird and Mammal Populations in the Gulf of the Farallones, 6-19 November 1984. Stinson Beach, CA. March 1985. 70 pp.
- Sellgren, C. and K. McEachern. 1993. (Unpublished Report) Monitor Water Quality on Santa Rosa Island, Channel Islands National Park. Study plan submitted to the National Park Service Water Resources Division. Fort Collins, CO. 9 pp.
- Serpa, Larry. 1991. The California Freshwater Shrimp (Syncaris pacifica) in Lagunitas Creek, Marin County, California. Prepared for the Marin Municipal Water District. September 1991. 28 pp.

BUDGET AND FTEs:

-----UNFUNDED-----

TO BE DETERMINED

(OPTIONAL) ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Under a NO ACTION ALTERNATIVE, the Point Reyes National Seashore would have no complete baseline of current water quality conditions. This would inhibit the identification of the magnitude and trends of water quality problems in the park and would limit the ability to prioritize and correct problem areas.

While this program may not allow for enforcement of water quality, it would provide Seashore personnel with a method of assessing the effects and magnitude of current land use practices as well as provide a system to monitor the effectiveness of corrective action.

COMPLIANCE:

This project is categorically excluded from NEPA compliance, Departmental Categorical Exclusions, 516 DM, Chapter 2, Appendices 1 and 7, U.S. Department of the Interior. Compliance under Section 106 of the NHPA is likewise not required for this project. Changes in management practices undertaken as a result of this project may require compliance actions.

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-004.000

TITLE: NON-POINT SOURCE POLLUTION OR MANAGEMENT INVENTORY OF PASTORAL OPERATIONS
IN POINT REYES NATIONAL SEASHORE

FUNDING STATUS: FUNDED: UNFUNDED: TBD

SERVICEWIDE ISSUES: N06 Land Use Practices
N11 Water Quality

CULTURAL RESOURCE TYPE CODE: N/A

PACKAGE NUMBER:

PROBLEM STATEMENT:

The Point Reyes National Seashore (PORE) is unusual unit among the National Park System in that the enabling legislation allows for ranching and dairying operations take place on approximately one-fourth of the Seashore's landbase (17,000 acres). These operations involve seven dairy and fourteen beef cattle operations. As a result, the Resources Management Plan (NPS, 1994) and Statement for Management (NPS, 1993b) for the Point Reyes National Seashore reflect that a pastoral zone has been established to allow dairy and beef cattle grazing under permit or lease from the National Park Service. Thus, both Point Reyes National Seashore and the Golden Gate Recreation Area (North Unit) are managed to provide not only recreational opportunities, but also to protect open space, preserve cultural aspects of, and to maintain agricultural activities in the defined pastoral zone (NPS, 1990c).

Because dairy and beef cattle operations comprise the vast majority of the pastoral zone in the National Seashore, they have the potential to impact water and wetland resources in a number of ways. Overgrazed lands may create erosion problems through the lack of vegetative cover. Erosion may then lead to increased sedimentation in streams, lakes, and estuaries, thereby altering habitat quality. Non-point source pollution from manure resulting from cattle ranching activity, may also lead to nitrogen enrichment, eutrophication and bacterial contamination of water resources within the Seashore. In addition, if not properly managed, grazing activities may significantly degrade or even destroy riparian and wetland habitat.

These critical issues must be evaluated and addressed, in part due to the National Seashore's enabling legislation, which calls upon these activities to be managed so as not to disturb or endanger other non-pastoral features of the National Seashore. Furthermore, the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 require that all landowners (public and private) manage their

sources of non-point source pollution. At this time a network of agencies and organizations -- including the Point Reyes National Seashore -- are actively involved in the development and implementation of management strategies to protect water quality in agricultural areas. The National Seashore is active in this network and has recognized the need to develop a program to assure that grazing and agricultural operation on National Seashore lands adhere to CZARA guidelines.

As part of this effort, the Point Reyes National Seashore Range Conservationist has been actively involved in a detailed data collection effort to evaluate the effects of grazing management practices upon range condition. This effort has resulted in a detailed baseline inventory of range conditions on all lands in the pastoral zone. With the assistance of a Range Scientist from University of California at Davis, much of the basic analysis on this data has been accomplished (Karl Striby, PORE Range Conservationist - Personal Communication).

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

1. The Point Reyes National Seashore should continue the development and basic information survey on the past and present extent of beef and dairy cattle operations in the Seashore. This survey should segment the information on a watershed-by-watershed basis relating to the potential for animal and agricultural wastes to pollute water with nutrients, bacteria, oxygen-depleting organic loads, and other substances. As part of this survey, the following specific information will be required:

- a. determine the location of individual dairy, grazing, and cultivation activities in each watershed, utilizing methods conforming to NPS Geographic Information System guidelines;
- b. complete the database currently underway in the park on cattle stocking levels and pasture areas;
- c. continue the data collection and analysis program now underway on rangeland conditions, including data on residual matter, soil conditions and erosion patterns and continue to ongoing analysis of this data;
- d. utilize "Rapid Range Assessment" methodology developed by the Bureau of Land Management (Wayne Elmore, Bureau of Land Management, personal communication) to undertake a multi-disciplinary impacts of grazing (range condition, erosion, hydrology, wetland/riparian zone impacts, soil compaction, fish habitat impacts, etc.) in order to identify watershed-related grazing problems, identify priority areas to be treated, and develop recommended prescriptions for mitigating undesired impacts;
- e. define the location and condition of all stormwater detention and waste holding facilities, identifying them as to non-point or point source in nature; also identify potential nonpoint source pollution from wastewater irrigation;

- f. define all possible water quality impacts from cultivated areas, including potential sources of sediment, nutrients and agricultural chemicals;
 - g. identify all riparian and wetland areas potentially affected by grazing activities.
2. In order to accomplish the above activities, Point Reyes National Seashore should consider adding term appointment Range Technician/Hydrologic Technician or Soil Science Technician to staff for a three year period in order to coordinate (under the direction of the Range Conservationist) the multidisciplinary "Rapid Range Assessment" and other activities listed above.
 3. In order to make practical use of the data and for the Seashore to comply with the Coastal Zone Act, all of the above information should be entered into a geographic information (GIS) system base.

REFERENCES CITED:

- National Park Service. 1990c. Range Management Guidelines. Point Reyes National Seashore, Point Reyes, CA. March 1990. 36 pp.
- National Park Service. 1993b. Statement for Management. Point Reyes National Seashore, Point Reyes, CA. 93 pp + map.
- National Park Service. 1994. Point Reyes National Seashore Resources Management Plan. Point Reyes National Seashore, Point Reyes, CA.

BUDGET AND FTEs:

-----FUNDED-----

*** KARL STRIBY: NEED TO JUDGE THE COST/FTE ASSOCIATED WITH YOUR CURRENT ACTIVITIES FOR RANGE ASSESSMENT

-----UNFUNDED-----

*** NEED TO WORK WITH KARL STRIBY AND GARY ROSENLIB TO EVALUATE COSTS ASSOCIATED WITH THE "UNFUNDED" RECOMMENDED ACTIVITIES (ESPECIALLY THE "RAPID RANGE ASSESSMENT") RECOMMENDED ABOVE.

(OPTIONAL) ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Under a NO ACTION ALTERNATIVE the full extent of dairy and beef operational effects in the park would not be known. In addition, planning efforts would be more difficult and limited in scope (i.e., the development of Ranch Plans) because of the lack of information on ranch operations. The no action alternative would also provide no baseline information for which the park could measure performance of management measures such as those in Project Statement PORE-N-005.

COMPLIANCE:

This project is categorically excluded from NEPA compliance, Departmental Categorical Exclusions, 516 DM, Chapter 2, Appendices 1 and 7, U.S. Department of the Interior. Compliance under Section 106 of the NHPA is likewise not required for this project. Changes in management practices undertaken as a result of this project may require compliance actions.

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-005.000

TITLE: IMPLEMENTATION OF GRAZING MANAGEMENT MEASURES/MANAGEMENT PRACTICES
IN TO CONTROL AGRICULTURAL NONPOINT SOURCE POLLUTION IN POINT
REYES NATIONAL SEASHORE

FUNDING STATUS: FUNDED: UNFUNDED: TBD

SERVICEWIDE ISSUES: N06 Land Use Prac
N11 Water Quality

CULTURAL RESOURCE TYPE CODE: N/A

PACKAGE NUMBER:

PROBLEM STATEMENT:

Dairy and beef cattle operations in the Point Reyes National Seashore (PORE) can potentially impact water quality, riparian zones, and watersheds (see also Project Statement PORE-N-004). The various harmful impacts include: soil erosion caused by improper grazing or cultivation practices; nonpoint source pollution evolving from animal wastes and agricultural chemicals; destruction of riparian zone ecosystems by direct cattle effects or by animal pollution; changes in vegetative cover and soil conditions resulting in reduced infiltration and other hydrologic effects; and pollution from disposal of dairy wastes during ponding, irrigation, and other practices.

Regulations of the Federal Clean Water Act in 1977 and 1987 and the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 require landowners to manage sources of nonpoint pollution by following EPA's Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (USEPA, 1993). This guidance document specifies that "Management Measures" and "Management Practices" will be carried out (these two terms replace the term "best management practices"). The Natural Resource Conservation Service (NRCS - formerly the Soil Conservation Service) also issues its Field Office Technical Guide of the USDA-SCS ***(Karl Striby - could you complete a citation for this document?) for ranchers and assists them in the development of "Ranch Conservation Plans" to help plan for proper conservation methods at the ranch level. Management measures include such actions as: proper grazing rotation patterns; protection of riparian zones via fencing and other measures; designs for on-land waste disposal that avoid runoff; and various biological and physical erosion control measures.

Some ranches in the National Seashore already are practicing good conservation, i.e., implementing management measures. *All* of the ranches that lie within Point

Reyes National Seashore and the northern unit of Golden Gate National Recreation Area now need to develop ranch conservation plans acceptable to National Park Service standards and implement appropriate management measures. Currently, only two plans are under development. National Seashore staffing and funding is such that the completion of all Ranch Plans will not be accomplished by the state set deadline. The project described below will provide the necessary support to complete this work.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Working in conjunction with the NRCS and the State Cooperative Extension Service, the Point Reyes National Seashore Range Conservationist will develop Ranch Conservation Plans. The Ranch Conservation Plans will implement the range and pasture components of a Conservation Management System (CMS) according to NRCS guidelines and will incorporate "management measures" (i.e., various soil and water conservation actions) for the ranchers and dairy operators to follow. These measures are generally outlined in EPA's Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (EPA, 1993). More details for ranchers for these Management Measures are found in the Field Office Technical Guide of the USDA-SCS (***Sam Kunkle - Can you provide reference for this?) or in materials available from the State Cooperative Extension Service.

The Ranch Conservation Plans will include the implementation of appropriate management practices (i.e., "management measures") for the protection of water quality, soils, and high value wetland and riparian areas. These management measures can include the following: (a) exclusion of livestock from certain areas, e.g., certain channel environs; (b) providing animals with stream crossings or access for drinking that avoid channel disturbance; (c) providing alternative drinking water locations, e.g., so as not to trample riparian areas; (d) locating salt and shade areas away from sensitive sites; and (e) utilizing improved grazing management schemes. The last item, grazing management, can include measures such as: (i) maintaining proper animal distribution; (ii) controlling stocking rates; (iii) adjusting timing of rest and grazing periods; and in some cases (iv) rehabilitating range with planting and other actions. The EPA Guidance Specifying Management Measures for Sources of Nonpoint pollution in Coastal Waters (EPA, 1993) and SCS Field Office Technical Guide (Karl - reference as above) as well as similar documents of the Forest Service (Sam Kunkle - can you specify these documents?) and Bureau of Land Management provide detailed designs and guidelines on the items listed above.

Currently, two Ranch Conservation Plans are under development. Development of these plans should continue under the guidance of the Seashore Range Conservationist, but also be allowed the input of expertise provided by other disciplines. Ranch Conservation Plan development should be conducted by a team under the lead of the Seashore Range Conservationist. Other disciplines on the team should include a Soil Scientist, Fisheries Biologist, Resources Management Specialist, and a Hydrologist. The process should include a thorough field review of ranch facilities and specify problem areas such as upland and riparian vegetation conditions, soil compaction problems, waste management, existing

grazing management practices, etc. It is vital that all of the lands that are under grazing in the Seashore be reviewed in relation to the above discussed document needs.

The final Ranch Conservation Plan product for each ranch should be a document that identifies the problems, the priority areas that should be treated, and the recommended prescriptions to initiate recovery. Because the development of meaningful Ranch Conservation Plans is so important to the future planning in the National Seashore, a large block of time must be committed to the effort. The current staffing of the National Seashore is inadequate to allow for the development of Ranch Plans to meet state deadlines. Therefore, it is suggested that the Seashore Range Conservationist should have the assistance of an experienced Range Technician to assist in the coordination of ranch planning activities. This technician should be able to interface with other disciplines on the Ranch Conservation Plan development team.

The Point Reyes National Seashore will need to determine if the various rangeland conservation efforts are effective. Therefore it is essential to design and implement a monitoring program. Monitoring in the early stages will help determine if the conservation efforts have resulted in improvements in watershed stabilization, wetlands protection, maintenance of good vegetative cover, erosion control, and water quality protection. Over the years the monitoring will serve to show if the improvements continue or if new problems occur.

Individual ranchers or farmers can carry out some aspects of the monitoring; however, the National Seashore will additionally need the quality assurance provided by additional monitoring by the State Water Quality Control Board or others independent of the ranching operation itself.

An annual report on status and accomplishments should be initiated once action begins on this project, and should be submitted to the Seashore upon completion of this project.

REFERENCES CITED:

U.S. Environmental Protection Agency. 1993. Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters. Office of Water, Washington DC.

***TOM BELLINGER: Please add in EPA Report Number and the Number of Pages in the report.

BUDGET AND FTEs:

-----FUNDED-----

*** Karl Striby: Can you add estimate of amount of cost/FTE are currently going into this effort?

-----UNFUNDED-----

*** Sam Kunkle/Karl Striby/Tom Bellinger /Greg Parsons: Could you arrange a conference call TO ESTIMATE BUDGET THAT WOULD BE REQUIRED TO UNDERTAKE THE DEVELOPMENT OF RANGE MANAGEMENT PLANS FOR ALL OPERATIONS IN PORE AND NORTH UNIT OF GOGA?

COMPLIANCE:

This project is categorically excluded from NEPA compliance, Departmental Categorical Exclusions, 516 DM, Chapter 2, Appendices 1 and 7, U.S. Department of the Interior. Compliance under Section 106 of the NHPA is likewise not required for this project. Changes in management practices undertaken as a result of this project may require compliance actions.

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-006.000

TITLE: WETLAND ASSESSMENT, PRIORITIZATION, PROTECTION/RESTORATION IN
POINT REYES NATIONAL SEASHORE

FUNDING STATUS: FUNDED: UNFUNDED: TBD

SERVICEWIDE ISSUES: N20 - Baseline Data
N11 - Water Flow

CULTURAL RESOURCE TYPE CODE: N/A

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

In order to identify, and subsequently protect which wetlands within the park are in the highest danger of degradation from disturbances, a wetland assessment needs to be performed. Point Reyes National Seashore was established, in part, to protect large areas of both marine and freshwater wetlands. Numerous wetland habitat types exist in the park, some of which are scientifically recognized as pristine and rare (***) Bill Shook - this was part of the original text, do you have a reference for this statement?). To date, little quantitative analysis has been conducted in these areas to document overall conditions, although a number of scientific studies have been completed by outside researchers *** (Bill Shook - Can you provide references?). Potential threats to the park's wetlands include adjacent land use, grazing and dairy operations, mariculture, park development and visitor impacts, oil or hazardous material spills, and erosion.

Wetland ecosystems perform many functions that are beneficial to society. Assessing the ability of wetlands to perform these functions in an important part of regulatory compliance, planning, and management activities. As part of this assessment, a model needs to be derived for the specific wetland ecosystems within the park that will rate their "health" or condition. This rating will contribute information on the functions and values that the wetland is currently providing and could potentially provide, if restored and/or protected.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Assess Wetland Conditions and Prioritize Wetlands for Protection and/or Restoration: At this point in time, it appears that wetland assessment using the hydrogeomorphic classification system (Brinson, 1993) is preferred. The strengths of this classification scheme include clarification of the relationship between hydrology, geomorphology and wetland function, as well as an open

structure, which allows adaptation in various types of wetlands and geographic regions of the country. The classification system has been developed and the U.S. Army Corps of Engineers (COE) is currently working on assessment models, functional profiles, and guidelines on how to scale or modify the generic assessment models for application to a group of wetlands. When the assessment procedure is more fully developed by the COE, its applicability to this project will be confirmed.

Current wetland maps, obtained from the proposed wetland inventory Project Statement (see PORE-N-002), will be used to locate wetland areas to be assessed. A wetland assessment procedure will be developed that will determine wetland condition based on factors deemed important by the Seashore (e.g., presence of endangered/threatened/rare/unique flora and fauna, habitat for migratory neotropical songbirds, grazing impacts, etc.). Reference wetlands will be established as control points and the functional capacity of wetlands being assessed will be compared to these reference wetlands. This will allow a comparison of functions and values of "healthy" wetlands with the wetlands being assessed. The degree of degradation and the severity of impacts can also be assessed. This assessment procedure will produce a quantifiable functional capacity index that will allow Seashore management to:

- 1) rank high priority wetland resources;
- 2) assess potential external impacts;
- 3) identify degraded wetlands; and,
- 4) establish wetland restoration priorities.

REFERENCES CITED:

Brinson, M.M. 1993. A hydrogeomorphic classification for wetlands. Wetlands Research Program TR-WRP-DE-4. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

BUDGET AND FTE's:

-----Unfunded-----			
Source	Act Type	Budget (\$1,000s)	FTEs
TO BE DETERMINED			
Year 1			
Year 2			
Year 3			

Total			

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

a. No Action. A no action alternative would fail to provide an assessment of wetland conditions throughout the Seashore. There would be no identification and ranking of wetland sites that were in need of protection and/or restoration. Wetland areas that are in danger of degradation would not be recognized and may progress to a stage where restoration is no longer feasible.

b. Assess Wetlands Only When Necessary for Compliance Purposes Associated with Proposed Actions. This alternative would provide a piecemeal approach to wetland assessment in the Seashore in that it would only be done on wetlands proposed for an action. This alternative would not provide consistency in the methods for wetland assessment. Possible restoration sites that could be used for mitigation would not be previously identified. Mitigation sites would individually need to be sought for each project.

c. Correct with Existing Funds. Begin wetland assessment, ranking, and restoration/protection as current staffing and funding allow. This alternative may not provide consistency in the wetland assessment process and may limit and/or delay recognition and protection of sensitive wetland areas.

COMPLIANCE:

This project is categorically excluded from NEPA compliance, Departmental Categorical Exclusions, 516 DM, Chapter 2, Appendices 1 and 7, U.S. Department of the Interior. Compliance under Section 106 of the NHPA is likewise not required for this project. Changes in management practices undertaken as a result of this project may require compliance actions.

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-007.000

TITLE: INVENTORY AND CONTROL OF CRITICAL EROSION AREAS WITHIN THE TOMALES BAY
DRAINAGE IN POINT REYES NATIONAL SEASHORE

FUNDING STATUS: FUNDED: UNFUNDED: TBD .

SERVICEWIDE ISSUES: N06 Land Use Prac
N11 Water Quality

CULTURAL RESOURCE TYPE CODE: N/A

PACKAGE NUMBER:

PROBLEM STATEMENT:

Erosion and sedimentation problems have long been recognized as a problem in the Tomales Bay watershed. It is currently estimated that a rapid sedimentation rate of over 200,000 tons of material each year enter the bay creating several habitat-related problems (SFSU, no date). Although several studies have been conducted in this area on specific erosion and sedimentation problems (H. Esmaili & Associates, 1980; Hantzsche and Peters, 1990; Hecht and Enkeboll, 1979; and, Hecht and Woyshler, 1980), to date, no inventory or prioritization of critical erosion and related impact areas has been completed. Also, no plan has been developed for a watershed-wide approach to implement and monitor corrective action.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

1. A full inventory of erosion problem areas located within that section of the Tomales Bay watershed impacting the Point Reyes National Seashore should be implemented in order to develop a systematic approach to identification of high, medium and low risk erosion areas. This type of inventory would ultimately be expanded on a watershed basis for all Seashore lands and non-Seashore areas that may be impacting park resources. However, this initial inventory would be used as a model to evaluate methods, effectiveness, etc. for identifying, monitoring, and mitigating erosion issues.

The proposed inventory would include a historical perspective of erosion problems as well as an analysis of recent trends in each watershed. As part of this action, erosion issues will be mapped and ranked as a first step to determining high problem erosion/sedimentation areas in the watershed. Issues related to historical land use, fisheries, channel incision, reservoir operations, flooding, riparian zone changes, pastoral land use (beef/dairy cattle and horses), timber

operations, fire suppression and road/trail construction would be included as part of this issue inventory. Ranking of problem areas would also be performed. Subdrainages of the Tomales Bay watershed to be evaluated in this phase of the project include:

- a. Olema Creek. Olema Creek is considered to be a major source of sediment to Tomales Bay. Most impact is believed to be from past land use-related abuses with an assumption that erosion problems have somewhat stabilized in recent years.
- b. Lagunitas Creek. In recent studies, Lagunitas Creek has been observed to have a large accumulation of sand in the stream bottom. This condition creates a soft bed of fine material that is prone to scour by winter flows thereby impacting spawning/rearing habitat. Related areas of impact are tributaries such as San Geronimo Creek, a major source of coarse material.
- c. Lower Tomales Bay Channel (below Giacomini Dam). The channel in this area is characterized by widening and braiding flows over mud flats in the southern end of Tomales Bay. The area has been filling with mud, sand and gravel that wash down from Lagunitas Creek. The area also is prone to flooding in which mobilized materials are deposited in the lower channel area.
- d. Within Park watersheds on the northwest side of Tomales Bay. Local land use problems including borrow pit operation impacts that impact sedimentation to the bay will need to be assessed.

2. Recommendation and implementation of erosion control measures on high priority areas. Once the erosion and sedimentation inventory is complete, high priority areas should be investigated in detail with the goal of reducing erosion and sediment problem in sensitive areas. This activity would consist of investigative methods that would apply to each specific area or problem. The activity will culminate with agreed-upon solutions and a plan for implementation of corrective action. Some of the "high priority" erosion areas could be in the pastoral zone, where cattle or other agricultural impacts are possible. For this reason the project described here should be linked closely to the sister Project "Management Measures for Controlling Nonpoint Source Pollution in Agricultural Areas" (see Project Statement PORE-N-005). The two projects both have erosion control and monitoring components and therefore could share in some aspects and avoid duplication.

3. Monitoring of erosion and effectiveness of corrective action. As part of the implementation activity, a program to monitor erosion problems for each site should also be developed. A monitoring program would will be used to establish a baseline pre-project condition as well ascertain post project effects. The monitoring program will also serve the purpose of providing information for making adjustments to corrective actions that may be needed to improve project effectiveness.

Many studies of sedimentation and erosion are valuable to scientists but too technical and specialized from their academic perspective to be useful to land managers. Therefore the erosion assessments and monitoring planned for this project must focus on the goal of relatively quickly giving Seashore managers an understanding of erosion in the park and of interpreting how and why this erosion and sedimentation is taking place. The field techniques used accordingly must have a practical slant that will explain: (i) the sources and extent of erosion as related to broad landscape features; (ii) the relationships between common physical and biological factors (e.g., soil types) and erosion rates; and especially (iii) the relations between land-use patterns and erosion.

Finally, this project must provide documentation that is immediately useful to park managers, consisting of geographic information system overlays, photographic examples, illustrated interpretations, and other explanations. Reporting should interpret sedimentation and erosion in the context of landscapes, soils, slopes, land use patterns, conservation practices, and other features or activities recognized by natural resource managers, Seashore staff, or others not specialized in erosion and sedimentation.

REFERENCES CITED:

- H. Esmaili & Associates. 1980. Substrate Enhancement/Sediment Management Study Lagunitas Creek, Marin County - Phase II: Sediment Transport and Substrate Conditions. Report to Marin Municipal Water District. H. Esmaili & Associates, Berkeley, CA. 93 pp. + app.
- Hantzsche, N.N., J.R. Peters, and R.H. Wright. 1990. Olema Creek Sedimentation and Erosion Study. Final Report to the National Park Service, Point Reyes National Seashore, Point Reyes, CA (Contract CS-8000-6-0007). Questa Engineering Corporation, Point Richmond, CA.
- Hecht, B. and R. Enkeboll. 1979. Substrate Enhancement/Sediment Management Study Lagunitas Creek, Marin County - Phase I: Sediment Sources and Control Alternatives. Report to Marin Municipal Water District. H. Esmaili & Associates, Berkeley, CA. 43 pp. + app.
- Hecht, B. and Woyshler, M.R. 1988. Status Summary Report: Substrate Enhancement Sediment Management Plan. Lagunitas Creek. Balance Hydrologics Inc. Report to Marin Municipal Water District. Corte Madera, CA.
- San Francisco State University. Not Dated. Tomales Bay LMER/BRIE Program. Pamphlet.

BUDGET AND FTEs:

-----FUNDED-----

*** Bill Shook ... Quick Estimate as to what has been spent on erosion control in this w/s to date please ... descriptive paragraph form of what has been accomplished would be useful!!

-----UNFUNDED-----

TO BE DETERMINED

Year 1: Olema Cr. Sub-drainage inventory

Year 2: Lagunitas Creek Inventory/Olema Monitoring

Year 3: Lower Bay Channel/NW Tomales Bay Drainages

Total 250K?

COMPLIANCE:

This project is categorically excluded from NEPA compliance, Departmental Categorical Exclusions, 516 DM, Chapter 2, Appendices 1 and 7, U.S. Department of the Interior. Compliance under Section 106 of the NHPA is likewise not required for this project. Changes in management practices undertaken as a result of this project may require compliance actions.

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-008.000

TITLE: RE-ESTABLISHMENT OF ANADROMOUS FISH POPULATIONS IN POINT REYES
NATIONAL SEASHORE

FUNDING STATUS: FUNDED: TBD

UNFUNDED: TBD

SERVICEWIDE ISSUES: NO2 T & E Animal

CULTURAL RESOURCE TYPE CODE: N/A

PACKAGE NUMBER:

PROBLEM STATEMENT:

Point Reyes National Seashore and the Northern Unit of Golden Gate National Recreation Area contain a number of streams which historically have had significant spawning runs of coho (silver) salmon (Oncorhynchus kisutch) and steelhead trout (Oncorhynchus mykiss), both of which have been petitioned for listing under the Endangered Species Act (ESA). These streams have been impacted by years of grazing and past timber harvest activity. Virtually all of the smaller streams within the National Seashore have been altered by impoundments and diversions which in many instances no longer fulfill their intended purpose. These dams have eliminated coho salmon and steelhead migrations and spawning areas throughout most of the park.

Olema Creek, nine miles in length, is tributary to Lagunitas Creek, a major coastal stream which historically was one of the most productive anadromous spawning streams on the central California Coast. It is the major source of freshwater to Tomales Bay, described by some aquatic experts as one of the most critical natural resources of the California Coast (State of California, 1983). Water developments and municipal diversions have eliminated approximately 50% of the potential spawning habitat from the Lagunitas Creek watershed and have restricted freshwater input to Tomales Bay. Years of effort and litigation have been devoted to restoration of the salmon fishery and habitat protection within the mainstem of Lagunitas Creek. Little work has been done on Olema Creek which is one of the most significant tributaries. Olema Creek receives little current impact, but has been severely altered by past land use practices. It potentially presents the most likely opportunity to enhance coho salmon and steelhead spawning within the Lagunitas Creek watershed. However, little is known of the condition of the habitat, current utilization by salmonids, or the feasibility for restoration.

Pine Gulch Creek is similar in size to Olema Creek, but is tributary to Bolinas Lagoon, another high value estuarian preserve. Over half of the length of the

six mile long stream and its two main tributaries lie within the National Park Service lands. Many of the same problems associated with Olema Creek apply to Pine Gulch Creek, including the lack of knowledge of current condition and potential for restoration.

Pine Gulch and Olema Creeks present opportunities for the restoration of self functioning salmon and steelhead spawning streams. Survey and classification of these major streams needs to be undertaken to evaluate habitat potential, identify structural problems and to recommend management actions to restore these streams. Numerous smaller streams within PORE need similar evaluation and prioritization.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

The Golden Gate National Recreation District (GOGA) recently acquired an aquatic specialist. This specialist could be made available to assist PORE (see Project Statement PORE-N-011 - PORE/GOGA Memorandum of Understanding for Lagunitas Creek Watershed Management) in conducting a habitat evaluation of historic salmon streams in PORE and the North District of GOGA. This effort would involve preparation of prescriptions and work plans to mitigate or restore high priority spawning streams to their potential. Implementation of prescriptions and institution of a short and long-term monitoring program would also be needed. This project would be carried out in several phases as follows:

1. **Habitat Evaluation:** The aquatic specialist should take the lead in this effort and work with other disciplines as necessary (resource managers, range conservationists, hydrologists, etc.) to identify impediments and limiting factors and determine the feasibility and methods of restoration. All streams possessing historical or potential salmonid spawning will be evaluated and prioritized according to the likelihood for habitat restoration and potential contribution to fisheries restoration of Tomales Bay and the Lagunitas Creek system. While determinations are made of problem areas and restoration and improvement methods, determinations should be made as to how these areas could be monitored in the final phase of the study.

2. **Habitat Improvement:** Implement the habitat improvement and restoration actions which may be recommended by the study. This work could be accomplished through cooperative arrangements with California Department of Fish and Game, area conservation organizations, other state and federal agencies as needed and local volunteers.

3. **Restoration Monitoring:** Conduct a monitoring program to evaluate the success of the restorations. This program should include both long- and short-term programs that monitor success of fishery population returns and corrective actions on watersheds and streams.

4. **Public Education:** A public education program could implemented be by the Point Reyes National Seashore Resource Management staff to educate the visiting public and school and school groups regarding stream dynamics, ecological restoration and conservation.

REFERENCES CITED:

State of California. 1983. Staff Recommendation: Lagunitas Creek Watershed Restoration (File No.: 83-27). State Coastal Conservancy, Oakland, CA.

BUDGET AND FTEs:

-----FUNDED-----

-----UNFUNDED-----

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-009.000

TITLE: DEVELOPMENT OF A MANAGEMENT PLAN FOR THE PROTECTION OF DRAKES AND
LIMANTOUR ESTEROS - POINT REYES NATIONAL SEASHORE

FUNDING STATUS: FUNDED: UNFUNDED:

SERVICEWIDE ISSUES: N06 Land Use Prac
N11 Water Quality

CULTURAL RESOURCE TYPE CODE: N/A

PACKAGE NUMBER:

PROBLEM STATEMENT:

Drakes and Limantour Esteros are both high value resources of Point Reyes National Seashore (PORE). These areas, which lie downstream of the PORE pastoral zone have been impacted by past and present land and water use practices such as ranching and oyster farming. Observed impacts from these practices include high nutrient levels in the esteros and associated drainage areas especially after storm events, increased sedimentation rates since the onset of ranching operations, oyster farm impacts, impacts by pesticides and fertilizer use, domestic septic system problems and offshore oil spills.

Although recent study of the estero area (Anima, 1990) has revealed priority problems in the esteros and their related drainage including oyster cultivation effects (Anima, 1990), septic system failures (Hansgen, 1994), etc.; several data gaps still exist as to the full impact of land use, tidal action, deposition of fine sediments (from oyster operations) and specific sources of nutrient inflow. Also, no comprehensive drainage-wide management plan has ever been developed to ensure these valuable resources are adequately protected in the future.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

1. Fill Key Data Gaps: An effort should be made to determine all data gaps that may preclude effective management of the Drakes and Limantour Estero area. Identification of these gaps would enable basin-wide identification and prioritization of management problems and provide guidance for options that need to be developed. This task should be accomplished in conjunction with the development of a Management Plan for the esteros (see item 2 below). Data gaps that directly inhibit the development of a meaningful management plan should be investigated initially; then as more detail and direction becomes available as

the plan develops, specific areas can be prioritized and related data gaps be filled. Examples of specific areas that should be investigated once the Management Plan is developed include:

- a. Conduct studies on the production of fine-grained material and its impact from the various filter feeders found in the lagoon as part of oyster farm operations.
- b. Monitor the rate of migration of the estero inlet to better understand the deposition of sand in the central part of the estero. Sedimentation work should also include additional geophysical profiles to determine the amount of sediment that has already been deposited as a baseline to measure future deposition.
- c. Attempt to determine the effect of damming of streams above the esteros and what impact the removal of these dams may have downstream.
- d. Since the full impact and extent of nutrients, herbicides, and pesticides is not fully known, develop a detailed management program including an inventory and monitoring program. Until more information becomes available, limit pesticide and herbicide use to no more than current levels.

2. **Development of a Management Plan.** Once much of the basic knowledge in the estero areas has been collected, individuals with expertise (researchers, local experts) or a vital interest (ranchers, oyster operations operators) in the area should be contacted and requested to serve on a management plan development team. The team should be restricted in size with persons having expertise in critical areas such as water resources, range science, estuaries, etc. These experts will draw on other expertise as needed to fully develop a management plan. The team would be tasked with:

- a. Developing a prioritized list of estero management issues.
- b. Investigation/proposal of management solutions for impacted areas.
- c. Development of a 3 or 5 year plan that would ensure containment of problem areas and reduction of future impacts.
- d. Development of a monitoring program that would ensure the continued improvement of management operations in the area.

The management plan should be conceived as a flexible document that can be modified in terms of management needs as more data becomes available.

3. **Implement an Inventory/Monitoring/Research/Resources Management Program:** Once the needs for inventory, data, and monitoring have been identified and planned, the implementation of the actual inventory, monitoring, research and resources management programs for the esteros need implementation. The implementation should be under the leadership of the Seashore Resources

Management Staff with assistance of other disciplines as necessary.

REFERENCES CITED:

Anima, R.J. 1990. Pollution studies of Drakes Estero and Abbotts Lagoon, Point Reyes National Seashore, California. Report to the National Park Service, Point Reyes National Seashore, Point Reyes, CA. 233 pp.

Hansgen, Kenneth H. 1994. Commercial Shellfish Growing Area Sanitary Survey Report and Reevaluation for Drakes Estero, California. Technical Report No. 94-01. California Department of Health Services, Division of Drinking Water and Environmental Management. Environmental Management Branch, Environmental Health Services Section, Preharvest Shellfish Sanitation Unit. 8 pp. + tables/maps.

BUDGET AND FTEs:

-----FUNDED-----

-----UNFUNDED-----

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-010.000

TITLE: PROTECTION AND MANAGEMENT OF SENSITIVE RESOURCES IN AND AROUND ABBOTTS LAGOON - POINT REYES NATIONAL SEASHORE

FUNDING STATUS: FUNDED:

UNFUNDED:

SERVICEWIDE ISSUES: N02 T & E Plant
N11 Water Qual
N20 Land Use Prac

CULTURAL RESOURCE TYPE CODE: N/A

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

One of the most important features of the Point Reyes National Seashore (PORE) is Abbotts Lagoon. Abbotts Lagoon is characterized by freshwater wetland features which occasionally are affected by marine processes. The Lagoon is also home to several endangered plant species (Bill Shook - do you want to include the plant names here?) which are threatened by nearby land use practices such as grazing, herbicide and pesticide use and dairy waste (Bill Shook, PORE Resources Management Specialist - Personal Communication). The lagoon is surrounded by a mixture of wilderness, ranching (3 ranches totalling 950 head) and private lands (Anima, 1990). The lands to the south and east of the lagoon are primarily used for dairy operations including pasture. Much of this pasture has been plowed recent years and planted in grains. Concerns in the lagoon are eutrophication due to high nutrient input from the ranching lands and a high residence time (especially in dry years), and the timing of nutrient input.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

1. Conduct a detailed inventory/assessment of Abbotts Lagoon. As part of Project Statements PORE-N-001 (Inventory of Water Resources), PORE-N-003 (Water Quality Status and Trends), PORE-N-004 (Inventory of Pastoral Operations), and PORE-N-006 (Identification/Evaluation of "High Value" Riparian and Wetland Systems), the ground work should be laid for future assessment of Abbotts Lagoon. Once these activities are complete, a detailed assessment of Abbotts Lagoon watershed should be undertaken to identify specific causes to identified lagoon problems/issues. Particular attention should be focused on threatened and endangered plants and wildlife in the area. The assessment should include all aspects of the following:

a. An assessment of the present condition water quality of the lagoon to be used as a benchmark for future work. This assessment should include a monitoring program that will fulfill baseline and future monitoring needs.

b. An inventory of sensitive and threatened species of the lagoon.

c. An inventory of all land uses and potential water-related issues in the watershed of Abbotts Lagoon. This would include an assessment of all beef and dairy operations, domestic water supplies and waste practices, cultivation practices (including pesticide uses), and ownerships.

2. Develop an Abbotts Lagoon Management Plan. The management plan should include a compilation of all data gathered in previous inventories and assessments. It should also include potential land use modifications (i.e. continued use of buffer strips to limit topsoil erosion) and ranch practice modifications (pesticide applications, dairy waste management) that are needed to protect the lagoon. Any recommendations developed as part of the management plan should be considered for use in ranch plans. Land use alternatives (i.e. converting critical areas to wilderness status) should also be considered as part of the plan. Appropriate project statements relating to protection of critical areas should also be a part of the plan. Resource management staff augmentation or hiring of needed expertise may be required to complete this management plan and its related projects.

BUDGET AND FTEs:

-----FUNDED-----

-----UNFUNDED-----

REFERENCES CITED:

Anima, R.J. 1990. Pollution studies of Drakes Estero and Abbotts Lagoon, Point Reyes National Seashore, California. Report to the National Park Service, Point Reyes National Seashore, Point Reyes, CA. 233 pp.

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-011.000

TITLE: POINT REYES NATIONAL SEASHORE/GOLDEN GATE NATIONAL RECREATION AREA
MEMORANDUM OF UNDERSTANDING FOR LAGUNITAS CREEK WATERSHED MANAGEMENT

FUNDING STATUS:

SERVICEWIDE ISSUE CODES: N24 Other

CULTURAL RESOURCE TYPE CODE:

PACKAGE NUMBER:

PROBLEM STATEMENT:

Two units of the National Park System, Point Reyes National Seashore (PORE), and Golden Gate National Recreation Area (GOGA) contain lands within the Lagunitas Creek watershed. Lagunitas Creek is a major tributary of Tomales Bay. A wide variety of water resource issues confront the watershed, and ultimately Tomales Bay.

Competition for the use of the water is quite intense. The watershed provides water for both municipal and agricultural uses, and is also the habitat for an endangered shrimp species (Syncaris Pacifica), and spawning and rearing habitat for Steelhead trout (Oncorhynchus mykiss) and Coho Salmon (Oncorhynchus kisutch). Tomales Bay is a valuable estuary which provides recreation, commercial fishing, and marine aquatic habitat.

Protection, and improvement of the water resources of the watershed, and Tomales Bay, are critical issues in Marin County. GOGA and PORE should initiate an agreement which will provide for adequate, and consistent management of the lands which are tributary to the watershed.

DESCRIPTION OF ACTION:

It is recommended that PORE and GOGA enter into a Memorandum of Understanding (MOU) which will define their relationship for the administration of National Park System lands in the Lagunitas Creek watershed. Types of items which should be addressed in an MOU include: joint responsibility for management of lands in the Lagunitas Creek watershed; goals and priorities for park lands in the watershed; joint review of priorities for watershed development and rehabilitation; a process to insure ongoing communication and decision making.

BUDGET AND FTE's

-----FUNDED-----				
	Source	Act Type	Budget (\$1000s)	FTE's
Year 1	PkBase-NR	ADM	0	.1
			=====	
			0	.1

-----UNFUNDED-----				
	Source	Act Type	Budget (\$1000s)	FTE's
Year 1			0	0
			=====	
			0	0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

The alternative to entering into an MOU which defines joint responsibilities in the Lagunitas Creek watershed, is to continue current management. Current management approaches may, or may not allow for joint consideration of watershed management activities. The watershed is a critical water resource for the State of California, as well as for the National Park System; therefore, any improvement in the means of management is important and is encouraged.

PROJECT STATEMENT SHEET

PROJECT NUMBER: PORE-N-012.000

TITLE: POINT REYES NATIONAL SEASHORE LIGHTHOUSE POTABLE WATER SUPPLY

FUNDING STATUS: FUNDED: UNFUNDED:

SERVICEWIDE ISSUES: N24 Other

CULTURAL RESOURCE TYPE CODE: N/A

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

An important park facility that has been identified to have water supply and wastewater problems is the Point Reyes National Seashore Lighthouse and housing facility. The lighthouse and housing area are supplied by a single 400 foot deep well. The well capacity is 1.5 gallons per minute. Treatment is provided by chlorination at the source and storage is provided by a 50,000 gallon lined redwood tank. Water is then fed to the visitor center and residential quarters by gravity. In most years the system has been augmented by hauling water. Waste is handled by a local leach field system.

A recent Public Health Survey by Robert Baldwin (Baldwin, 1994), Public Health Consultant and John Ryan, Chief of Maintenance, PORE, revealed that the water shortage in part may be due to leakage of the redwood tank liner and the failure of the tank float system. Also, raw sewage has surfaced at the wastewater disposal site indicating failure of the septic system.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

It is recommended that the Lighthouse supply system be repaired. This would include repair or replacement of the tank, tank liner and float system. It is speculated that if this system were repaired and returned to automatic operation, the water supply provided by the well could be more efficiently managed and possibly provide adequate supply for the four apartments and a drinking fountain thereby eliminating the need for hauling water (Baldwin, 1994). Prior to any repair action, this theory should be tested in an operational analysis of the system. If the supply is still found to be inadequate under an improved operational scenario, then other means of supply augmentation should be studied.

Evaluation and repair of the Lighthouse septic waste system should be done as soon as possible to prevent any public health risks that could arise with the current system.

REFERENCES CITED:

Baldwin, Robert D. 1994. Public Health Survey of Point Reyes NS, October 24-26.
Memorandum to Superintendent, Point Reyes National Seashore. November 14,
1994.

BUDGET AND FTEs:

Note to Bill Shook: Could you pass this Project Statement to John Ryan for
review and request cost information?

-----FUNDED-----

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However, due to the intensity of the monitoring program, and the need for continued trend analysis, the addition of a full-time Range Technician to assist the Range Conservationist with continued data collection and analysis is needed. With the addition of the technician position, the Range Conservationist would be better able to complete other tasks such as the development of Ranch Conservation Plans.

3. With the above information in hand, the development of Ranch Conservation Plans should be a more comprehensive process. The Ranch Conservation Plans will implement the range and pasture components of a Conservation Management System (CMS) according to NRCS guidelines and will incorporate "management measures" (i.e., various soil and water conservation actions) for the ranchers and dairy operators to follow. These measures are generally outlined in EPA's Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (EPA, 1993). More details for ranchers for these Management Measures are found in the Field Office Technical Guide of the USDA-SCS (Karl Striby - can you provide a complete citation reference for this?) or in materials available from the State Cooperative Extension Service.

The Ranch Conservation Plans will include the implementation of appropriate management practices (i.e., "management measures") for the protection of water quality, soils, and high value wetland and riparian areas. These management measures should include the following: (a) exclusion of livestock from certain areas, e.g., certain channel environs; (b) providing animals with stream crossings or access for drinking that avoid channel disturbance; (c) providing alternative drinking water locations, e.g., so as not to trample riparian areas; (d) locating salt and shade areas away from sensitive sites; and (e) utilizing improved grazing management schemes. The last item, grazing management, can include measures such as: (i) maintaining proper animal distribution; (ii) controlling stocking rates; (iii) adjusting timing of rest and grazing periods; and in some cases (iv) rehabilitating range with planting and other actions. The EPA Guidance Specifying Management Measures for Sources of Nonpoint pollution in Coastal Waters (EPA, 1993) and SCS Field Office Technical Guide (Karl - reference as above) as well as similar documents of the Forest Service (Sam Kunkle - can you specify these documents?) and Bureau of Land Management provide detailed designs and guidelines on the items listed above.

Currently, two Ranch Conservation Plans are in the development stage using NRCS techniques. Development of these plans should continue under the guidance of the Seashore Range Conservationist, but also be allowed the input of expertise provided by other disciplines. Ranch Plan development should be conducted by a team under the lead of the Seashore Range Conservationist. Other disciplines on the team should include a Soil Scientist, Fisheries Biologist, Resources Management Specialist, and a Hydrologist. The process should include a thorough field review of ranch facilities and specify problem areas such as upland and riparian vegetation conditions, soil compaction problems, waste management, existing grazing management practices, etc. It is vital that all of the lands that are under grazing in the Seashore be reviewed. This information could be used in planning the recovery of native grasses and riparian areas through using different grazing techniques (i.e., graze-rest schemes for stressed parcels of land).

The final Ranch Conservation Plan product for each ranch should be a document that identifies the problems, the priority areas that should be treated, and the recommended prescriptions to initiate recovery. Because the development of meaningful Ranch Plans is so important to the future planning in the Seashore, a large block of time must be committed to the effort. The current staffing of the Seashore is inadequate to allow for the development of Ranch Plans to meet state deadlines. Therefore, it is suggested that the Seashore Range Conservationist should have the assistance of an experienced Range Technician to assist in the coordination of ranch planning activities. This technician should be able to interface with other disciplines on the Ranch Plan development team.

4. In addition to the Ranch Conservation Plans, a report on the status of plans and inventory of pastoral operations should be completed on an annual basis. A final inventory document should be developed and submitted to the National Seashore upon completion of this project that discusses current operations, current and potential problems affecting the ranches and other Seashore components, provide maps of operations and problem areas.

