

APPENDIX A

WESTERN MARIN COUNTY WATERSHEDS DESCRIPTIONS

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ACRONYMS USED IN THIS APPENDIX

ACOE	U.S. Army Corps of Engineers
ARS	Agricultural Research Service
BLTAC	Bolinas Lagoon Technical Advisory Committee
BMP	Best Management Practice
CDFG	California Department of Fish and Game
DHS	California Department of Health Services
DPR	California Department of Parks and Recreation
EA	Environmental Assessment
EHS	Marin County Environmental Health Services
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ESU	Evolutionarily Significant Unit
FishNet 4C	Fisheries Network of the Central California Coastal Counties
GGNRA	Golden Gate National Recreation Area
Gold Ridge RCD	Gold Ridge Resource Conservation District
LMER	Land Margin Ecosystem Research
MALT	Marin Agricultural Land Trust
MCOSD	Marin County Open Space District
MMWD	Marin Municipal Water District
MOU	Memorandum of Understanding
Marin RCD	Marin Resource Conservation District
NCRWQCB	North Coast Regional Water Quality Control Board
NOAA	National Oceanic and Atmospheric Administration
NMWD	North Marin Water District
NOAA Fisheries	National Marine Fisheries Service, a part of NOAA
NPS	National Park Service
NRC	National Research Council
NRCS	Natural Resource Conservation Service
PCI	Prunuske Chatham, Inc.

PL	Public Law
PRBO	Point Reyes Bird Observatory
PRNS	Point Reyes National Seashore
PWA	Pacific Watershed Associates
RWQCB	Regional Water Quality Control Board
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFZC	San Francisco Zen Center
SPAWN	Salmon Protection and Watershed Network
SPAWN	Salmon Protection and Watershed Network
Southern Sonoma County RCD	Southern Sonoma County Resource Conservation District
STRAW	Students and Teachers Restoring a Watershed
SWRCB	State Water Resources Control Board
TBA	Tomales Bay Association
TBAG	Tomales Bay Agriculture Group
TBSTAC	Tomales Bay Shellfish Technical Advisory Committee
TBWC	Tomales Bay Watershed Council
TMDL	Total Maximum Daily Load
UCCE	University of California Cooperative Extension
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

Western Marin County Watersheds Descriptions

ESTERO AMERICANO WATERSHED

GENERAL DESCRIPTION

The Estero Americano watershed is a coastal estuary at the base of Americano Creek. It forms a portion of the northern boundary between Marin and Sonoma counties where it drains into Bodega Bay. In some years, a seasonal sand bar at the mouth restricts tidal exchange. Periods of hypersalinity have been recorded in the Estero. When the mouth is open, the tidal influence ranges up to 4 miles upstream. Americano Creek, the sole tributary of the Estero, is ephemeral and generally dries up for 4 to 6 months between late spring and fall.

Watershed Area: 49 square miles (31,360 acres)

Channel Length:

Americano Creek: 7 miles (11.3 kilometers)

DOMINANT OR INTERESTING HABITATS

The Estero Americano contains 301 acres of open water and 412 acres of wetland habitat, including mudflats, seasonal brackish marsh, and freshwater marsh. A mudflat in the middle reach of the Estero “strongly limits exchange between the upper and lower Estero.” (Commins, et al., 1990). The California Department of Fish and Game (CDFG) has identified Estero Americano and its southern neighbor, Estero de San Antonio, as one of the most significant habitat areas in the state. Streamside habitat along Americano Creek consists of grazed pastures with few trees interspersed with dense willow thickets. Coastal oak woodland occurs in the upper watershed.

SPECIAL SPECIES

Special status species: Northwestern pond turtle, steelhead, Myrtle silverspot butterfly, tidewater goby, and tricolored blackbird have been observed in the watershed. Special status plants that are known to occur include showy Indian clover and Point Reyes checkerbloom.

Other species of interest: Seventy-one species of water and marsh-associated birds, 66 species of terrestrial birds (Madrone, 1977), and 44 marine and freshwater fish species (Commins, et al., 1990). have been identified in and surrounding the Estero. Over 70 species



of benthic invertebrates and 30 species of epibenthic invertebrates were collected in the Estero in the late 1980s (Commins, et al., 1990).

LAND USE

Historically, the Estero Americano was an important area for Coast Miwok who inhabited the beaches along the mouth. From 1865 to 1982, the area was used extensively for agriculture, including corn, beets, potatoes, onions, oats, and hay. In the late 1800s, the Estero Americano was reportedly a navigable body of water, and products such as potatoes were shipped to market. Today, land use within the watershed is primarily dairy operations, beef and sheep grazing, and residences. The small communities of Valley Ford and Bloomfield are within the Sonoma County portion of the watershed.

WATERSHED PLANNING AND MANAGEMENT

Extensive background information on the Estero Americano has been documented. In 1977, CDFG published “The Natural Resources of Esteros Americano and de San Antonio,” a synthesis of information accumulated on wetland areas for the Coastal Wetland Series. As part of the Santa Rosa Subregional Water Reclamation System Long-term Studies, additional assessments were completed on the Estero Americano. These included evaluations of aquatic habitats, wetlands, fish and wildlife communities, discharge criteria, streamflows, and additional resources within the Estero Americano watershed.

The *Sonoma County Coastal Wetland Enhancement Plan*, an erosion survey of the Estero Americano and several coastal watersheds to the north, was completed in 1987 by Circuit Rider Productions for the Gold Ridge Resource Conservation District (Gold Ridge RCD) (State Coastal Conservancy and Circuit Rider Productions, 1987). With funding from the State Coastal Conservancy, Gold Ridge RCD undertook repair of many of the erosion sites identified. Gold Ridge RCD continues to be active in the watershed, sponsoring workshops to assist agricultural landowners in developing ranch plans and implementing projects to improve water quality and reduce erosion.

IMPORTANT WATERSHED ISSUES

- 1. Water quality.** The Estero Americano is identified as an impaired waterbody by the North Coast Regional Water Quality Control Board (NCRWQCB) due to nutrients and sedimentation/siltation. As in its southern neighbor, the Estero de San Antonio, significant historic erosion occurred within the watershed resulting in an approximately 25 percent loss in tidal prism. Current watershed enhancement efforts have focused on reducing polluted runoff from agricultural operations and repairing remaining sites of accelerated erosion.
- 2. Agricultural viability.** As in most of western Marin County, agricultural producers are struggling to stay profitable (University of California Cooperative Extension [UCCE], 2003). This is especially true for sheep and beef producers within the watershed.
- 3. Invasive non-native plants.** Invasive non-native plant species are displacing native vegetation and are reducing the extent and quality of habitats for native species.

4. **Estero function.** Historic activities in the watershed have contributed excessive amounts of sediment to the Estero. The change in the shape of the Estero in turn affects tidal circulation, nutrient circulation, and salinity.

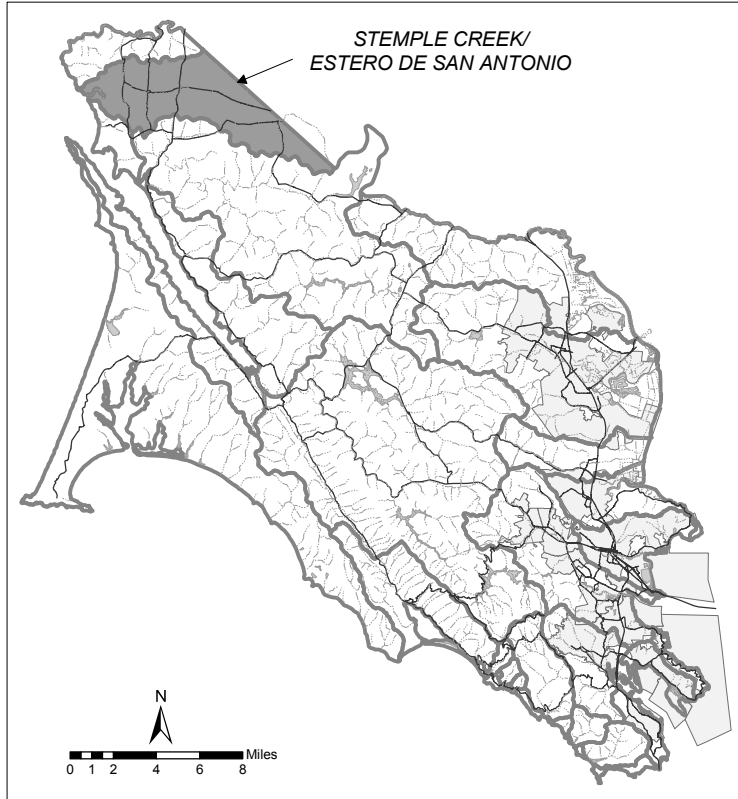
WATERSHED NEEDS

1. Ongoing funding for landowners to implement and manage habitat restoration and water quality improvement projects. Natural Resource Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) funds and grants received by Gold Ridge RCD have provided the primary support for implementation projects.
2. Effectiveness monitoring and maintenance of completed projects.
3. Support with and simplification of permits for habitat enhancement and agricultural operations.
4. Updated assessment of Estero function.

STEMPLE CREEK/ESTERO DE SAN ANTONIO WATERSHED

GENERAL DESCRIPTION

The Stemple Creek watershed begins just west of Petaluma and empties into the Pacific Ocean through the Estero de San Antonio. It is characterized by grassy, rolling hills with grazing-based agriculture. The towns of Two Rock and Fallon once provided basic services to local ranchers, but little remains of either except a few buildings and a sense of place. The



drainage is cut almost exactly in half by the Sonoma-Marín county line. The historic riparian corridor has been lost in much of the upper watershed, although restoration efforts have re-established significant reaches of riparian vegetation.

The watershed changes sharply from Highway 1 west. Slopes increase in steepness, and coastal scrub and dense stands of native perennial grasses take over the hills. The Estero de San Antonio, a small coastal lagoon, is part of the Gulf of the Farallones National Marine Sanctuary and is also included in the Central

California Coast Biosphere Reserve (UNESCO Man and Biosphere Program). A sandbar often closes the mouth of the Estero in the summer or early fall. It remains closed until winter rains with heavy runoff break open the sandbar. Local residents used to blast open the mouth if hypersaline conditions developed within the Estero.

Watershed Area: 50 square miles (32,000 acres)

Channel Length:

Mainstem upstream of Highway 1: 14.6 miles (23.5 kilometers)

Mainstem below Highway 1: 9.0 miles (14.5 kilometers)

DOMINANT OR INTERESTING HABITATS

The land draining into Stemple Creek is largely grassland. Willows have been re-established along parts of the mainstem and tributary streams; coastal oak woodland can still be found along some of the higher tributaries. Eucalyptus, planted in rows for windbreaks and fuel, is now one of the most common trees.

Stemple Creek itself was once a marginal coho salmon and steelhead trout stream. A small dam for livestock built on the Button Ranch in the early 1960s closed off the last available spawning areas. Residents tell of dense flocks of waterfowl, but, as in most areas along the Pacific flyway, their numbers have dropped precariously. Farm ponds, especially those with shallow edges, now provide some of the best remaining habitat for waterfowl, northwestern pond turtles, and other aquatic species.

CDFG has identified the Estero de San Antonio and Estero Americano as one of the most significant habitat areas in the State. It is a remarkable mosaic of intermingling habitat types—densely wooded riparian ravines, saltgrass areas, mudflats, eelgrass beds, and small freshwater ponds. The area between the two Esteros contains extensive areas of native coastal terrace prairie.

SPECIAL SPECIES

Special status species: California freshwater shrimp, northwestern pond turtle, California tiger salamander, tidewater goby, Myrtle silverspot butterfly, and California red-legged frog have been observed in the watershed. Special status plants known to occur include Baker's larkspur, Blasdale's bent grass, showy Indian clover, and yellow larkspur.

Other species of interest: River otters have been observed in the Marin County portion of Stemple Creek east of Highway 1. Eelgrass beds in the Estero de San Antonio provide nursery habitat for Dungeness crabs. The Estero is used by over 40 species of waterfowl and is an important winter feeding area for migrating birds. Golden eagles are known to nest in the upper watershed.

LAND USE

Land use in the watershed is almost exclusively agricultural. From the beginning of European settlement to the mid 1900s, the watershed had mixed farming with small livestock herds and large areas of land cultivated for barley, wheat, vegetables, and potatoes. Poultry and egg production was an important part of the local economy from the 1930s through World War II. Today 90% of the watershed is used for livestock grazing, mostly beef and sheep ranches in the Marin County portion with a half dozen dairies.

Although the Estero itself is part of the Gulf of the Farallones National Marine Sanctuary, the land surrounding it is all privately owned. Since access across land is by permission only, recreational use is limited. There are no cities or towns in the watershed.

WATERSHED PLANNING AND MANAGEMENT

In 1994, the Marin and Southern Sonoma County Resource Conservation Districts (Marin RCD and Southern Sonoma County RCD, respectively) completed an Enhancement Plan for the Stemple Creek/Estero de San Antonio watershed. The plan was guided by a community-based advisory committee and established 10 major goals with recommendations for implementation. They included the following:

Enhancement Recommendations

1. Encourage the local community to take the lead in developing and implementing enhancement projects.
2. Assist agricultural producers with practices that promote the conservation and enhancement of natural resources.
3. Reduce pollutants entering Stemple Creek and the Estero de San Antonio.
4. Reduce soil erosion.
5. Encourage environmentally-sound management of rangeland.
6. Conserve and enhance existing natural habitats.
7. Restore the riparian corridor.
8. Develop a long-term monitoring program.
9. Support agriculture as the major land use in the watershed.
10. Request additional investigation by the Santa Rosa Subregional Water Reclamation System on the potential impacts of the proposed West County Alternative on agriculture and natural resources.

The plan's appendices include a biological assessment of the Estero de San Antonio, a report on watershed vegetation and habitat restoration, an erosion and sediment study, a geomorphic and hydrodynamic analysis of the Estero, a report on water resources, and a summary of interviews with watershed residents.

Implementation of the enhancement plan has been a decentralized effort. Although the two RCDs have led the way with grant-sponsored projects, local landowners have also implemented many measures on their own and with support from NRCS. The Shrimp Club, a nationally-recognized project of Brookside School in San Anselmo, began its stream restoration work in Stemple Creek. The Shrimp Club and its successor, STRAW (Students and Teachers Restoring a Watershed) have together replanted native riparian vegetation along 8 miles of mainstem Stemple Creek and its tributaries.

The two RCDs and NRCS are currently working to bring funding under the authority of the Watershed Protection and Flood Protection Act (Public Law [PL] 566) into the watershed to improve water quality. NRCS completed a Draft Watershed Project Plan and Environmental Assessment in 2002. A steering committee of landowners and agency representatives provided direction to NRCS staff during the planning process. If approved, the PL 566 funding would assist with upgrading waste management systems on approximately 16 dairies, restoring riparian habitat along 33 miles of mainstem and tributary streams, and providing treatment, including erosion control measures, on 13,000 acres of rangeland. Marin RCD and NRCS are working with Sustainable Conservation on the development of the Marin Coastal Watershed and Permit Program. In addition, the U.S. Department of Agriculture's (USDA) Agricultural Research Service (ARS) and NRCS conducted a Historical Sediment Study in 2001-2002.

IMPORTANT WATERSHED ISSUES

1. **Nutrients.** In 1990, Stemple Creek was listed on the federal Environmental Protection Agency's (EPA) 303(d) list as an impaired waterbody due to excessive nutrients. The NCRWQCB adopted a Total Maximum Daily Load (TMDL) and Attainment Strategy for the watershed in December of 1997. The TMDL set limits for sediment, dissolved oxygen, total and un-ionized ammonia, and temperature; it recommended a time schedule and practices to achieve these limits (NCRWQCB, 1997). A TMDL for nutrients in Stemple Creek has been adopted into the Basin Plan for the North Coast. CDFG monitoring data show that water quality in Stemple Creek has steadily improved since the early 1990s. CDFG attributes this to improved awareness on the part of dairy producers and efforts to restrict direct livestock access to creeks. However, they also note that a single spill of dairy waste can have a catastrophic effect on aquatic organisms (CDFG, 2000; CDFG, 2001).
2. **Groundwater quality.** Many of the wells serving Stemple Creek residents have been dug into the alluvium along Stemple Creek, particularly in the upper end of the watershed. The water quality from these wells is closely tied to the surface water quality. Several have tested high in nitrates.
3. **Habitat restoration.** Habitat restoration, particularly along the riparian corridor, continues to be a priority in the watershed. The 1994 Enhancement Plan stated that only 20% of the watershed's stream channels had woody riparian cover. Since that time, efforts by landowners, the RCDs, and STRAW have led to approximately 12 miles of riparian fencing and revegetation. UCCE, with technical and financial assistance from NRCS, has developed a riparian pasture demonstration with local beef ranchers.
4. **Estero function.** In the geomorphic and hydrodynamic analysis of the Estero de San Antonio prepared for the 1994 Enhancement Plan, Williams (1993) found that 80% of the lagoon's volume has been lost through historic sedimentation. This reduction in tidal prism has led to an increase in the frequency and duration of lagoon closures from the sandbar that forms at the mouth. Evidence from the 1992/93 winter rains indicated that natural scouring of the lagoon bed could occur over time if sediment delivery to the Estero is reduced.
5. **Erosion and sedimentation.** The NCRWQCB has recommended that Stemple Creek's 303(d) listing be updated to include sediment as a cause of impairment (NCRWQCB, 2001). The Enhancement Plan states that over 80% of the accelerated erosion comes from the lower watershed with large gully systems as the primary source. Gully stabilization projects have been implemented by local landowners with support from the RCDs and NRCS, but additional work is needed.
6. **Agricultural viability.** As in most of western Marin County, agricultural producers are struggling to stay profitable (UCCE, 2003).
7. **Sediment and water quality effects from Sonoma County landfill.** The Sonoma Central Solid Waste Disposal Site, the central landfill for Sonoma County, is perched at the very top of the Stemple Creek watershed. In 1995, the NCRWQCB issued a Cleanup and Abatement Order because of excessive sediment and leachate leaving

the landfill and entering the watershed. Since that time, the landfill has completed significant erosion control and other work to contain runoff from the site.

WATERSHED NEEDS

1. Support for the PL 566 project application. A vigorous effort by local legislators, Marin County, and conservation groups could help secure funding.
2. Ongoing funding for landowners to implement and manage habitat restoration and water quality improvement projects. NRCS EQIP funds and grants received by Marin RCD, Southern Sonoma County RCD, and STRAW have provided the primary support for implementation projects.
3. Effectiveness monitoring and maintenance of completed projects.
4. A bathymetric and topographic survey of the Estero de San Antonio coupled with a monitoring program to define closure and opening events, to measure peak flood flows and low summer flows, and to determine if net scour or deposition are occurring within the lagoon.
5. Monitoring of groundwater quality.
6. Development of a Safe Harbor program. Safe Harbor programs are designed to protect landowners who restore habitat for endangered or threatened species from then incurring more stringent regulatory constraints as a direct result of their enhancement activities.
7. Support with and simplification of permits for habitat enhancement and agricultural operations.
8. Continue to educate and encourage farmers about restricting livestock access to creeks.

EAST AND WEST AREA OF THE TOMALES BAY WATERSHED

GENERAL DESCRIPTION

Many of the watersheds (Walker, Lagunitas, and the smaller east and west shore tributaries) addressed in this Appendix drain into Tomales Bay. This section presents an overview of bay habitat plus issues and needs that are specific to Tomales Bay itself.

Watershed Area: 215 square miles (137,600 acres)
30 miles of shoreline ringing the bay
Bay is 17.4 square miles (28 square kilometers)

DOMINANT OR INTERESTING HABITATS

Tomales Bay has intertidal, subtidal, and benthic habitats as well as dunes, mud flats, salt marshes, and freshwater marshes (TBWC, 2003).

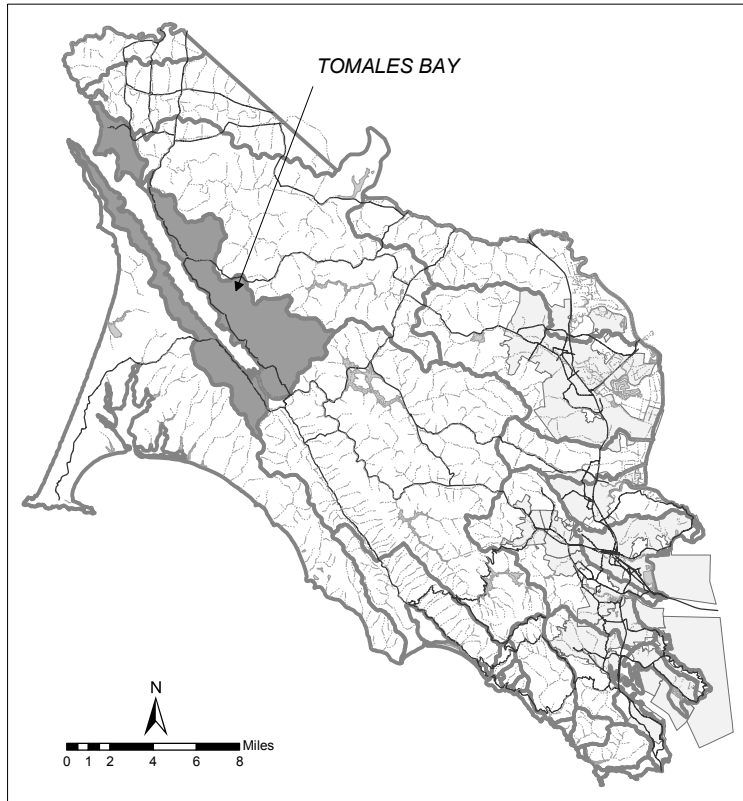
Large eelgrass beds grow in the northern half of the bay with smaller ones lining the eastern shore. Small islands provide roosts for birds and haul out areas for marine mammals. Tomales Bay is included in the Gulf of the Farrallones National Marine Sanctuary. It is also part of the Central California Coastal Biosphere Reserve and the Western Hemisphere Shorebird Reserve Network (TBWC, 2003).

In 2002, the U.S. Fish and Wildlife Service (USFWS) designated Tomales Bay as a Wetland of International Importance (Tomales Bay Watershed Council [TBWC], 2003).

SPECIAL SPECIES

Special status species: Tomales Bay and its watershed support over 900 species of plants and animals, including many that are listed as threatened or endangered or are identified as species of concern by state and federal agencies. Among the special status species are coho salmon, Chinook salmon, steelhead trout, tidewater goby, Tomales roach, western snowy plover, California brown pelican, Point Reyes jumping mouse, Steller sea lion, clapper rail, and California least tern.

Other species of interest: Approximately 45% of all bird species in North America have been recorded in the adjacent Point Reyes peninsula, while as many as 50,000 waterbirds may depend on Tomales Bay during winter (Kelly & Tappen, 1998). Approximately 300-600



harbor seals live in Tomales Bay. Gray whales forage at the mouth of the bay and at times enter the bay (USDA, 2001). Pacific herring runs support a small commercial fishery. Tomales Bay has the second largest mariculture industry in the state.

WATERSHED PLANNING AND MANAGEMENT

Concern about the water quality of Tomales Bay surfaced in the early 1960s when studies showed high fecal coliform counts in the winter months (Smith, et al., 1971). Subsequent studies (Sharpe, 1974; Jarvis, et al., 1978; Musselman, 1980) confirmed that fecal coliform levels rose following heavy rains and concluded that “a mixture of rural and livestock nonpoint point pollution was the most likely source of high bacterial counts in the bay.” (TBWC, 2003). In 1993, the California Legislature passed the Shellfish Protection Act, which required the appropriate RWQCB to form a technical advisory committee for any commercial shellfish growing area that is determined to be threatened by water quality. The Tomales Bay Shellfish Technical Advisory Committee (TBSTAC) was formed in 1994 and undertook a two-year investigation into sources of non-point pollution (TBSTAC, 2000). During the 1990s, the National Science Foundation’s Land Margin Ecosystem Research (LMER) program implemented an extensive study on water quality, bay water mixing, and nutrient dynamics. The San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) is currently investigating the impacts of mercury washed from the Gambonini Mine in the Walker Creek watershed into Tomales Bay. The National Park Service (NPS), UCCE, California Department of Health Services (DHS), Audubon Canyon Ranch, and many universities and private researchers have also contributed to the understanding of the bay through studies and assessments.

The construction of Soulajule Dam on Walker Creek and the raising of Peters Dam on Kent Lake, followed by the intense winter storms of the early 1980s, galvanized community concern around increasing sedimentation of Tomales Bay and declining salmonid runs in the tributary streams. The State Coastal Conservancy implemented their Program for Restoring Tomales Bay in 1984 and funded many projects to reduce sedimentation and repair streams and wetlands damaged by the storms.

Many community groups, individual residents, and agencies have worked together to protect and restore Tomales Bay. The Environmental Action Committee, Tomales Bay Association, Inverness Foundation, Audubon Canyon Ranch, kayak companies, and oyster growers have worked on restoration and education efforts. The Marin Agricultural Land Trust (MALI) holds conservation easements on 26,000 acres in the Tomales Bay watershed (TBWC, 2003). Marin RCD and Point Reyes National Seashore (PRNS) have undertaken major restoration programs to improve water quality and restore habitat. UCCE spearheaded the Marin County Coastal Enhancement Program in 1995 and has recently initiated a pilot program to restore native oysters in the bay. UCCE has also provided ongoing support to Tomales Bay Agriculture Group (TBAG), a group of agricultural operators working to improve water quality and stream resources on their ranches. NRCS has provided financial and technical assistance to watershed landowners to implement Best Management Practices (BMPs). PRNS, Tomales Bay State Parks, and Marin County manage recreational use of the bay.

The Tomales Bay Watershed Council (TBWC) was formed in 2000 with 24 members representing residential and community groups, agricultural interests, environmental groups, maricultural interests, recreational interests, and public agencies. The Tomales Bay Draft Watershed Stewardship Plan, completed by TBWC in 2003, identifies the following goals, objectives, and tasks:

Goal A. Ensure water quality in Tomales Bay and tributary streams sufficient to support natural resources and sustain beneficial uses.

Objective 1: Improve water quality in Tomales Bay and tributary streams through reductions in sediment, pathogen, mercury, and nutrient loading – with the specific objectives of removing Tomales Bay from the 303(d) list of impaired waterbodies and reducing shellfish harvest closures by increasing the rainfall threshold and reducing the minimum duration of shellfish harvest closures.

Objective 2: Restore and maintain adequate high quality freshwater flow to Tomales Bay and tributary streams.

Objective 3: Reduce potential for other contaminants in Tomales Bay.

Goal B. Restore and preserve the integrity of natural habitats and native communities.

Objective 1: Restore and protect populations of native species in the Tomales Bay watershed.

Objective 2: Control invasive non-native species in the Tomales Bay watershed.

Objective 3: Restore and protect habitats of native species in the Tomales Bay watershed.

Objective 4: Restore and protect the hydrologic integrity of the Tomales Bay watershed.

Goal C. Develop strategies to implement the Stewardship Plan and to protect the watershed.

Task 1: Encourage comprehensive planning to address watershed issues and facilitate interagency coordination and cooperation.

Task 2: Monitor implementation of the plan. Develop recommendations for public policies and programs to achieve the goals of the plan.

Task 3: Define the role of TBWC in helping to ensure implementation and achievement of plan goals.

Task 4: Involve and educate the public to become watershed stewards.

- Encourage public awareness and participation in developing and implementing a watershed plan.
- Promote and coordinate watershed education.
- Promote volunteer efforts.
- Promote watershed stewardship.

IMPORTANT WATERSHED ISSUES

1. **Water quality.** Tomales Bay is identified by the SFBRWQCB as impaired for sedimentation, nutrients, pathogens, and mercury. Current efforts to reduce pollution are focused on human pathogen sources from failing septic systems and inadequate facilities for recreational users, animal waste from agricultural operations, mercury-contaminated sediments from the Gambonini Mine, and sediment from erosion throughout the watershed.
2. **Water quantity.** MMWD reservoirs “now capture about 40% of the freshwater that historically flowed into the bay” (TBWC, 2003). Irrigation systems, small dams, and domestic water supply systems also reduce flow. Freshwater is important in the bay for diluting pollutants, moderating salinity levels, and maintaining the bay’s natural circulation patterns.
3. **Habitat protection and restoration.** Diverse and well-functioning habitat is key to maintaining the population sizes and number of species of Tomales Bay plants and wildlife. Control of invasive non-native plants and animals is an important component of habitat protection.
4. **Balancing recreation with healthy habitat.** Tomales Bay is a popular destination for camping, fishing, kayaking, clamming, and simply enjoying the area’s beauty. Balancing visitor use with protecting sensitive species, keeping the water clean, and maintaining the bay’s serenity is a formidable challenge.
5. **Maricultural viability.** When water quality in the bay exceeds certain standards, DHS prohibits the harvesting of shellfish, which results in a direct economic impact on the oyster industry.
6. **Education and outreach.** The Tomales Bay Stewardship Plan states that “an aggressive public outreach and education program directed at residents and visitors to the watershed will be essential for the reduction of the impacts of ever-intensifying patterns of usage.”
7. **Coordination of watershed efforts.** With so many agencies, interest groups, residents, and visitors involved in Tomales Bay, coordination of monitoring, planning, implementation, and education efforts is vital.

WATERSHED NEEDS

The Tomales Bay Watershed Stewardship Plan contains the following 4 actions:

- Action 1.0** Develop a coordinated and comprehensive water quality monitoring plan for Tomales Bay and tributary streams.

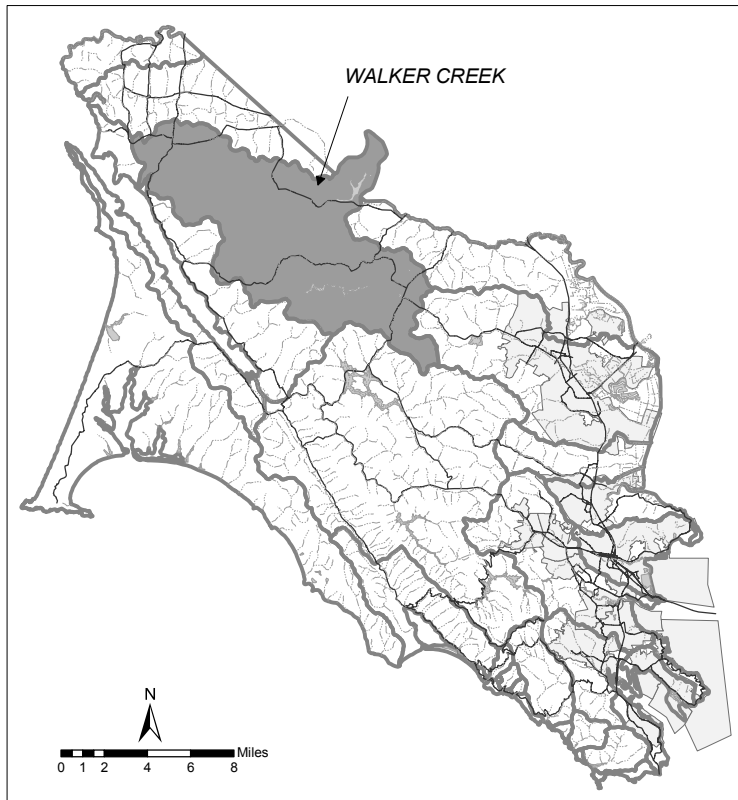
- Action 2.0** Support implementation of practices and projects that will reduce nonpoint sources of water pollution and enhance habitats in Tomales Bay and its watershed.
- Action 3.0** Assess, protect and restore key habitats for species of local interest.
- Action 4.0** Promote and support public outreach and education about Tomales Bay and its watershed.

Each action is then followed by specific recommendations organized by priority and urgency. The full “Framework for Watershed Stewardship” section of the Stewardship Plan is included as Appendix E herein.

TOMALES BAY – WALKER CREEK SUBWATERSHED

GENERAL DESCRIPTION

Topography in the 76-square mile Walker Creek watershed ranges from 1,500 feet to sea level where the creek empties into Tomales Bay just south of its mouth. The northern tributaries, Keyes Creek and Chileno Creek, flow through wide valleys with gentle, grassy hills. The upper watershed is much more rugged with extensive areas of coast live oak forest.



The watershed contains a 220-acre natural lake, Laguna Lake, at the top of Chileno Valley. Soulajule Reservoir, constructed in 1968 in Arroyo Sausal and enlarged in 1980, is managed by the Marin Municipal Water District (MMWD).

Since European settlement, the land use has been almost exclusively agricultural. Cattle ranching is the predominant industry, along with a few sheep ranches and dairies. Vineyard development has spread into the eastern edge of the watershed. The only concentrated development in the watershed occurs in the small town of Tomales.

Watershed Area: 76 square miles (48,640 acres)

Subwatershed area of major tributaries:

Chileno Creek: 19.8 square miles (12,672 acres)

Salmon Creek: 5.1 square miles (3,264 acres)

Keyes Creek: 4.7 square miles (3,008 acres)

Arroyo Sausal: 7.6 square miles (4,864 acres)

DOMINANT OR INTERESTING HABITATS

The Walker Creek watershed is a mosaic of grassland, mostly annual but grading towards perennial towards the coast, valley foothill riparian forest, coastal scrub, and oak bay woodland. A small stand of redwood trees is growing in the upper reaches of the Arroyo Sausal drainage. Laguna Lake in Chileno Valley is a shallow natural lake. Officially classified as a vernal pool, it retains water year round although it diminishes significantly in area during

the summer. The lake is used extensively for migrating and breeding waterfowl. Wetlands at the mouth of Walker Creek are also important habitat for waterfowl.

Mainstem Walker Creek contains areas of thick riparian forest, some of which are contiguous to upland forest. Other areas, particularly in the Chileno and Keyes Creek subwatersheds, have little mature riparian forest remaining, although efforts are underway to re-establish native riparian vegetation.

SPECIAL SPECIES

Special status species: Steelhead trout, coho salmon, California freshwater shrimp, California red-legged frog, yellow-legged frog, Tomales roach, tidewater goby, and northwestern pond turtle have been observed in the watershed. Special status plants known to occur include Baker's larkspur and checker bloom.

Other species of interest: The Walker Creek grasslands are excellent places to find raptors including Swainson's hawks, ferruginous hawks, and golden eagles. Restored riparian corridors in Chileno Valley attract a variety of neotropical songbirds species, including warblers, vireos, flycatchers, and thrushes.

LAND USE

Ninety-five percent of the Walker Creek watershed is in private ownership. MMWD owns land around Soulajule Reservoir, and the Marin County Office of Education operates the Walker Creek Ranch as an outdoor education facility.

Since European settlement, the watershed has been used for food production. Marin County was a primary source of beef and butter for early San Francisco. Potatoes, barley, and other grains were also grown in the watershed. From the 1850s into the early 1870s, potatoes were loaded onto shallow barges in Keyes Creek immediately downstream of the present Highway 1 bridge (UCCE, 1995). The current small size of the channel at this location, more suitable for a canoe than a barge, is dramatic evidence of significant watershed change over the past 150 years. Historic sedimentation has been linked to the disturbance of the native grassland through cultivation, change in species composition as introduced annual grasses gained dominance, and concentrated livestock use (Zumwalt, 1972).

Mercury was mined at three sites in the Walker Creek watershed after World War II. The largest mine, at the Gambonini Ranch near the confluence of Salmon Creek and mainstem Walker Creek, closed in 1970. The severe storm of January 1982 destabilized the mine site and sent massive amounts of mercury-laden sediment into Walker Creek. The federal EPA, working with the SFBRWQCB, completed remediation of the site in 2000.

Current land use in the watershed is almost exclusively agricultural with the exception of residential use in Tomales. Beef is the primary agricultural product. Few dairies are left in the watershed. One vineyard has been established in the Salmon Creek subdrainage, a small organic apple orchard has been planted in Chileno Valley, and one farm is producing organic strawberries.

WATERSHED PLANNING AND MANAGEMENT

MMWD commissioned several studies to assess the impact of raising Soulajule Dam on the Walker Creek fishery. In addition to recommending summer releases to sustain year round flow, Kelley (1976) found that streambed sedimentation contributed to the decline of salmonid populations. However, he identified “the accelerated runoff and intensification of the flash characteristics of floods” caused by overgrazing as the major culprit. After the big storms of the early 1980s, Bratovich (1984) and Rich (1989) identified embedded gravels and cobbles as a major factor in limiting salmonid populations. Rich also strongly recommended incorporating habitat and fishery monitoring into restoration activities.

The Marin RCD commissioned an early hydrology study on the Lagunitas and Walker Creek watersheds (Nolte, 1965). The study estimated peak flood flows at 20 stations along Walker Creek and estimated annual average sediment yields to be 250 to 300 tons per square mile. In 1986, Marin RCD received \$1 million in funding as part of the State Coastal Conservancy’s Tomales Bay Enhancement Program to repair 14 large-scale erosion sites. At that time, over \$6 million of erosion control projects were identified, not including landowner outreach, contract management, design, or permitting costs (Prunuske Chatham, Inc., 1986).

The Walker Creek Watershed Enhancement Plan (Prunuske Chatham, Inc. [PCI], 2001), a project of Marin RCD, is focused around five landowner goals developed through an intensive community outreach effort:

- A. Support a strong agricultural economy.
- B. Provide clear, factual information on the issues facing Walker Creek.
- C. Help landowners implement land management practices that support a healthy environment.
- D. Provide education for the public.
- E. Work with regulatory agencies to reduce the burden on the watershed’s private landowners.

The plan included an erosion site inventory and a riparian habitat assessment (Prunuske Chatham, Inc., 2001). Lands above Soulajule Reservoir and Laguna Lake were excluded because the survey focused on salmonid habitat. Of the 196 erosion sites inventoried, 30% rated a high priority based on impacts to fisheries resources, erosion potential, activity, and access. Marin RCD is currently working with landowners, NRCS, and grant funders to implement and manage the erosion control and riparian habitat enhancement recommendations.

Additional erosion control work has been performed by private landowners, as well as the Marin Motorcycle Club on the Gambonini Ranch and the Marin County Office of Education on the Walker Creek Ranch. NRCS continues to provide technical assistance and cost-share programs, particularly EQIP funds that encourage landowners to implement best management practices. UCCE offers ongoing range management education and advice to Walker Creek watershed ranchers. UCCE staff members are also working closely with

TBAG, which includes several Walker Creek watershed agricultural landowners, to monitor water quality on participating dairies and to implement measures to reduce targeted pollutants.

The SFBRWQCB is continuing to monitor mercury movement through sediments and bioaccumulation in Walker Creek and Tomales Bay. In addition, Marin RCD, NRCS, and the Point Reyes Bird Observatory (PRBO) employed a Riparian Habitat Conservationist for almost 2 years to encourage restoration and to monitor changes in songbird populations after restoration.

IMPORTANT WATERSHED ISSUES

1. **Water quality.** Walker Creek is listed as an impaired waterbody for nutrients, sediment/siltation, and heavy metals (mercury). Pathogens, primarily E. coli, are also a concern because of their impact on the Tomales Bay shellfish industry. CDFG has also expressed concern over the impacts of high water temperatures on salmonids. TBAG, UCCE, NRCS, and Marin RCD have made significant progress in working with dairies to reduce nutrient and pathogen levels. Marin RCD and NRCS have implemented an aggressive program of riparian restoration to improve water quality through creating buffers for rangeland runoff, reducing soil erosion, and cooling water temperature.
2. **Riparian habitat restoration.** In addition to providing water quality benefits, riparian restoration improves habitat for salmonids and many other aquatic and terrestrial wildlife species.
3. **Range management.** Productive, healthy grasslands are vital to the agricultural economy, good water quality, and biodiversity. UCCE and NRCS provide technical assistance to Walker Creek landowners in planning and implementing range management practices. Emphasis is placed on improving distribution of livestock to reduce prolonged concentrated utilization of grassland and riparian areas and to provide periods of rest for improved grassland.
4. **Agricultural viability.** The dairy industry has been steadily declining in the Walker Creek watershed. As in most of western Marin County, agricultural producers, particularly livestock growers, are struggling to stay profitable. Diversification, marketing, and relief from regulatory costs are important watershed issues.
5. **Mercury.** Elevated levels of mercury have been found in sediment in the Walker Creek delta (Whyte, 2000). Although the largest mercury source, the Gambonini mine, has been stabilized, the mercury remains in sediment moving through the stream system and into Tomales Bay. High mercury levels were also found in fish collected from Tomales Bay (Whyte and Kirchner, 2000). More investigation is needed to directly relate the mercury concentrations in Tomales Bay sediments with the mercury in the fish tissue. Nonetheless, managing the mercury-contaminated sediment within the Walker Creek system for the least possible impact on downstream resources and human health is a critical issue for the Walker Creek watershed.

6. **Landowner participation.** Because there is so little publicly managed land within the watershed, enhancement efforts and ongoing good stewardship are dependent on the willing participation of private landowners.
7. **Invasive non-native plants.** Invasive non-native plant species (i.e., distaff, star and other thistles, scotch broom, and gorse) are displacing native vegetation and are reducing the extent and quality of habitats for native species.

WATERSHED NEEDS

1. Continued funding of efforts to improve water quality, control erosion, and enhance habitat. Current target areas include the Chileno Creek subwatershed, Laguna Lake, the Keyes Creek subwatershed, and large-scale streambank erosion on mainstem Walker Creek upstream of the Highway 1 bridge.
2. Effectiveness monitoring and maintenance of completed projects.
3. Support with and simplification of permits for habitat enhancement and agricultural operations.
4. Limiting factors analysis for steelhead and coho. Monitoring of salmonid habitat and populations.
5. Fluvial geomorphic analysis to provide a scientific basis for selection, design, implementation, and monitoring of future fisheries habitat enhancement and sediment reduction projects. Marin RCD has received a grant from the State Water Resources Control Board (SWRCB) to conduct this analysis.
6. A monitoring program for sediment, water temperature, and other water quality parameters, as well as of neotropical songbird use of riparian corridors. Primary partners in developing and implementing the program should be UCCE, TBAG, PRBO, and other watershed landowners. The program should include instruction in self-monitoring for landowners.
7. Continued support of outreach and stewardship education efforts, including landowner workshops, tours, watershed-specific informational materials, and Marin RCD's watershed newsletter. Specific landowner education needs include managing grazing in riparian pastures, weed management, and permitting.
8. Ongoing riparian habitat mapping to measure restoration accomplishments and identify gaps.
9. Development of practical and effective TMDLs and attainment strategies.
10. Control of invasive, exotic plants.

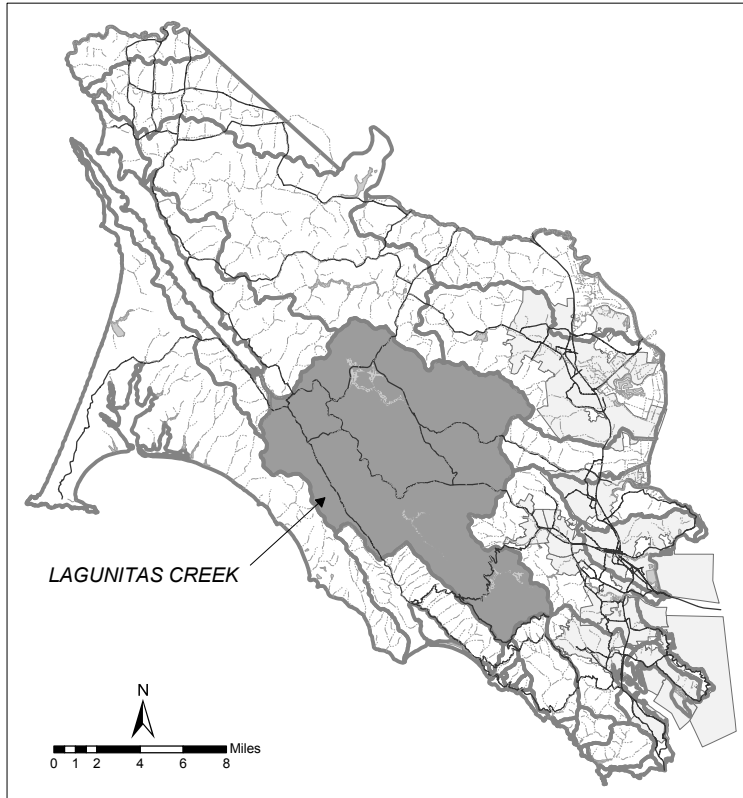
TOMALES BAY – LAGUNITAS CREEK SUBWATERSHED

GENERAL DESCRIPTION

The Lagunitas Creek watershed is the largest drainage into Tomales Bay. Its major tributaries include San Geronimo Creek, Devils Gulch, Cheda Creek, Nicasio Creek, and Olema Creek. At the southwestern edge of the watershed, Olema Creek flows in nearly a straight line through a rift valley along the San Andreas Fault zone.

Over half of the watershed is in public ownership. The upper part is owned and managed by MMWD for water supply. Samuel P. Taylor State Park is completely within the watershed boundaries. PRNS and Golden Gate National Recreation Area (GGNRA) manage extensive holdings north and west of Samuel P. Taylor State Park and in the Olema Creek and Bear Creek subdrainages.

The Lagunitas Creek watershed holds many small rural communities — Woodacre, San Geronimo, Forest Knolls, and Lagunitas in San Geronimo Valley, as well as Nicasio, Olema, and Point Reyes Station. It has been the focus of salmonid restoration efforts for over twenty years. Coho salmon populations have rebounded from tens of fish spawning in the early 1980s to an average of 500 adults in the past few years. The creek system also supports a robust population of steelhead trout. Chinook, and chum salmon have been observed in small numbers in recent years.



Watershed Area: 103 square miles (65,920 acres)

Subwatershed area of major tributaries:

Olema Creek: 14.5 square miles (9,280 acres)

Nicasio: 37 square miles (23,680 acres)

San Geronimo: 9.3 square miles (5,952 acres)

Reservoirs: Kent, Alpine, Bon Tempe, Lagunitas, and Nicasio

DOMINANT OR INTERESTING HABITATS

The upper Lagunitas Creek watershed is steep and fairly heavily forested. Parts of San Geronimo Creek, Olema Creek, and mainstem Lagunitas Creek through Samuel P. Taylor State Park have areas of dense redwood growth and cool water year-round. These reaches provide spawning and rearing habitat for salmonids. Except for a few open areas, most of Lagunitas Creek downstream of the state park is thickly forested with willows and alders. The valley opens below Tocaloma Bridge to broader, more gently sloping hills that are primarily used for livestock grazing.

Plant communities include coast redwood forest, mixed evergreen forest, oak woodland, non-native grassland, northern coastal scrub, coastal riparian forest, chaparral, freshwater marsh, and coastal salt marsh. Roy's Redwoods, a Marin County Open Space District (MCOSD) property in San Geronimo Valley, retains a beautiful grove of old growth redwood trees, as do parts of Samuel P. Taylor State Park. An area of serpentine soils on Carson Ridge above Woodacre and San Geronimo supports a stand of Sargent cypress trees as well as other uncommon plants, including serpentine reed grass. Several tributaries, such as Devils Gulch, have excellent examples of mature riparian forest with a rich diversity of plants, including redwoods, California nutmeg and many shrub species. Olema Marsh at the confluence of Olema Creek, Bear Creek, and Lagunitas Creek is one of the largest freshwater marshes in Marin County.

SPECIAL SPECIES

Special status species: The Lagunitas Creek watershed supports a significant population of wild coho salmon, with some estimates ranging as high as 10% of the population for the Central California Coast Evolutionarily Significant Unit (ESU). It also has steelhead trout, California freshwater shrimp, northern spotted owl, and California-red legged frog. Tiburon paintbrush and Marin dwarf-flax are two listed plant species with recorded occurrences in the watershed.

Other species of interest: Chinook and chum salmon were observed in Lagunitas Creek during the 2001/02 and 2002/03 winters. Pacific lampreys spawn in Lagunitas Creek. Until the early 1980s, green sturgeon used the lower reaches. Mountain lions are frequently seen in the watershed. Foothill yellow-legged frogs occur in some of the smaller tributary streams, and river otters have frequently been sighted in the mainstem of Lagunitas Creek. Serpentine endemic plants are also found within the watershed.

LAND USE

The Lagunitas Creek watershed has a mix of recreational, agricultural, water supply, and residential use. Commercial logging began in the upper Lagunitas Creek watershed in the 1860s and moved downstream until nearly all of the old growth Douglas fir and redwood trees were harvested (UCCE, 1995). Logging continued in the Olema Creek watershed until 1962. Major fires have burned portions of the watershed several times.

Samuel P. Taylor built the west's first paper mill on mainstem Lagunitas Creek near Devils Gulch in 1856. Lagunitas Creek is still referred to as "Papermill Creek" by many local residents. Dairy farming, beef and sheep production, and potato growing dominated the

more open landscapes of the lower watershed and San Geronimo, Nicasio and Olema Valleys. Gravel. Sand was mined from the streambed at the confluence of Lagunitas and Nicasio Creeks until a short time after Nicasio Dam was constructed in 1960. Ranchers regularly harvested small amounts of streambed gravel to maintain ranch roads through the 1980s.

The first reservoir, Lake Lagunitas, was built in 1872, followed by Alpine Lake in 1918, and then by Bon Tempe in 1948. Peters Dam, built in 1953 to form Kent Lake, was raised 45 feet in 1982, nearly doubling reservoir capacity from 16,600 acre feet to 33,000 acre feet. The last reservoir to be built in the watershed was Nicasio Reservoir, formed by Seeger Dam in 1960, on Nicasio Creek. In addition to blocking anadromous fish passage to miles of spawning and rearing habitat, the impoundments have altered streamflows and reduced bedload transport from the upper reaches of the watershed.

In the early 1920s, Olema Creek between the town of Olema and its confluence with Lagunitas Creek was straightened into the 3-kilometer long “Olema Canal” that drained the surrounding land for agricultural production. Olema Creek is currently reclaiming its historic configuration in an interesting example of restoration through a change in management, which in this case consists of no longer maintaining the straightened channel.

Ranching on land leased from NPS continues on the east side of Olema Valley and in Lagunitas Valley. Private ranching also occurs within Nicasio Valley, and one cattle ranch remains in San Geronimo Valley. Horse boarding facilities are located in Nicasio, Olema, and San Geronimo Valleys. Residential development is concentrated in the upper and lower ends of the watershed in San Geronimo Valley and Point Reyes Station.

Recreational use of the extensive public lands in the watershed includes hiking, bicycling, horseback riding, and camping in the state park. The railroad right-of-way from Tocaloma Bridge south through the state park has been converted into a trail.

WATERSHED PLANNING AND MANAGEMENT

The raising of Peters Dam initiated a period of intensive analysis of the geomorphology and aquatic habitat of Lagunitas Creek. Local residents and public agencies were concerned that the expansion could severely threaten the fragile salmonid runs. In the late 1970s, CDFG and MMWD initiated a series of investigations into salmonid habitat and sediment transport in order to evaluate proposed flow releases from Kent Lake.

In 1994, MMWD began a sediment management and monitoring program to reduce the annual fine sediment load from San Geronimo Creek through a combination of source control and small sediment traps. State Water Resources Control Board Order WR 95-17 set instream flow and temperature requirements and mandated that MMWD implement a comprehensive sediment and riparian management plan. The order also requires MMWD to monitor for coho salmon, steelhead trout, and freshwater shrimp populations in Lagunitas Creek (SWRCB, 1995). MMWD is continuing to prioritize and undertake projects to improve bed conditions and instream habitat in Lagunitas Creek. Their work in the

watershed is being assisted by a Technical Advisory Committee, which includes representatives from public resource agencies, environmental organizations, and academia.

Marin RCD completed an earlier round of erosion control projects in the Lagunitas Creek watershed between 1983 and 1987. An important part of the Marin RCD program was to coordinate the maintenance of unsurfaced ranch and fire roads by the Marin County Fire Department, MMWD, Samuel P. Taylor State Park, and local ranchers. Marin RCD, working with TBWC, received a grant from the SWRCB for a salmonid limiting factor analysis, prioritization and implementation of restoration and sediment control projects, and public outreach. As the largest system entering the bay, the Lagunitas Creek watershed is a major element in the draft Tomales Bay Watershed Stewardship Plan (TBWC, 2003).

PRNS commissioned a study to identify sediment sources in Olema Creek, to compare current and historic rates of erosion and sedimentation, and to develop watershed management recommendations (Questa, 1990). In 1999, they instituted a water quality monitoring program on NPS watershed lands with testing for many parameters including total suspended sediments (PRNS, 2001). PRNS has focused on enhancing aquatic habitat on their lands through riparian protection, removal or modification of barriers to fish passage, range management, and erosion control. PRNS is currently in the planning phase of a major restoration of the Giacomini Ranch at the downstream end of Lagunitas Creek. Diked for agricultural use in the 1960s, 563 acres will be restored to a complex of salt and freshwater wetlands.

Local residents have been a driving force in protecting and restoring the Lagunitas Creek watershed. Trout Unlimited volunteers maintained hatch boxes in the mid 1980s on small tributary streams where eggs stripped from wild Lagunitas Creek coho salmon were protected from predators and unstable bed conditions. Trout Unlimited also organized numerous volunteer projects in the watershed, several of which drew hundreds of people to help on erosion control and instream habitat projects. The Salmon Protection and Watershed Network (SPAWN) has undertaken water quality monitoring, spawning salmonids surveys, assessment, community outreach, and restoration projects. The Tomales Bay Association initiated the first riparian fencing projects in Olema Creek and began coho monitoring in the mid 1980s.

As an element of the SWRCB Order WR 95-17, MMWD initiated the development of a memorandum of understanding (MOU) for the maintenance and management of unpaved roads in the Lagunitas Creek watershed. Signatories to the MOU include MMWD, County of Marin, MCOSSD, DPR, NPS, and Marin RCD. The intent of the MOU is to foster a consistent working relationship for sediment control and sediment reduction from unpaved roads in the watershed in order to benefit the creek habitat for coho salmon and steelhead trout.

Between May 2002 and June 2003, Ross Taylor and Associates evaluated county-maintained stream crossings within Marin County to assess juvenile and adult salmonid passage (Draft, June, 2003). The survey focused primarily on stream crossing that historically or currently support populations of coho salmon and/or steelhead. The report also includes site-specific

treatments and scheduling. The highest priority sites occur within the Lagunitas Creek and Bolinas Lagoon watersheds.

IMPORTANT WATERSHED ISSUES

1. **Water quality and quantity.** Lagunitas Creek is listed as an impaired waterbody for sediment/siltation, nutrients, and pathogens. Much of the focus to date has been on sediment and its impact to aquatic habitat. Streambank erosion in the upper watershed; the network of old logging, fire control, private access, and ranch roads; and livestock-related erosion have been identified as sediment sources. Maintaining adequate flows will be an issue into the future.
2. **Aquatic habitat.** Lagunitas Creek is extremely important to the survival of coho salmon in the Central Coast ESU. It also supports the largest remaining population of California freshwater shrimp. Managing sediment delivery and transport, maintaining stream flows through water releases from Kent Lake, and protecting riparian habitat and water quality are ongoing concerns.
3. **Fish passage.** Salmonid access to small tributary streams with good spawning and rearing habitat is a critical issue in Olema Creek and the tributaries to San Geronimo Creek.
4. **Agency and community coordination.** Because of the intertwining public and private ownership throughout this watershed, overlapping jurisdictions between agencies, and the scarcity of financial resources, close coordination is essential for effective use of funding and management resources.
5. **Community participation.** Lagunitas Creek inspires passionate commitment from its community. Opportunities for participation in planning and monitoring, volunteer enhancement projects, and education efforts are important to local residents.
6. **Water supply.** The Lagunitas Creek watershed supplies most of the water for MMWD. Management of the lands draining into the MMWD reservoirs for reliable, high quality water is vital to Marin County.

WATERSHED NEEDS

1. Limiting factors analysis for salmonids and California freshwater shrimp. Restoration priorities based on limiting factors.
2. Ongoing funding to implement erosion control and habitat restoration projects.
3. Maintenance and effectiveness monitoring of completed projects.
4. Analysis of sediment monitoring data collected by MMWD and a review and possible update of the sediment monitoring program.
5. Coordinated water quality and quantity monitoring program involving state, federal, county, and private landowners.
6. Outreach to rural residential landowners on good stewardship practices, including maintaining driveways and private roads, increasing permeability, using native plants,

- keeping horses and other animals, and reducing the use of toxic chemicals in their yards and homes.
7. Development and implementation of a comprehensive habitat management plan for the Olema Creek watershed that considers salmonid habitat, agricultural land use, and wetland restoration.
 8. Evaluation of septic systems in San Geronimo Valley and other areas of rural residential development. Implementation of measures to improve septic system function.
 9. A watershed forum, perhaps a subcommittee of the TBWC, to facilitate coordinated planning, monitoring, and project implementation by federal, state, and county agencies that manage land within the watershed. The current group formed to advise Marin RCD on the Proposition 13 grant funding could form the starting point for such a forum.
 10. Development of practical and effective TMDLs and attainment strategies.
 11. Coordinated implementation of the multi-agency MOU for maintenance and management of unpaved roads in the Lagunitas Creek watershed.
 12. Restoration of the natural hydrologic processes on the Giacomini Ranch at the mouth of Lagunitas Creek.
 13. Implement restoration planning based on fish passage evaluation recommendations within Lagunitas Creek.