

The Convention on Wetlands came into force for the USA on 18 April 1987. The USA presently has 36 sites designated as Wetlands of International Importance, with a surface area of 1,854,546 hectares.

USA names California coastal site to the Ramsar List - September 30, 2002

Ramsar site no. 1215

The Bureau is very pleased indeed to announce the United States of America has designated its 19th Wetland of International Importance (as of 30 September 2002) - **Tomales Bay** (2,850 ha, 38°09'N, 123°23'W) in the state of California, just 50 km north of the city of San Francisco near Point Reyes protected area. (Nearby **Bolinas Lagoon** has also been a Ramsar site since 1998.)

Tomales Bay is a marine-coastal wetland consisting of geomorphologically dynamic estuaries, eelgrass beds (*Zostera marina*), sand dune systems, and restored emergent tidal marshes which floods the northern 20 km of the San Andreas Fault-generated Olema Valley on the central California coast. The site fulfills all eight Ramsar Criteria. Approximately 90% of the bay's 28.5 km² area is subtidal with a much greater area of open water at low tide than most other Pacific coast estuaries, thus becoming a suitable waterbird habitat through the tidal cycle. Because the 58,000 ha. watershed is non-industrial and has a low human population density, the bay is relatively pristine. The site supports several endangered or threatened plant and animal species and is an important waterbird migratory stopover site and over-wintering ground along the Pacific flyway - it regularly hosts over 20,000 individuals in the winter months, most notably of surf scoter (*Melanitta perspicillata*), bufflehead (*Bucephala albeola*), and greater scaup (*Aythya mariloides*). In the past, the site has been affected by industrial and agricultural activities, which have since been terminated or mitigated. Local authorities and private and non-governmental organizations have conducted a number of watershed protection measures and conservation and restoration projects over the past 40 years in the area.

-- site description: **Julio Montes**. [09/01/03]

**Key Nomination Documents of the Ramsar Convention
Information Sheet on Ramsar Wetlands (RIS)**

1. Date this sheet was completed/updated: March 22, 2002

2. Country: United States

3. Name of Wetland: Tomales Bay

4. Geographical Coordinates: 38°04' N to 38°15' N
122°48' W to 123°58' W

5. Elevation: (average and/or maximum and minimum: Sea Level

6. Area: (in hectares): Tomales Bay (28.5 km²)

7. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

Tomales Bay floods the northern 20 km of the San Andreas Fault-generated Olema Valley on the central California coast, about 50 km north of San Francisco. Approximately 90% of the bay's 28.5 km² area is subtidal with a much greater area of open water at low tide than most other Pacific coast estuaries, and therefore more waterbird habitat through the tidal cycle. Because the 223-square mile (142,720 acre) watershed is non-industrial and has a low-human population density, the bay is relatively pristine.

8. Wetland Type: (please ~~circle~~ [bold] the applicable codes for wetland types as listed in Annex I of the Explanatory Note and Guidelines document)

Marine-coastal: **A B C D E F G H I J K Zk(a)**
Inland: **L M N O P Q R Sp Ss Tp Ts U Va Vt W Xf Xp Y Zg Zk(b)**
Human-made: **1 2 3 4 5 6 7 8 9 Zk(c)**

Please now rank these wetland types by listing them from the most to the least dominant:

A, B, G, F, H, E

9. Ramsar Criteria: (please ~~circle~~ [Bold] the applicable criteria; see point 12 below)

1 2 3 4 5 6 7 8

Please specify the most significant criterion applicable to this site: **5**

10. Map of site included? Please tick **YES** --or-- **NO** See U.S. Geologic Survey map, attached.

11. Name and address of the compiler of this form:

Jules G. Evens, President

PO Box 609 | 65 Third Street, Suite 14 | Point Reyes Station, CA 94956
(415) 663-9312 | info@eacmarin.org | www.eacmarin.org

Environmental Action Committee of West Marin
P.O. Box 609
Point Reyes Station, CA 94956-0839

Please provide additional information on each of the following categories by attaching extra pages (please limit extra pages to no more than 10):

**12. Justification of the criteria selected under point 9, on previous page.
(Please refer to Annex II in the Explanatory Note and Guidelines document).**

Tomales Bay meets all eight of the criteria for wetlands of international importance.

Criterion 1 Because the west coast of North America has relatively recent geologic history, estuaries are relatively rare and tend to be more geomorphologically dynamic than in other regions of the continent. This dynamism is amplified by the San Andreas fault which underlies the estuary. The “near-natural” condition of the estuary is the reason it has been chosen for numerous long term studies (Largier, et al. 1997, Smith and Hollibaugh 1997, Kelly & Tappen 1998, etc.). The rarity of emergent tidal marsh habitat in coastal California estuaries, and their degradation since the mid-1850s, accounts for the 550 acre Giacomini marsh restoration effort, initiated by the National Park Service, that is underway in the south-end of Tomales Bay. In addition to tidal marsh, rare and biologically important habitat types include eelgrass beds (see #17, below) and one of the best developed coastal sand dune systems with associated dune slack wetlands on the central California coast, at Sand Point (“Tomales Dunes.”)

Criterion 2 In addition to the threatened ecological communities present (coastal salt marsh, coastal dunes, eelgrass beds), Tomales Bay and its watershed supports the following numbers of special status species: 23 plant species (including 3 endangered species); 48 bird species (6 endangered or threatened species), 8 mammalian species, 2 reptiles (both species of special concern), 2 amphibians (one endangered), 9 invertebrates (3 endangered) and 3 fish taxa listed as endangered (see #s 17, 18, below). The bay is also an important pupping site for harbor seals (see #18, below).

Criterion 3 The abundance and diversity of waterbirds supported by Tomales Bay, especially during the autumn, winter, and spring months, indicates its importance as a migratory stop-over site and over-wintering ground along the Pacific flyway. Various studies have documented its biogeographic importance as waterbird habitat (Shuford et al. 1989, Kelly & Tappen 1998, Kelly 2001 etc.) and its existence as part of a complex of estuarine habitats (Bollinas Lagoon, Bodega Bay, Abbott’s Lagoon, Drake’s and Limantour Estero) that support a diverse array of avian species. The importance of the estuary for fish is also indicated by the diversity of species present (see attachment), and its historical importance as a spawning ground for Pacific herring and coho salmon.

Criterion 4 The importance of the eelgrass beds as breeding substrate for herring is discussed below (#18). These beds are also critical foraging habitat for migratory black brant (*Branta bernicula nigricans*) during spring and fall and support an estimated 30% of the California population during winter (Kelly & Tappen 1998). Numerous marine invertebrates are also associated with this habitat. The tidal marsh and transitional vegetation provides important refuge for the threatened California Black Rail (*Laterallus jamaicensis coturniculus*) and other salt marsh dependent species during periods of extreme tidal inundation (Evens & Page 1996).

Criterion 5 During seven years (1989-1996), an average of 21,943 waterbirds were counted per survey (n=21) on Tomales Bay in winter with a range of 14,842-25,553 (SE 647) individuals. Surf scoter, bufflehead, and greater scaup together accounted for ~70% of the total winter population of waterbirds (Kelly & Tappen 1998). In addition, Tomales Bay supports up to 20,689 shorebirds in early winter, thereby qualifying for inclusion in the Western Hemisphere Shorebird Reserve Network (Harrington and Perry 1995, Page and Shuford 2000, Kelly 2001). During fall and autumn migration, total numbers are much higher, especially when migratory pulses of Western Sandpiper, Dunlin, and Black Brant inflate the population.

Criterion 6 “A wetland should be considered internationally important if it supports 1% of the individuals in a population of one species or subspecies of waterbird.” Tomales Bay undoubtedly reaches this criterion. Although worldwide population numbers are not available, the following data support this assumption for several species. Tomales Bay may provide the most important winter habitat for Bufflehead on the west coast south of the Columbia River. Tomales Bay supports these estimated percentages of the midwinter California populations of the following species: bufflehead (12.3%); scoters (6.4%); black brant (30.8%). Undoubtedly > 1% of the world population of black brant, and possibly dunlin and western sandpiper, utilize Tomales Bay as either a wintering ground or a migratory refueling station.

Criterion 7 The Federally endangered tidewater goby (*Eucyclobius newberryi*) occurs in Tomales Bay. The bay also supports significant life-history stages of several species and subspecies of anadromous fishes, most notably: Pacific herring (discussed below), California (or ‘Tomales’) Roach, steelhead trout, and coho salmon (Tomales Bay Watershed, Fall 1995). The spawning beds of the pacific herring are of worldwide significance and the bay is within the USFWS “Ecologically Significant Unit” because of its importance to the endangered coho salmon and steelhead populations. Dune beaches near the mouth of Tomales Bay may provide critical winter habitat for the threatened Western Snowy Plover (*Charadrius alexandrinus nivosus*) (USFWS 1995). The historic tidal wetlands (aka "Giacomini Marsh") at the southern end of the bay also support a viable population of the Federally threatened (5-20-96) California Red-legged Frog (*Rana aurora draytonii*).

Criterion 8 In addition to the threatened and endangered species mentioned in Criterion 7, Tomales Bay provides an important nursery for leopard shark (*Thiakis semifasciata*), bat ray (*Myliobatis californica*), a variety of surfperch (Embiotocidae), rockfish (Scorpaenidae), sculpin (Cottidae), and flat fish (Pleuronectidae) including the pacific halibut (*Hippoglossus stenolepis*). (See species list, attached). Topsmelt and jacksmelt, two abundant species that breed in the eelgrass beds, provide the primary food source for the osprey population that breeds within the Tomales Bay watershed, the largest concentration of osprey in California (Evens 1995).

13. General location: (include the nearest large town and its administrative region).

Tomales Bay is adjacent to the Point Reyes National Seashore (National Park Service) in Marin County, California. The small villages of Inverness, Point Reyes Station and Marshall are situated around the shore of the bay. The City of San Rafael, about 20 miles to the East, is the seat of county government.

14. Physical features: (e.g. geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; catchment area; downstream area; climate)

Tomales Bay occurs over the San Andreas fault zone, at the boundary of the North American and Pacific tectonic plates, and therefore is surrounded by two entirely distinct geologic complexes. The Point Reyes Peninsula, on the west side of the bay, is a granitic-metamorphic core complex; the east side is a Franciscan formation (graywackes, shale, cherts, limestone, and pillow basalts) core complex of volcanic origin. Tomales Bay floods the northern end of the Olema Valley along the San Andreas rift zone. The bay is a 28 km² shallow (mean depth = 3 m), highly unidirectional, Mediterranean-type, coastal estuary, alternating between a classical estuary (net dilutive basin) during the wet winter and a hypersaline estuary (net evaporative basin) during the dry summer. The two primary sources of freshwater inflow (Lagunitas Creek and Walker Creek) are partially dammed to impound several reservoirs. A third watercourse, Tomasini Creek, is currently diverted from entering the tidal marsh at the south end of the bay, but a restoration effort is underway to restore the natural hydrology of that system. There are numerous smaller perennial and ephemeral streams entering the bay along either shore. Most of those on the western shore are unimpeded and flow rather rapidly through granitic substrate. Those on the eastern shore flow through Franciscan formation of marine origins; many are interrupted by agricultural stock ponds. The catchment area (561 km²) is a rural watershed of mostly parklands and pastureland with low human population density (11,000 people; ~20 persons/km²). There is no industrial effluent entering the bay and human sewage is treated almost entirely by individual septic systems. The bay is fully tidal. Coastal upwelling of the California current is the primary oceanographic influence from March to August and provides cool sea water with elevated nutrient levels and high primary productivity. In late summer and fall evaporative loss of freshwater exceeds the supply of fresh water via precipitation and runoff and the inner estuary becomes hypersaline. The average annual maximum tidal swing is 2.5 m, with a difference between mean high and mean low tide of about 1.1 m.

Water quality has been the subject of several recent and ongoing studies. Historically, the waters of the estuary were considered pristine, however recent studies indicate that they are impaired by excessive nutrient contributions, primarily from agricultural runoff, and elevated levels of mercury, from the tailings of a mining operation along the banks of the Walker Creek tributary. Each of these situations has been ameliorated in recent years and there is an ongoing effort to improve water quality in the watershed.

15. Hydrological values: (groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.)

The Mediterranean climate of the region is characterized by winter rains and summer drought. Depending on location within the watershed, the 120-year average rainfall ranges from ~30 to 61 inches/year with 95% of the precipitation occurring from October to April. Over the past 130 years, sedimentation in the bay has averaged 1 kg•m⁻²•yr⁻¹. This rate was amplified by poor agricultural practices and logging which produced rapid sediment delivery between 1930 and 1957 (6 kg•m⁻²•yr⁻¹), however in recent years the rate of sedimentation has been near the long term average (Rooney 1995) and recent land use practices have reduced the annual load.

16. Ecological features: (main habitats and vegetation types)

Primary productivity is dominated by phytoplankton, although eelgrass (*Zostera marina*) is a significant producer as well (Spratt 1989). The following 'special status natural communities' are encompassed by Tomales Bay and its shoreline: coastal dune scrub, coastal freshwater marsh, coastal brackish marsh, coastal terrace prairie, Northern coastal saltmarsh, Northern maritime chaparral (California Department

of Fish and Game Natural Diversity Data Base, Apr. 6, 1999). Estuarine habitat includes: salt marsh, riparian thickets, tidal flats, eelgrass beds, open water, and coastal strand.

17. Noteworthy flora: (indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc.)

Point Reyes Bird's Beak (*Cordylanthus maritimus* spp. *palustris*) occurs in 52 colonies distributed among 14 isolated populations in the salt marshes of Tomales Bay. It has been extirpated from much of its former range elsewhere, and is now confined to remnant populations in Marin, Sonoma, and Humboldt counties and is listed as endangered in Oregon. In California it is Federally listed as a species of special concern (SSC).

Tidestrom's lupine (*Lupinus tidestromii*): Federally endangered. Previously verified at Dillon Beach. May be extirpated, but also may persist as dormant seed.

Sonoma spineflower (*Chorizanthe valida*). Federally endangered and extant, this species is the focus of current conservation efforts and research (see #23, below).

Woolly-headed ("San Francisco") spineflower, *Chorizanthe cuspidata*, grows on the Tomales Dunes, the only locale in which both varieties (*C.c. cuspidata* and *C.c. villosa*) co-occur and intergrade. Hooked-involucrespine flower, *C.c. cuspidata*, a Federal species of special concern (SSC), is biogeographically distinct and important.

Eelgrass (*Zostera marina*) beds cover ~392 ha (~3%) of the inner bay and provide one of the most productive habitats, an important substrate for a variety of organisms. Indeed, Tomales supports an important herring spawn, dependent on these beds and, in turn, attracts annual concentrations of waterbirds that congregate to forage on the roe and the grasses.

Other officially listed species occurring along on near the shoreline of the bay include:

Marin bentgrass, *Agrostis blasdalei* var. *marinensis*, is State listed as rare.

Humboldt Bay Owl's clover, *Castilleja ambigua* var. *humboldtensis*, Federal SSC

Fragrant fritillary, *Fritillaria liliacea*, is a Federal SSC.

Dune gilia *Gilia capitata* ssp. *chamissonis*

18. Noteworthy fauna: (indicating, e.g., which species are unique, rare, endangered, abundant or biogeographically important; include count data, etc.)

Fish: Pacific Herring (*Clupea harengus pallasii*) spawn in the eelgrass beds with a 20 year average of approximately 5500 tons, making Tomales Bay one of the major spawning sites in California (Moore & Mello 1995). Additionally, three Federally threatened or endangered taxa breed in the waters of Tomales Bay and its tributaries: Tidewater goby (*Eucyclogobius newberryi*); the Central California 'ESU' of Steelhead (*Oncorhynchus mykiss*); and, the Central California 'ESU' of Coho salmon (*Oncorhynchus kisutch*).

Birds: Ten years of systematic observation detected 51 species of waterbirds with an average of 21,943 individuals per survey and a mean density of 770 birds/km² (Kelly & Tappen 1998).

Mammals: The Point Reyes peninsula supports the largest population of Harbor Seals (*Phoca vitulina*) in California and a large proportion of those animals utilize Tomales Bay as a traditional pupping and resting site (Allen 1985, Evens 1993).

The following rare, threatened, and endangered species occur on Tomales Bay:

Tomales isopod, *Caecidotea tomalensis*

California freshwater shrimp, *Syncaris pacifica* (Federally Endangered)

Myrtle's silverspot butterfly *Speyeria zerene myrtleae* (Federally Endangered)

Green sturgeon *Acipenser medirostris* (Species of Special Concern)

Coho Salmon *Oncorhynchus kisutch* (State Endangered, Federally threatened)

Steelhead *Oncorhynchus mykiss* (Federally threatened)

Tidewater goby *Eucyclogobius newberry* (Federally Endangered)

California red-legged frog, *Rana aurora draytonii* (Federally Threatened)

Foothill yellow-legged frog, *Rana boylei* (CDFG: SSC)

Western pond turtle *Clemmys marmorata* (CDFG: Protected)

California brown pelican (*Pelecanus occidentalis californicus*) Federally endangered

Great blue heron *Ardea herodias* (rookery) (CDFG: Sen siti ve)

Western least bittern *Ixobrychus exilis hesperis* (nesting) Species Special Concern

Aleutian Canada goose *Branta canadensis leucopareia* (wintering)

Northern harrier *Circus cyaneus* (CDFG: SSC)

California black rail *Laterallus jamaicensis coturniculus* (State Threatened)

California clapper rail *Rallus longirostris obsoletus* (Federally Threatened)

Western snowy plover *Charadrius alexandrinus nivosus* (Federally Threatened)

Northern spotted owl *Strix occidentalis caurina* (Federally Threatened)

19. Social and cultural values: (e.g., fisheries production, forestry, religious importance, archaeological site, etc.)

Mariculture is an important cultural and economic human activity. Oysters (*Crassostrea gigas* and *C. virginica*), halibut (*Paralichthys californicus*), herring (*Clupea pallasii*) and rock crab (*Cancer spp.*) are all commercially harvested from Tomales Bay. Since the first commercial planting near Millerton Point in 1875, the oyster industry has grown from a small industry (~6% of the California market in 1915) to become the largest producer in California by the 1950s (79% in 1953). The industry has experienced resurgence since the early 1980s and the bay now supports six profitable oyster cultivating operations, supporting a work force of perhaps 100 people, and has become an important component of the social fabric of the watershed. The subtidal leases are licensed and regulated by the California Department of Fish and Game (CDF&G).

CDF&G also manages the herring fishery. Herring has been harvested in Tomales Bay since the early 1800s, in some years providing up to 75 percent of the total harvest. From the 1930s until 1973, herring landings varied from 200 to 1500 tons per season depending on environmental variables. A shift from fish harvest to roe harvest began in the early 1970s. Low harvests in recent years due to low spawning biomass (related to El Niño and low precipitation years) have forced Fish and Game to close the fishery to commercial harvest, however, a resurgence is still possible since the eelgrass habitat is relatively intact.

The commercial halibut take also fluctuates due to environmental variables. In 1994, a take of 7500 tons was a fairly typical year. Recreational halibut fishing is also a popular local sport.

The predominant land use in the watershed for over 100 years has been animal agriculture—beef, dairy, and sheep production. Currently there are approximately 25 ranches operating in the watershed, about half dairy and half beef. (There has been a shift from dairy to beef over the last decade or so due to market forces.) Ranching families and ranch workers comprise the dominant influence on the social fabric of the communities surrounding the bay. The existence of Marin Agricultural Land Trust (MALT), whose purpose is to preserve agriculture in the watershed through the purchase of conservation easements from viable agricultural concerns, attests to the importance of agriculture as a social value.

Archeological sites associated with the Coast Miwok native peoples exist at various sites around the shore. All are protected by public entities (National Park Service, California Parks) and indicate that Tomales Bay was historically an important focal point for Miwok culture. “More than a hundred village sites have been identified . . . most of these are along the west shore of Tomales Bay.” (Thalman 1993). Indeed, the name “Tomales” probably has its origins in the Miwok word *tamal*, meaning ‘bay.’

The presence of large tracts of protected public lands within the watershed, preserved as park and open space (see below), attest to another cultural value that is often overlooked—the value of wilderness and open space that underlies the designation of such lands.

20. Land tenure/ownership of: (a) site (b) surrounding area.

- (a) Tomales Bay itself lies within the boundaries of the 948 square miles of the Gulf of the Farallones Marine Sanctuary administered by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), Marine and Estuarine Management Division. There are some overlapping jurisdictions with the National Park Service along the western shore of Tomales Bay.
- (b) The 142,720 acres of the surrounding watershed is owned by the following entities in the approximate percentages: 40% in private ownership (the vast majority is ranchland; of that acreage, approximately one half is protected by MALT’s conservation easements); 35% National Park Service (Point Reyes National Seashore and Golden Gate National Recreation Area); 15.3% Marin Municipal Water District (20,350 acres); and the remainder as follows: California Department of Parks and Recreation (2300 acres); Marin County Open Space District (700 acres); Audubon Canyon Ranch (398 acres); Inverness Public Utility District (189 acres).

21. Current land use: (a) site (b) surroundings/catchment.

- (a) Because the bay waters are within the marine sanctuary and are protected by state and federal laws, all commercial and recreational activities are regulated by NOAA, the National Park Service, or California Department of Fish and Game. Uses of Tomales Bay include commercial mariculture (restricted to 10% of the intertidal habitat), commercial and recreational fishing, clamming, and boating (sailing, sea kayaking, motor boating, windsurfing.)
- (b) The land use practices in the surrounding watershed are dominated by agricultural production (primarily beef and dairy), National Park lands (designated wilderness and low-impact human use areas), rural residential, and municipal watershed. Land-based recreational use includes: hiking, birdwatching, horseback riding, mountain biking, etc.

22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects: (a) at the site (b) around the site

- (a) Agricultural practices, historically, have contributed to accelerated sediment loading and high nutrient loads, especially at the onset of the rainy season. Mining operations (mercury, asbestos, gypsum), logging operations, domestic septic systems, stock pond overflow, and a landfill were also contributing factors to sedimentation and water quality. Mining operations have ceased and successful remediation and mitigation was initiated by the State Regional Water Quality Control Board in the late 1990s. Logging ceased by the early 1960s and remedial measures have been taken to restore the erosion and sedimentation caused by those endeavors. The West Marin Landfill was closed to operation in 1998 and is currently undergoing remedial closure regulations by the State Regional Water Quality Control Board. Agricultural practices have also improved and are currently being addressed by three governmental or quasi-governmental organizations: the Tomales Bay Watershed Council (under the auspices of the Marin County Resource Conservation District); Tomales Bay Agricultural Group, and the National Park Service. The restoration of riparian drainages and stabilization of gullies and creek beds is a primary focus of the Resource Conservation District, the Park Service, and private landowners. Additionally, market forces and active Park management have caused a decrease in the total number of cattle per acre over the last two decades.
- (b) Because the Olema Valley is formed by the San Andreas Rift Zone, and the area is underlain by an active earthquake fault, the surrounding land is inherently unstable. This instability is exacerbated by past land use practices that further disturbed the integrity of the substrate: overgrazing, logging, road building, etc. These factors, coupled with the seasonal frequency of intense Pacific storms (high precipitation events over short periods of time) mean that the potential of flooding, land sliding, and heavy sedimentation is ever present.

23. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

The last 40 years have hosted a variety of conservation measures in the bay and the watershed that will promote conservation with an objective of increasing water quality, promoting sustainable agriculture and mariculture, and preserving wild lands. These measures include the establishment of the Point Reyes National Seashore (1962), Golden Gate National Recreation Area (1972), and Marin Agricultural Land Trust (1980), and the set aside of watershed by Marin Municipal Water District (1859). Currently the National Park Service is initiating a 550-acre marsh restoration project in the Lagunitas Creek delta at the south end of the bay to restore tidal influence to an area that was converted to agricultural pastureland in 1947. Additionally, several small restoration projects have been accomplished by the Marin County Open Space District (Tomasini canyon riparian area), Audubon Canyon Ranch (Olema Marsh, Livermore Marsh, Tom's Point), Inverness Association, and California State Parks (Millerton Point, Tomasini Point).

The Marin Coastal Watershed Enhancement Project was initiated in 1994 by a variety of regulatory agencies in response to an increased focus on nonpoint source (NPS) pollution. The primary goal of the project was to develop solutions to water quality problems that affect agricultural and natural resources in West Marin County, including the Tomales Bay watershed. This effort solicited active participation by

land owners and managers within the watershed and provided technical assistance on ranch planning, nutrient budgeting, and wildlife considerations. This initial project has generated riparian restoration efforts on private lands through the Marin Sonoma Resource Conservation District (MRCD) and helped spawn the Tomales Bay Watershed Council (TBWC) and the Tomales Bay Agricultural Group (TBAG), two organizations working toward the common goals defined by the project.

The Tomales Bay Association, a nonprofit, member-ship supported environmental advocacy group has worked diligently to restore the coho and steelhead spawning beds in Olema Creek and other tributaries of the bay. The success of these efforts spawned the coho restoration project currently underway by the National Park Service.

The Environmental Action Committee of West Marin, a member-supported non-profit advocacy organization, supports a paid staff that reviews development proposals within the watershed and has functioned as a citizen-supported watchdog group for 30 years, ensuring that government agencies uphold and enforce laws and regulations that protect environmental values within the watershed.

24. Conservation measures proposed but not yet implemented: (e.g, management plan in preparation; officially proposed as a protected area, etc.)

As mentioned above, the National Park Service recently purchased the 'Giacomini marsh,' 550 acres at the south end of Tomales Bay and is initiating a marsh restoration project in the immediate future. This effort will restore tidal influence to the Lagunitas Creek delta by removing levees that were built in 1947 to convert tidal wetlands to agricultural pasture. The restored wetland will provide habitat for a variety of rare, threatened and endangered species, increase the tidal prism and the estuarine reach of the bay, reduce sediment loading, and improve water quality.

The Tomales Bay /Bodega Bay Watershed Boundary Study was initiated in 1995 and has culminated in the "Point Reyes Farmland Protection Act" which currently is moving through the United States Congress (H.R. 2202). If implemented, the Act will provide funds to purchase conservation easements within the watershed and afford protection to acreage that is currently not protected by Marin Agricultural Land Trust (MALT).

MALT has purchased conservation easements on 29,807 acres since its establishment in 1980 and has a goal of protecting 10,000 more acres from development over the next 5 years.

The Environmental Action Committee of West Marin (EAC) is currently undergoing a campaign to preserve the Tomales Dunes at the mouth of Tomales Bay. This is the only whole dune complex in California that is privately owned. It encompasses some of the best developed dune slack wetlands on the central California coast, ranging from seasonal freshwater ponds, to marshes, to wet meadows. As relictual dune system the Tomales Dunes offer potential habitat for recovery for several endangered plant species (*Chorizanthe cuspidata*, *Layia carnososa*, *Astragalus pycnostachys*, *Lupinus tidestromii*) as well as several threatened animals or "species of special concern," most notably California red-legged frog (*rana aurora draytonni*) and Myrtle silver spot butterfly (*Speyeria zerene myrtleae*).

The recently formed (1999) Tomales Bay Watershed Council (TBWC) is a consortium of government agencies, Park Service personnel, members of local non-profit organizations, and private landowners with conservation interests in the Tomales Bay watershed. The purpose of TBWC is to "to improve the

water quality of the Bay and to restore the environmental integrity of the entire watershed in a manner which promotes the harmonious relationship of man to nature. To accomplish this TBWC will develop a comprehensive watershed management plan to both protect the watershed from further environmental degradation and to restore its health and integrity.” (from Draft “Visions and Goals Statement, TBWC, July 13, 2000).

The Tomales Bay Agricultural Group (TBAG), a member of the TBWC, has also formed recently with the intent of improving agricultural practices and reducing runoff and nutrient loading in Tomales Bay.

An Interagency Working group, comprised of representative from the National Park Service, California Department of Fish and Game, regional Water Quality Control Board, Department of Commerce, California Department of Health Services, and Marin County Open Space District has recently produced “Guidelines for Protection and Use of Tomales Bay (Copy attached.)

25. Current scientific research and facilities: (e.g., details of current projects; existence of field station, etc.)

The Pacific Coast Learning Center is operated by Point Reyes National Seashore in partnership with eleven National Parks and nineteen public and private organizations. The major goals of the Center are to facilitate research on 1) coastal ecosystems; 2) environmental history and cultural landscapes; 3) fire ecology and prescribed burning; and, 4) to provide educational programs to the people of the San Francisco Bay area.

The Park Service maintains the Resource Management and Service Center that supports a a research staff involved in ongoing research on harbor seal disturbance, tule elk range ecology, northern spotted owl monitoring, elephant seal research and protection, coho and steelhead habitat restoration, Sonoma spineflower ecology, exotic plant control, and terrestrial mammal & herpatile biology,

The Point Reyes Bird Observatory—a private, non-profit, membership sponsored research organization—conducts long term scientific studies of bird populations within the Tomales Bay watershed as well as worldwide. Current projects within the watershed include; predator-prey relationships, grazing disturbance to songbird distribution and abundance, protection and nest success of Snowy Plovers. PRBO maintains a field station at Palomarin on the Point Reyes Peninsula.

Audubon Canyon Ranch’s Cypress Grove Preserve, located on the shore of Tomales Bay. encompasses a nature preserve and a research facility. Research efforts within and around Tomales Bay include; a plant inventory of Tomales Bay; control of exotic weeds; coastal prairie restoration and management; harbor seal disturbance monitoring; shorebird population dynamics; reproductive success of egrets and heron colonies; and winter waterbird surveys.

26. Current conservation education: (e.g., visitors center, hides, information booklet, facilities for school visits, etc.)

Point Reyes National Seashore Visitor’s Center offers a self-guided tour with diorama’s and placards that describe the natural history and natural values of the Park, including many of the species and natural phenomena that characterize Tomales Bay. The bookstore at the Visitor’s Center provides a variety of pamphlets, checklists, and books that describe the natural resources in the watershed. Outdoor

interpretive signs are strategically located to describe some of the watershed's emblematic species and habitats (e.g. tule elk range, pastoral zone, earthquake trail, bishop pine forest.) Park rangers provide regular field trips and nature classes to the public. Point Reyes Field Seminars also provides in-depth weekend field courses taught by experts in their fields.

Tomales Bay State Park has several kiosks strategically located to identify and describe natural values, including interpretive information on shellfish, osprey, and native plants. Ranger/naturalists also provide interpretive programs to visiting school groups and the general public.

Public access is provided at various points around the Bay with trailheads established, signed, and maintained by the Park Service (Tomales Point, Coastal Access at Martinelli Point), the California Department of Parks and Recreation (Millerton Point, Tomasini Point, Heart's Desire Beach), Marin County Open Space District (Chicken Ranch Beach, Shell Beach, Miller Park boat ramp), California Department of Fish and Game, and Audubon Canyon Ranch (Shield's Marsh, Cypress Grove Preserve).

27. Current recreation and tourism: (state if wetland is used for recreation/tourism; indicate type and frequency/intensity)

On the east shore of the bay, Marin County Open Space District (MCOSD) maintains a public boat ramp at Miller Park in Marshall and provides fishing access at Walker Creek. These sites are fairly heavily used on summer weekends, especially by sports fishermen and recreational boaters. There is also a private boat ramp available for public use on the west shore at the Golden Hinde Boatel in the town of Inverness.

Point Reyes National Seashore attracts 2.6 million visitors annually. Although most of these visitors utilize hiking trails, beaches, and other attractions on the ocean side of the Point Reyes Peninsula, a significant proportion also visits the shores of Tomales Bay, especially via the tule elk range from the Tomales Point trailhead. Camping is permitted on the west shore of Tomales Bay and restricted to 240 individuals/day. Additionally, Tomales Bay State Park maintains 6 camp sites. There is a private campground along the banks of Olema Creek that serves approximately 100 campsites and trailer hook-ups. A private campground at Lawson's Landing, near Tomales Dunes, has 233 space travel trailer sites (average occupancy 50%) and admits up to 1000 vehicles per day to their camping area (average occupancy 10%). Large numbers of 'clammers' and sports fishermen, congregate here, particularly on summer weekends. The impacts of these activities on the harbor seal population have been and are being studied (Allen 1985, and pers. comm.). Concern over impacts to clam beds and invertebrate populations has been expressed and the Point Reyes National Seashore Association is in the process of initiating an "All Taxa Biological Inventory" of Tomales Bay to address biodiversity questions.

Eight kayak companies rent kayaks to the public and instruct their clients in responsible use of the bay waters. Numbers of kayak rentals are not available, but numerous flotillas of kayaks gather on fair-weather weekends.

Inverness Yacht Club has annual summer classes on sailing and boat safety

28. Jurisdiction: (territorial, e.g., state/region and functional, e.g., Dept. of Agriculture/Dept. of Environment etc.)

The Department of Commerce (Gulf of the Farallones Marine Sanctuary,

National Oceanic and Atmospheric Association) and the National Park Service (Point Reyes National Seashore and Golden Gate National Recreation Area), have overlapping jurisdictions. The Tomales Bay Technical Advisory Committee, representing additional jurisdictional agencies (County of Marin, California Regional Water Quality Control Board, California Department of Fish and Game, National park Service, etc.) meets monthly and informs those agencies of current issues and management problems.

29. Management authority: (name and address of local body directly responsible for managing the wetland)

Overlapping jurisdictions require that we provide several management authorities, as follows:

Ed Ueber, Manager
Gulf of the Farallones Marine Sanctuary
National Oceanic and Atmospheric Association
Fort Mason
San Francisco, CA 94123

Don Neubacher, Superintendent
Point Reyes National Seashore
Point Reyes Station , CA 94956

30. Bibliographical references: (scientific/technical only)

The Marin Coastal Watershed Enhancement Project. 1995. Final Report. University of California Cooperative Extension. Novato, CA.

Tomales Bay: Guidelines for Protection and Use. Draft. June 2000. Interagency Planning Group.

Allen, S. 1985. Harbor Seals at Point Reyes. Point Reyes Bird Observatory Newsletter 68.

Daetwyler, C.C. 1966. Marine geology of Tomales Bay, central California. Univ. Pacific., Pacific Marine Station Res. Rept. (6):1-169.

Evens, J. & G. Page. 1986. Predation on black rails during high tides in salt marshes. *Condor* 88:107-109.

Evens, J. 1993. Natural History of the Point Reyes Peninsula. Revised Edition. Point Reyes National Seashore Association. 224 pp.

Evens, J. 1995. Population size and reproductive success of osprey at Kent Lake, Marin County, California. Final Report from Avocet Research Associates to Marin Municipal Water District. Nov. 15, 1995.

Galloway, A.J. 1977. Geology of the Point Reyes Peninsula, Marin County, California. California Div. of Mines and Geology. Bulletin 202.

Harrington, B. and E. Perry. 1995. Important shorebird staging sites meeting Western Shorebird Reserve Network criteria in the United States. Report to Western Hemisphere Shorebird Reserve Network, Manomet Bird Observatory, P.O. Box 1770, Manomet, MA 02345.

Hollinbaugh, J.T., Cole, B.E., Dollar, S.J., Hager, S.W., Vink, S.M., Kimmerer, W. J. Obrebski, S. Smith, S.V., Valentino, M., and Walsh, T.W> 1988. Tomales Bay, California: a macrocosm for examining biogeochemical coupling at the land-sea interface. *Eos* 69:843-845.

Kelly, J. 2001. Distribution and abundance of winter shorebirds on Tomales Bay, California: implications for conservation. *Western Birds* 32:145-166.

Kelly, J.P. 1993. Fall, early-winter, late-winter, and spring 1992/1993 shorebird censuses on Tomales Bay, California. ACR Project Report 89-4-4, Audubon Canyon Ranch, 4990 shoreline Hwy., Stinson Beach, CA 94970

Kelly, J. and S. Tappen. 1998. Distribution, abundance, and implications for conservation of winter waterbird on Tomales Bay, California. *Western Birds* 29:103-120.

Kelly, J.P., Evens, J.G. Stallcup, R.W., and Wimpfheimer, D. 1996. Effects of aquaculture on habitat use by wintering shorebirds in Tomales Bay, California. Calif. Dept. Fish and Game 82:160-174.

Moore, T.O. & J.J. Mello. 1995. Pacific Herring (*Clupea harengus pallasii*), studies and fisheries management in Tomales Bay, 1992-93, with notes on Humboldt bay and Crescent City area landings. Calif. Dept. Fish and Game Mar. Res. Div. Admin. Rpt 95-5.

Page, G. and D. Shuford. 2000. Southern Pacific Coast Regional Shorebird Plan, version 1.0. U.S. Shorebird Planning Council, U.S. Shorebird Conservation Plan. Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970.

Shuford, W.D., Page, G.W., Evens, J.G., and Stenzel, L.E. 1989. Seasonal abundance of waterbirds at Point Reyes: a coastal California perspective. *Western Birds* 20:137-265.

Smith, S.V. and J.T. Hollibaugh. 1997. Annual cycle and inter-annual variability of ecosystem metabolism in a temperate climate embayment. *Ecological Monographs* 67(4):509-533.

Spratt, J.D. 1989. The distribution and density of eelgrass, *Zostera marina*, in Tomales bay, California. California Department Fish and Game 75:204-212.

Thalman, S.B. 1993. The Coast Miwok Indians of the Point Reyes Area. Point Reyes National Seashore Association. 40pp.

Rooney, J. 1995. Determination of sedimentation rate in Tomales Bay, California: new ideas and old tracers. Thesis, Univ. of Hawaii, Honolulu, Hawaii, USA.

U.S. Fish and Wildlife Service. 1995. Proposed designation of critical habitat for the Pacific coast population of the Western Snowy Plover. Fed. Reg. 60:11767-11809.