



ICWM PLAN OBJECTIVES

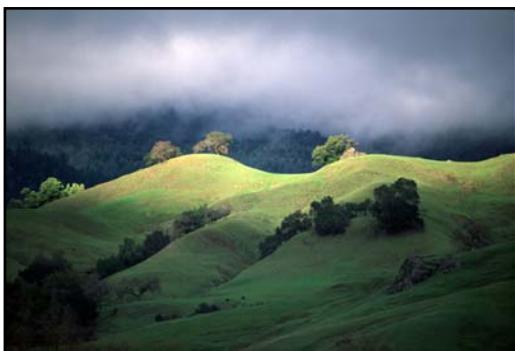


Photo by Kathleen Goodwin

3. ICWM PLAN OBJECTIVES

STATE IRWM REQUIREMENTS: C. Objectives. Identify IRWM Plan objectives and the manner in which they were determined. The Plan must address major water-related objectives and conflicts within the region, including, at a minimum, water supply, groundwater management, ecosystem restoration, and water quality.

3-1 PROCESS FOR DETERMINING OBJECTIVES



The development of the Tomales Bay ICWMP objectives was a result of a collaborative review with the TAC of existing plans, studies and recommendations in the region. All existing plans, reports and technical studies were reviewed and summarized to identify key management issues that led to the development of ICWMP objectives. The TBWC's *Tomales Bay Watershed Stewardship Plan* provided the foundation from which plan objectives were identified, expanded, and/or refined. The issues and objectives were reviewed by the

TAC and TBWC, and the objectives were prioritized as part of the review of regional and project priorities (see Chapter 5).

Section 3-2 provides a summary of the key findings and management issues that helped define the ICWMP objectives. Section 3-3 presents the ICWMP objectives. As part of this process, five issues were raised which, according to TAC, require additional discussion, review, and/or evaluation as the plan is updated in the future or as new data becomes available. These topics are further discussed in section 3-4 at the end of this chapter.

3-2 SUMMARY OF KEY FINDINGS & MANAGEMENT ISSUES

This section summarizes the key conditions and issues within the Tomales Bay critical coastal areas, based on the review and summary of existing data presented in Chapter 2.

WATER SUPPLY

1. **Water Supply Availability / Reliability:** Availability of water for the many uses that exist within the watershed is a critical issue. All participating water agencies have constrained water supplies under existing and/or long-term (20±-year) conditions due to supply limitations, reliability issues, and/or infrastructure constraints (i.e., treatment plant,

distribution pipeline, and/or treated storage capacity). Water supplies are subject to periods of interruption due to flooding, drought and seismic events, and some facilities are vulnerable to landslides. Landscaping water demand results in constrained supplies in some areas.

2. **Balancing Needs for Water:** Efforts that can provide solutions for balancing instream flow requirements with the needs of domestic, commercial, and agricultural water users, as well as wildlife habitat needs, will contribute to habitat protection and restoration and the continuation of economic and cultural values in the region. MMWD indicates that water supply management operations are currently geared toward the balance between water supply management and fisheries habitat protection and improvement (i.e., through implementation of State Water Resource Control Board mandates).

3. **Water Quality / Safe Drinking Water:** Safe drinking water is a concern for all water districts in the planning area. This is a concern in North Marin Water District (NMWD), especially during the summer and periods of high tides and saltwater intrusion. IPUD and BCPUD are concerned about the treatment of disinfection byproducts in their treated water and are endeavoring to eliminate periodic chlorine disinfection byproducts exceedences from treated drinking water (based on maximum contaminant Levels established by federal and state law).

4. **Agricultural Water Supply Reliability:** A secure water supply for agricultural users is a key concern to the economic well-being of the region. There is lack of data regarding the extent of existing agricultural water sources.

5. **Global Climate Change:** Most studies have not fully accounted for changes in global climate change and variability, which could significantly affect water availability. Potential water resource impacts and consequences of global climate change include: changes in the timing, intensity and amount of precipitation; sea level rise; increased flooding and higher surges; increased water temperatures; changes in urban and agricultural water demand; and disruption to wetlands and habitat areas.

GROUNDWATER MANAGEMENT

6. **Groundwater Conditions:** In general, groundwater conditions in Marin County have not been well documented, but the bulk of unserved areas are underlain by poorly permeable rock with limited storage capacity. Except for the Pt. Reyes peninsula and Bolinas Point, only small pockets of alluvial valleys (such as the NMWD Pt. Reyes wells) are projected to yield in excess of 10 gpm. Review of wells in the Tomales region as part of the County’s Countywide Plan update reveals yields ranging between two and 30 gpm and indicates that the fractured bedrock can provide limited water supply to rural communities.

7. **Groundwater Quality:** PER SWRCB Order WR95-17, water from North Marin’s wells in the vicinity of Lagunitas Creek is considered subsurface stream flow. Because of the details of this order, the NMWD groundwater resources (Coast Guard Wells) are now susceptible to

the detrimental effects (for domestic water supply) of marine-based saltwater intrusion in the immediate area.

8. **Groundwater Impacts:** Two concerns related to groundwater were raised during preparation of the ICWMP. One concern is the potential decrease in groundwater levels due to increased impervious surfaces and decreased stormwater infiltration, which may affect water supplies and instream flows. Another potential issue that was raised is the cumulative impact of rural residential groundwater pumping on tributary stream flow. As indicated above, groundwater data is limited, and additional data is needed to better define and address groundwater issues as related to supply and/or effects of pumping on instream flows.

WATER QUALITY

9. **Impaired Water Quality:** Tomales Bay and its primary tributaries are identified by the SFBRWQCB as impaired for: pathogens (Tomales Bay, Lagunitas Creek and its tributaries); sediment (Tomales Bay, Lagunitas and Walker Creeks and tributaries); nutrients (Tomales Bay, Lagunitas and Walker Creeks and tributaries); and mercury (Tomales Bay, Walker Creek). Pollution sources include: agricultural runoff; contamination related to septic systems; stormwater runoff; heavy metal pollutants from past mining activities; erosion from stream banks, roads, trails and landslides; and recreational activities.
10. **Impacts to Beneficial Uses:** Beneficial uses are impacted or potentially impacted by water quality impairments as specified in the SFBRWQCB “Water Quality Control Plan (Basin Plan)” related to municipal, domestic and agricultural water supply; fishing and shellfish harvesting; preservation of rare and endangered species; fish migration and spawning; wildlife habitat; and recreational uses. (See full list in Chapter 2 of this Plan.)
11. **Pathogens:** Pathogen contamination in Tomales Bay, primarily *E. coli* sources from Lagunitas and Walker Creeks, impacts the Tomales Bay shellfish industry due to harvesting prohibitions when water quality exceeds standards, resulting in a direct economic impact. Pathogens also pose potential health risks to recreational users and shellfish consumers. Agricultural runoff (dairy farms, cattle/sheep grazing lands, horse facilities), faulty onsite sewage disposal systems, boat wastes, and residential runoff (e.g., pet waste) are considered to be significant sources of pathogens to Tomales Bay. The TMDL Report identifies the lower Walker Creek subwatershed and lower and upper San Geronimo Creek subwatersheds as the highest fecal coliform contributors. Sampling in certain areas of San Geronimo Valley, including Woodacre, detected high levels of fecal coliforms and nitrates. If detected, pathogens due to human activity would be a concern in ASBS areas and the Bolinas area.
12. **Mercury:** Mercury adversely affects aquatic and wildlife species. Walker Creek and Soulajule Reservoir are listed as impaired for mercury. Walker Creek is impaired because mercury adversely affects beneficial uses, including wildlife habitat and all uses supporting aquatic life. Mercury concentrations in Walker Creek exceed the mercury freshwater aquatic life acute toxicity objective established to protect aquatic organisms. Terrestrial

species that primarily or exclusively eat fish are at risk from exposure to mercury due to its tendency to bioaccumulate in the food web. Soulajule Reservoir is impaired due to mercury levels that may pose health risks upon frequent consumption of fish from the reservoir. Although the largest mercury source, the Gambonini mine (downstream of Soulajule), has been stabilized, the mercury remains in sediment that moves through the stream system and into Tomales Bay. High mercury levels were also found in fish collected from Tomales Bay. Mercury is also a water quality indicator in Tomales Bay due to advisory for seven commercial and recreational fish species.

13. **Sedimentation:** The effects of sedimentation include the infilling of Tomales Bay, loss of wetland habitat and eelgrass beds, and impacts to salmonids habitat. Sedimentation (particularly inputs of fine sediment) in Lagunitas, Olema, San Geronimo and Walker Creeks also adversely affects salmonids. Major sediment sources include streambank erosion; the network of unpaved roads and trails; landslides; and livestock-related erosion.
14. **Nutrients:** Tomales Bay, as well as Lagunitas and Walker Creeks, are listed as impaired due to elevated nutrient levels in the tributary streams. The SFBRWQCB expects to initiate development of a Tomales Bay Nutrient TMDL in the near future. While a large number of scientific papers address various monitoring results, hydrological models, and geochemical reconstruction, only limited data exists regarding eutrophication or the extent of nutrient loading from the watershed to Tomales Bay. The TMDL development process will include further assessment of nutrient loading.
15. **Onsite Sewage Disposal Systems:** Tomales Bay communities and residential areas primarily utilize onsite sewage disposal systems (OSDS) for wastewater treatment and disposal. Despite studies and efforts to date, there is insufficient knowledge of baseline conditions and effects of these systems on surface and ground water quality due to an incomplete inventory of existing onsite systems, inadequate tracking of these systems, unknown number of systems failing, and sporadic water quality monitoring. There also is a lack of comprehensive management program(s)—i.e., routine inspections, education and outreach to owners/users, and technical and financial assistance for repair/upgrades.
16. **ASBS:** There is very limited water quality data for ASBS discharges, marine water quality, and discharge compliance history. Currently, there is insufficient data regarding potential water quality effects of discharges into ASBS areas. Additional data is needed to identify appropriate measures to comply with the California Ocean Plan water quality objectives and discharge prohibitions into Duxbury and Point Reyes ASBS areas. Except for one unnamed drainage culvert discharge in Duxbury Reef, ASBS discharges are primarily related to non-point sources in stormwater runoff and erosion. Analysis of one water quality sample taken at Alder Creek at Duxbury Reef found that the analyzed constituents did not exceed the *California Ocean Plan* standards.

STORMWATER AND FLOOD MANAGEMENT

- 17. **Municipal Stormwater Management:** Stormwater management within unincorporated communities is accomplished primarily through ditches and limited storm drains, without any inlet management or treatment, except for occasional sediment removal. Until recently, the stormwater drainage system in West Marin had not been mapped, and stormwater impacts on water quality have not been known. However, recent mapping and monitoring was undertaken as part of the ICWMP process. The Marin County Roads Division performs routine maintenance on County-owned stormwater facilities throughout West Marin as time and budgets allow.

- 18. **Effects of Increased Runoff:** Increases in impervious surfaces related to development, road construction, and stream crossings results in increases in runoff and peak storm hydrographs, and may have contributed to increased flooding and bank erosion within the Tomales Bay watershed.

- 19. **Flood Management:** FEMA-designated floodplains are limited in the Tomales Bay region. The primary flood-prone area is Inverness; however, other areas in the region (including Woodacre and Bolinas) have been subject to periodic, localized flooding. Culverts and stream channels are not functioning adequately in transporting flood flows for many reasons, including: increases in peak flows from development, improperly sized culverts (too small), increased sources of sedimentation causing culvert blockage, and disconnection of stream channels from their floodplain. This is exacerbated by infrequent maintenance due to budget and permit constraints. Disruption of floodplains has contributed to geomorphological and ecologic impacts.

- 20. Water supply systems are subject to interruption during flood periods (NMWD and IPUD).

ECOSYSTEMS AND HABITAT

- 21. **Tomales Bay** is one of the major estuaries on the Pacific Coast of California, supports abundant wildlife and is one of four commercial oyster-growing areas in the State. Marin County has the second largest mariculture industry in the state, which consists primarily of Tomales Bay and Drakes Estero. Pacific herring runs in Tomales Bay support a small commercial fishery as well as recreational activities associated with the national and state parks in the area. Beneficial uses within the bay are impacted by water quality impairments as discussed above. Additionally, past and present human uses and activities within the region have impacted habitats and special status species in Tomales Bay and its tributaries.

- 22. **Habitat and Special Status Species Protection:** The Tomales Bay region supports at least 26 known special status species, including significant populations of wild coho salmon, steelhead, and California freshwater shrimp, all within Lagunitas Creek. Habitat loss, species decline and invasive, exotic species are significant concerns in the Tomales Bay watershed. Habitat protection and restoration are key to maintaining diverse and well-

functioning habitats. Control of invasive exotic plants and animals is an important component of habitat protection.

23. **Freshwater Flows:** Approximately 67% of freshwater inflow to Tomales Bay comes from the Lagunitas Creek watershed and about 25% from the Walker Creek watershed (Fisher et. al. 1996). Much of the stream flow in mainstem Lagunitas Creek is regulated by dams and collected into various reservoirs upstream of the San Geronimo confluence, with Olema and San Geronimo Creeks being the largest uncontrolled tributaries. Over the last 10 years, MMWD’s diversions (and evaporation) have totaled about 27,400 acre-feet per year from Lagunitas and Walker Creeks and from reservoir surfaces. It is estimated that MMWD operations lower Lagunitas Creek flow to Tomales Bay by about 27% and decrease total freshwater flow (including Walker Creek diversions) to the bay by about 14%. 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.

24. **Coho Salmon and Steelhead Recovery:** According to SWRCB Order WR95-17, construction of dams and other development within the Lagunitas Creek watershed have significantly depleted fishery resources, and the Order establishes instream flow requirements based on its review of water flow requirements for various salmonid life stages. Activities that facilitate coho recovery, especially in Lagunitas Creek watershed, are of high priority in the region. The Lagunitas Creek watershed now supports a significant population of wild coho salmon, estimated as 10% of the population for the Central California Coast Evolutionarily Significant Unit (ESU), and the largest and most stable population south of the Noyo River.

Factors that affect fishery habitat include stream flow, sedimentation, instream habitat conditions (i.e., large woody debris (LWD), refuge areas, especially winter refuge areas, and stream bed conditions), barriers to fish passage, water temperature, and removal of or alteration to riparian vegetation adjacent to creeks. Managing sediment delivery, maintaining stream flows through water releases from Kent Lake, enhancing stream and riparian habitats, protecting riparian habitat and water quality, and improving fish passage are ongoing enhancement efforts.

The salmonid fishery within the Walker Creek watershed has been degraded over the last century, although it does support a steelhead population. Coho sightings have been very rare in the last fifteen years. Coho stock from Olema Creek were released by CDFG into Walker Creek in 2004 because it historically contained coho salmon that most likely was genetically related to the Olema Creek. Historic studies indicated that sedimentation and high temperatures, caused in part by removal of riparian vegetation, were limiting salmonid populations in the Walker Creek watershed. Other concerns are degraded channel and riparian habitats.

- **Fishery Spawning and Sedimentation:** A significant portion of the coho and steelhead populations that use Lagunitas Creek use San Geronimo Creek, Devil’s Gulch and

other tributaries for spawning and rearing (in addition to Lagunitas Creek). Olema Creek also has been identified as being important to coho recovery. The San Geronimo Creek watershed is a major source of sediment deposition below Peters Dam; this sediment deposition has impaired Lagunitas Creek habitat. Significant habitat impairment has been caused by excessive coarse sand and fine gravel deposition in the Lagunitas channel bed in the reach below Peters Dam and below the outlet of San Geronimo Creek due to excess sediment yield from the San Geronimo Creek watershed. Additional sediment sources may be significant below the confluence with Devil's Gulch, but have not been quantified. According to SWRCB Order WR95-17, dams have reduced the size and frequency of winter flushing flows which transport sediments downstream, resulting in loss of fishery habitat, and MMWD was ordered to prepare a comprehensive sediment management plan. That plan, completed in 1997, is a 10-year plan that expired at the end of June 2007. However, the MMWD has indicated that it will continue its fisheries restoration and enhancement efforts into the future, most likely through the development of a new plan.

25. **Wetlands:** Protection and restoration of aquatic habitat and functions are critical to achieving stewardship goals for the region. Since the early 1900s, construction of levees at the southern end of Tomales Bay for roads and development of dairy farms has converted wetlands and served to hydrologically disconnect Lagunitas Creek and its tributaries from their floodplains. Sedimentation into Tomales Bay has also resulted in loss of wetlands. The diking, drainage and agricultural use of the headwaters of Tomales Bay affect both the immediate critical habitat values (for coho salmon and freshwater shrimp), as well as the broader watershed values of wetland filtration and floodplain integrity. Of particular importance is the role wetlands play in improving water quality and retaining floodwaters.
26. **Riparian Habitat:** Management of riparian resources in the Lagunitas and Walker Creek watersheds is a concern. Riparian habitat is found along Lagunitas Creek with high quality habitat found upstream of Samuel P. Taylor State Park and mainstem Walker Creek and in San Geronimo Valley. Other areas, particularly in the Chileno and Keyes Creek watersheds, have little remaining mature riparian habitat, although efforts have been underway to re-establish native riparian vegetation. Lack of high quality habitat, degraded habitat and presence of invasive species (such as vinca and cape ivy) are concerns. Riparian habitat restoration improves water quality and habitat for salmonids and many other aquatic and terrestrial wildlife species.
27. **Invasive, Exotic Species:** Spread of exotic, invasive species in the Tomales Bay watershed can have adverse effects on both aquatic and plant species. The spread of these plants results in loss of native species and coastal grassland terraces. Invasive species include, but are not limited to, the introduction and spread of European green crabs, which has led to major declines of several key invertebrate species. Non-native, invasive plants include thistles, gorse, giant reed, cape ivy, saltwater cordgrass, periwinkle and non-native perennial grasses (see list in Appendix N). The extent of invasive species threats requires further review as well as development of management measures to address the containment or elimination of those species.

WATERSHED MANAGEMENT

28. **Water Quality Monitoring:** There is a need for ongoing and coordinated comprehensive water quality monitoring for Tomales Bay and tributary streams to document baseline conditions, identify trends for pollutants of concern, and better assess the overall success of projects to reduce non-point sources of pollution.

29. **Fishery Monitoring:** There has been extensive and coordinated monitoring in the Lagunitas watershed which should be continued, although some monitoring and sampling methods vary among monitoring entities. This monitoring has documented baseline conditions as well as trends in the fisheries populations and habitat. There has also been some effort to assess the overall success of projects to enhance habitat, but these analyses have proven to be more difficult. Recently some monitoring work has been conducted in Walker Creek. Review of monitoring methods is needed to develop additional coordination and consistency among the several monitoring programs being undertaken in the region.

30. **Land Use Practices:** Review, monitoring and evaluation of land use practices and other human influences on tributaries to the bay, uplands, riparian corridors, wetlands and along the bay shores would increase the effectiveness of actions taken to improve water quality and floodplain management. Private land uses and development is regulated by the County of Marin. The Countywide Plan is being updated and addresses wetland and riparian habitat protection and restoration, streamside conservation areas, and agricultural protection through draft policies and programs.

31. **Regulatory Requirements:** All agencies are subject to compliance with environmental regulations related to water quality protection, wildlife habitat needs (including endangered species protection), and public health. All projects implemented will be subject to applicable environmental review and permitting requirements, thus achieving sound project design and implementation while minimizing and/or avoiding adverse environmental impacts.

32. **Partnerships:** The community has been successfully organizing to address key watershed issues, and numerous agencies and organizations have been involved. Continued and expanded partnerships are not only desired, but necessary, to address issues in the Tomales Bay region.

33. **Additional Data Needs:** Additional surveys, studies, monitoring and/or reviews have been recommended or data gaps identified during preparation of the ICWMP, include the following general topics (see Chapter 9 and Appendix H for further details).
 - Water quality studies identified in the *Tomales Bay Watershed Stewardship Plan* (see list in Chapter 9), and coordinated water quality sampling among the various entities conducting monitoring, which will in part be facilitated by a recent grant to the TBWC in which this coordination will be initiated.

- Water quality sampling and monitoring for ASBS areas.
- Data on baseline conditions and effects of on-site wastewater systems on surface and ground waters with water quality monitoring.
- Groundwater studies.
- Fishery salmonid population and habitat data and studies identified in the Limiting Factors Analysis and developing standard monitoring methods among monitoring agencies and entities.
- Sediment budgets and transport studies, i.e. those identified in the *Tomales Bay Watershed Stewardship Plan*.
- Additional species and habitat surveys, including Tomales Bay east and west shore mapping; other aquatic and terrestrial species assessments; assessments; Pacific flyway; “Species of Local Interest” (SOLI); mapping of quantity and quality of riparian habitat; monitoring of other special status species; and extent of invasive species.
- Effects of global climate change have not been taken into account in water supply or watershed management studies.



Photo by Greg Filbrandt

3-3 ICWMP OBJECTIVES

GUIDING MANAGEMENT APPROACH AND PRINCIPLES

As part of the development of the ICWMP and the selection of objectives, the TAC reviewed, consolidated and ranked the plan’s objectives. As a result of this process, the following guiding management approach and principles were developed that reflect sound resource and watershed management approaches.

GUIDING APPROACH
SOUND RESOURCE AND WATERSHED MANAGEMENT
Contribute to the promotion of economic, social, recreational and environmental values and goals. Develop strategies to implement the ICWM Plan and to protect the watershed.

- Maintain and promote sound water resource management practices. Promote efforts that can provide solutions for balancing instream flow requirements with the needs of domestic, agriculture, and commercial water users, as well as fish and wildlife habitat needs, and that contribute to habitat protection and restoration and the continuation of economic and cultural values in the region.
- Balance water needs for all beneficial uses of water as set forth in the Basin Plan: municipal, domestic and agricultural water supply, aquatic life, wildlife habitat, and recreational uses.
- Support new technologies and management practices through feasibility studies and demonstration projects.
- Address environmental justice issues as they relate to disadvantaged communities, drinking water quality and public health.
- Acknowledge potential effects of global climate changes and support incorporation of further studies into future watershed planning and modeling efforts.
- Incorporate monitoring into restoration, management, and implementation programs. Develop a scientific peer review group to review technical studies.
- Support the Tomales Bay Watershed Council in the role of facilitating and coordinating with other agencies and organizations to ensure implementation and achievement of Plan goals and objectives.
- Increase community outreach and education, and involve and educate the public to become watershed stewards.

ICWMP OBJECTIVES

The objectives developed by the TAC and TBWC were prioritized to aid the process of reviewing, evaluating and prioritizing projects (see Chapter 5). It was determined that of the five key issue areas for the Tomales Bay region, three objective elements would receive equal weight and ranking: Water Quality, Ecosystem Restoration and Habitat Improvement, and Water Supply Reliability. These are followed by Stormwater and Flood Management and Groundwater Management. The specific objectives are outlined below.

WATER QUALITY

GOAL: Ensure water quality in Tomales Bay and tributary streams is sufficient to support natural resources and sustain beneficial uses.

1. Improve water quality in critical coastal areas (CCAs); i.e., improve water quality in Tomales Bay and tributary streams through reductions in sediment, pathogens, mercury, and nutrient loading, with the specific objectives of protecting all beneficial uses, and of removing Tomales Bay from the 303(d) list of impaired water bodies by attaining state and federal water quality standards; or reducing the potential for other contaminants in Tomales Bay; or minimizing point and non-point source pollution and sources areas for pollutants of concern in the CCAs.
2. Develop and implement an ongoing and coordinated comprehensive water quality monitoring program for CCAs (i.e., in Tomales Bay and tributary streams) to document baseline conditions, identify trends for pollutants of concern, and better assess the overall success of projects to reduce non-point sources of pollution.
3. Restore and maintain adequate high quality freshwater flow to maintain geomorphologic form and function in CCAs to protect viable populations of special status species and commercial aquatic species.

**ENVIRONMENTAL RESTORATION
& HABITAT IMPROVEMENT**

GOAL: Restore and preserve the integrity of natural habitats and native communities.

4. Protect, restore and/or rehabilitate the hydrologic and ecological integrity of the CCAs—i.e., restore wetlands, streams and riparian areas for native aquatic and terrestrial species.
5. Restore, protect and maintain viable populations and habitats of special status species in the CCAs—i.e., implement projects and programs that contribute to recovery of coho salmon,

including placement of large woody debris projects and assessment and reduction of stream temperatures, etc.)

- 6. Remove and/or control invasive non-native species in the CCAs.

WATER SUPPLY & RELIABILITY

GOAL: Support adequate and improved water supplies to meet community needs and to improve reliability, consistent with ecosystem management and state and federal regulations, including aquatic ecosystems and stream geomorphology. Maintain and promote water resource management practices. Promote efforts that can provide solutions for balancing instream flow requirements with the needs of domestic, agriculture, and commercial water users, as well as fish and wildlife habitat needs, and that contribute to habitat protection and restoration and the continuation of economic and cultural values in the region.

- 7. Support water supplier provision of reliable, high quality water supplies to meet future and dry year demands and to sustain water supplies in drought, for domestic water supply, adequate fire flow, and during emergency periods, with sensitive management of natural resources, including potential effects of global climate change.
- 8. Maintain and improve drinking water quality by continuing to meet or exceed existing and anticipated federal and state drinking water standards.
- 9. Support reliable water supply and improved technologies for agricultural uses consistent with ecosystem management goals.
- 10. Maximize water use efficiency, conservation, and/or increased opportunities for recycled water consistent with health and safety.
- 11. Minimize vulnerability of water supply system and infrastructure to natural disasters.

STORMWATER & FLOOD MANAGEMENT

GOAL: Promote sound and environmentally sensitive stormwater and flood management programs and measures.

- 12. Support and continue to implement environmentally sensitive flood management programs, practices and associated future planning, including floodplain restoration. Maintain and improve performance of flood protection and stormwater facilities to prevent flooding of communities and important water infrastructure.

13. Evaluate and implement stormwater pollution prevention methods to minimize non-point stormwater discharges in CCAs (i.e., reduce or eliminate all stormwater discharges to ASBS areas area).
14. Support development and implementation of best management practices and alternative technologies to promote stormwater detention that can help reduce stormwater runoff and improve stormwater infiltration and treatment.

GROUNDWATER MANAGEMENT
GOAL: Protect groundwater quality and supplies.

15. Assess groundwater supplies and conditions, including effects of impervious surfaces and increased groundwater pumping on creeks, and assess and reduce groundwater contamination resulting from onsite wastewater disposal systems.
16. Improve agricultural range practices to promote groundwater infiltration.
17. Assess impacts of salinity on groundwater resources in Lagunitas Creek, especially at the Coast Guard Wells.

3-4 ISSUES & QUESTIONS FOR FUTURE CONSIDERATION

During preparation of the ICWMP, five issues and/or questions were raised that the TAC felt needed ongoing discussion, review, and/or evaluation as the plan is updated in the future or as new data becomes available. The water and resource management issues within the Tomales Bay region have generally been addressed through collaboration between the stakeholders. However, some issues or concerns in the planning area are more complex due to pre-existing regulatory requirements and differences of opinion regarding past decisions (i.e., the SWRCB Order WR95-17). Though not considered conflicts at this time, these potential issues have been identified, and it is the intent of the stakeholders to have ongoing policy discussions as part of implementation of the ICWMP and as data may become available.

These topics include the following, which are further addressed below.

- Reservoir Management
- Stream Water Temperature
- Water Diversions
- Agricultural Water Security
- Floodplain Connectivity

RESERVOIR MANAGEMENT & STREAM WATER TEMPERATURE

During preparation of the ICWMP, some TBWC Technical Advisory Committee members expressed concern as to whether reservoirs are managed in a manner that adequately balances drinking water needs and fisheries/ecosystem needs. Concerns were raised regarding: 1) potential negative impacts

of reservoir management on the ecosystem, broadly, and on fisheries, in particular; and 2) whether existing data is adequate to inform current and future decisions about reservoir management. It was acknowledged that MMWD operates reservoirs under the provisions of the SWRCB Order WR95-17 as summarized in Chapter 2, and that coho salmon became a listed species after this Order was put in place. The MMWD has been conducting monitoring for over 10 years and intends to prepare a summary study of findings in the next few years.

The unanswered questions that were raised relate generally to whether the water supply facilities are being operated in the most environmentally sound fashion relative to water quality, large woody debris, in-stream flows, and water temperature. It was expressed that there is insufficient current data to determine whether management of Nicasio and Soulajule Reservoirs impacts fisheries and natural systems. Specific concerns/questions about water quality and migration issues were identified regarding the stream reach below Nicasio Dam. Questions were also raised regarding Kent Lake discharges to Lagunitas Creek and whether flows are maintained at the minimum level required for fish species success in the watershed, including temperature and what information is available on geomorphic issues, sediment flushing and large woody debris (LWD). It was noted that there are known temperature exceedances—e.g., Lagunitas and Walker Creeks (see discussion below), as well as other water quality concerns (e.g., algal blooms in Nicasio Reservoir and mercury in Soulajule Reservoir). It was also noted that while MMWD has undertaken fish habitat projects involving large woody debris, there is a need for more LWD projects.

It is MMWD's position the District is operating and maintaining instream flows as required by State Water Board Order WR95-17, which set flows in perpetuity (unless the Order is revised). Releases from Kent Lake are in accordance with the State Order, and thus, flows are being maintained at the minimum level required for fish success. There has been no information indicating that this flow regime is anything but beneficial to salmon. The District does not intend to pursue a modification of the minimum base flow requirements (which range between 8 and 25 cfs during normal years) and hence does not plan to modify the operations of Kent Lake. Although the State Order was issued before coho salmon were listed, the Order is entirely focused on fishery habitat issue. The years of study and hearings regarding instream flow requirements were specifically to establish a flow regime that would be beneficial to coho, steelhead and California freshwater shrimp. Kent Lake discharges are being maintained at the minimum level required for fish species success. MMWD also notes that the watershed is being managed for LWD.

Related to the reservoir management questions above is another set of questions related to whether and/or how stream water temperature affect coho and steelhead in the Tomales Bay watershed. Water temperature is one part of the larger issue of the long-term goal of sustainable coho and steelhead populations. There is some data about temperatures from some sources, but some of this is not current, has not been consistently monitored, and thresholds differ. The MMWD is required by State Order WR95-17 to maintain specified water temperatures for mainstem Lagunitas Creek, but reportedly, there have been instances in the past when these temperatures have been exceeded. There is no specified temperature regime for Walker Creek. There is insufficient data on Lagunitas, Walker and Olema Creeks regarding temperatures and effects on fish.

It is unclear whether reservoir operations are adversely impacting beneficial uses of the watershed. There is a general question as to whether the coho and steelhead populations of the Tomales Bay watersheds are sustainable and a specific question as to whether long-term temperature trends will be an issue for these species. Additional data would be necessary to further inform this discussion, but it was noted by the TAC that the suggestion for further review was not a suggestion that reservoir operations necessarily be modified. Should future studies be completed that address these questions, the results will be integrated in the ICWMP as appropriate when they become available.

WATER DIVERSIONS

There are many small, in-stream dams on tributary creeks within the region), and the cumulative impact of these small dams on the Tomales Bay watershed is not known. Unanswered questions that were raised included how sizing affects natural processes, which dams/diversions have legal diversion rights, storage rights, and riparian rights. It also is not known how these diversions or certain others may affect the hydrologic connectivity between groundwater and surface water (e.g., how new private wells near streams may affect stream flows and fishery habitat). At this time, the issue of water diversions is of unknown consequence, scope and significance. It is also recognized as an issue of potential sensitivity.

AGRICULTURAL WATER SECURITY

The need for a reliable and secure agricultural water supply was an issue raised by some members of the TAC during preparation of the ICWMP. Two primary concerns were discussed:

- Agricultural water security related to implementation of restoration practices; and
- Agricultural water security related to diversification of agriculture.



Photo by Greg Filbrandt

Agricultural water supply as it relates to restoration efforts is currently an issue. Implementation of grazing and agricultural Best Management Practices (BMPs) to improve/protect water quality, such as fencing off creeks, often requires that an alternative water source be developed—e.g., well, pipeline, tank. This can be an expensive effort; e.g., recently a farmer had to drill five times to find alternative water supply. In consideration of this issue, it was noted that agricultural uses comprise about two-thirds of the

Tomales Bay watershed, and farmers are custodians of much of the watershed’s open space and riparian land. Generally, it was agreed that the issue involves changing the way the water is accessed; in effect, there is no net change in the amount of water used. There was agreement on the desire and need to support ranchers and farmers who are

implementing restoration measures that help Tomales Bay, which is now reflected in this chapter of the ICWMP in both the management issues (#4) and Plan objectives (#9) sections.

The Tomales Bay area has supported sustainable agriculture for 40 years, and expects to continue to support it. However, as agriculture in the region diversifies, increasing numbers of organic and other operations require more water. This is likely to become a major issue as demand for these products continues to increase. Agricultural water security related to changing agricultural practices directly relates to potential increased water demands, how demands can be met and effects of increased demand. With two-thirds of the watershed in agricultural use, it is important to assess trends and potential impacts of agricultural diversification, including further identification and review of opportunities and concerns if water demands were to increase in the future. After discussion, it was agreed that this is an “issue of the future” that calls for ongoing policy discussions, and data to inform those discussions.

FLOODPLAIN CONNECTIVITY

As part of the preparation of the ICWMP, concerns were raised related to increases in impervious surfaces in the watershed, increases in flooding, and potential reconnectedness of floodplains. Questions that were raised included how flooding relates to floodplain connectivity. The discussion included the potential for floodway planning in developed areas, to route floodwaters and encourage conditions that reduce peak hydrograph and reduce flooding. Further study in San Geronimo Valley, where flooding has occurred, was suggested to determine causes and whether elevations in Lagunitas Creek are affecting water elevations in San Geronimo Creek. This could help assess whether a County flood zone should be considered for the area. Floods also can cause loss of large woody debris that is important to fishery habitat and result in bank erosion, bank alterations and downcutting. It was also noted that there needs to be a greater understanding of the value of floodplains as ecosystems with better management and planning. After discussion, it was agreed that this is an “issue of the future” that calls for ongoing discussions, and data to inform those discussions. In particular, a watershed-level hydrologic / geomorphic study may be warranted.