Stewardship

Humans, as part of the ecosystem, can act as stewards by taking individual and community actions that reduce adverse impacts on valued attributes of the Bay. Stewardship activities can include both volunteer efforts as well as the work of regulatory and management agencies or permittees—like cities and counties—pursuant to laws and regulations. Examples of good stewardship actions include individuals and communities using water more efficiently, participating in cleanup efforts in their local beaches and watersheds, or planting marsh vegetation. Examples of stewardship actions by management and regulatory agencies include programs to reduce water pollution, increase vital wetland habitat, or reduce disposal of dredged material into the Bay.

This section of the report highlights and evaluates indicators of a few key stewardship activities involving water use, volunteers, and public access efforts. Many important programs and efforts could have been evaluated as part of this stewardship analysis. The indicators below should be viewed as pilot indicators, and we recognize that some of the selected measures may not represent

NORTH BAY CONSERVATION CORPS

the broad category of activities from which they are drawn. As with other portions of this document, we intend for these indicators to begin a dialog about how to refine and improve stewardship indicators in future assessments and, most importantly, about which actions and activities citizens and committed resource managers should support, expand, or begin.

Urban water use

About 90 percent of the 1.1 million acre-feet per year of water used in the Bay Area is for urban uses. Most of that water is imported from outside the Bay Area, mainly from the Delta watershed with smaller amounts from the watersheds of the Russian River and Tomales Bay. Some local watersheds provide groundwater to urban users in the Santa Clara Valley, Fremont area, and in the North Bay.

Bay Area residents have the opportunity to demonstrate stewardship by using water more efficiently, leaving more water to maintain the habitats, living resources, and ecological processes that contribute to a healthy Bay. Efficient use of water can also reduce the vulnerability of our supplies to disruption by earthquakes, droughts, floods, and rising sea level, and help meet regulatory requirements to protect endangered species; reduce the need for transporting and storing water and developing new sources; relieve competition for limited supplies; and reduce pollutant loads from irrigated lawns, gardens and crops.

HEALTH INDICATOR

This indicator measures water used annually by urban users in Bay Area watersheds from 1986 to 2009. It also examines residential water use specifically as this use directly reflects decisions by individuals and families, whose choices to use water more efficiently in and around the home can collectively create large-scale benefits.

BENCHMARK

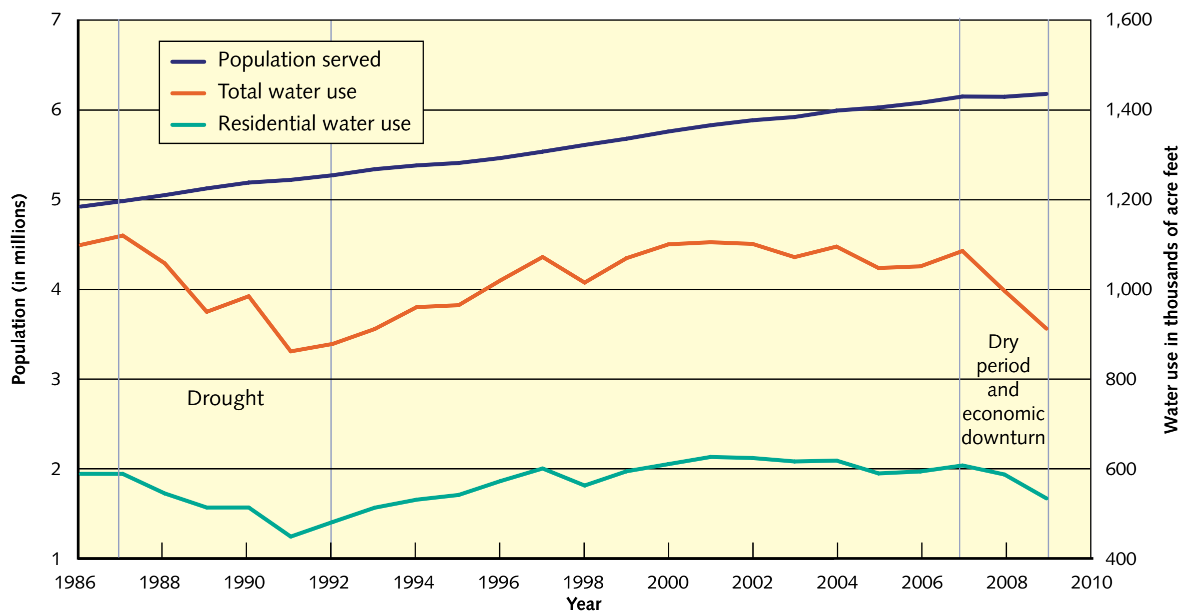
A recently adopted state law (The Water Conservation Act of 2009) establishes a goal of reducing urban per-capita water use by 20 percent by 2020 with an interim goal of a 10 percent per-capita reduction by 2015. The 2020 goal, interpreted by the California Department of Water Resources as 124 gallons per day per person in the Bay Area, is used to evaluate this indicator of stewardship activity in our region.

KEY RESULTS AND TRENDS

Total urban water use in the Bay Area is 20 percent less today than it was 25 years ago, a remarkable achievement given that the population has increased by 20 percent (Figure 26).

This accomplishment is primarily due to greater efficiency of use, combined more recently with a dampening of water demand due to the economic downturn. The increased efficiency has been achieved through mandates for more efficient water-using appliances, and by Bay Area residents and businesses reducing

Figure 26. Urban water use in the San Francisco Bay Area. Data from the regional water agencies (see Technical Appendix for details).

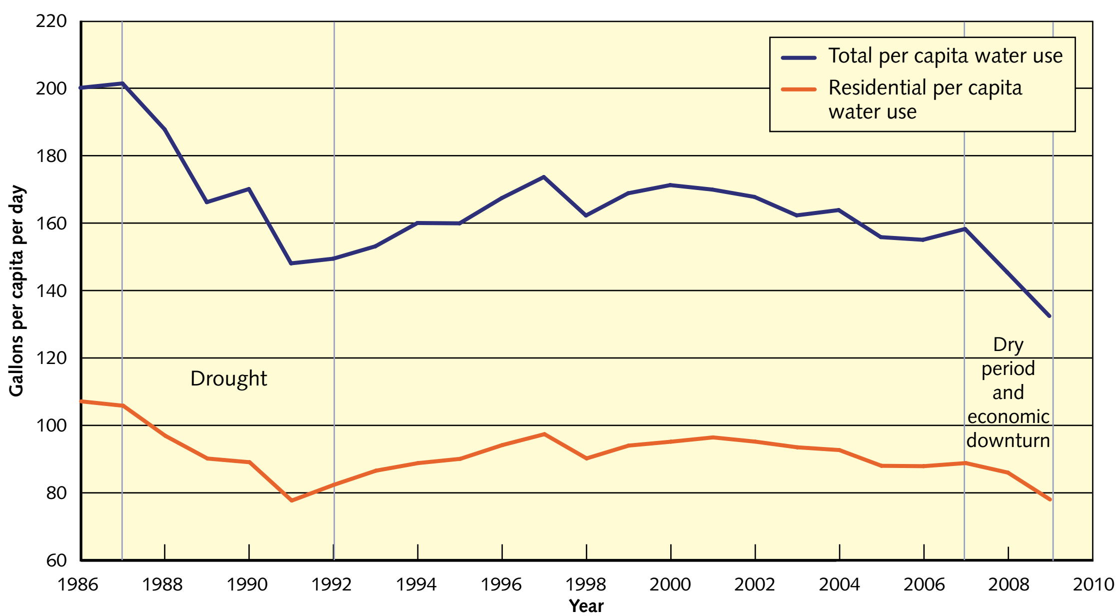


their use in response to requests for conservation during dry periods (Figure 27). Although data for the entire Bay Area is only available through 2009, data from selected suppliers for 2010 and 2011 indicates that usage is continuing its downward trend as cooler and wetter springtime weather suppresses demand. Given these recent factors, Bay Area water agencies have already made significant progress toward meeting their urban water use targets. A rebounding economy and years with less precipitation are factors that will likely increase urban water use at some point in the future. However, if recent per-capita usage can be maintained or improved, the legislative mandate for a 20 percent reduction should be easily achieved by 2020.

SUMMARY

The Bay Area is using less water today than it did 25 years ago even though the population has increased by well over a million people. While conservation practices deserve much of the credit, the economic downturn and climate variation are also significant factors. Additional efficiency improvements will be needed in the future if Bay Area water users are to continue this trend. These improvements can be achieved by greater adoption of water-saving appliances and drought-tolerant landscapes, and increasing the use of recycled water.

Figure 27. Water Use Per-capita in the San Francisco Bay Area. Data from the regional water agencies (see Technical Appendix for details).



Reduced water demand by Bay Area residents and businesses will increase freshwater inflows to the Bay and flows in streams and rivers only if upstream users do not increase their diversions.

Recycled water use

Nearly all of the high quality water consumed in the region is used once, treated, and discharged to the Bay from wastewater treatment plants. There has been a small amount of intentional recycling or reuse for over 50 years, but the amount and uses of recycled water have grown substantially over the past decade.

Recycled water use demonstrates stewardship because it allows limited local and imported water supplies to be used more efficiently, with the potential to reduce the need for new water diversions from the Bay's watershed. Using recycled water increases the region's sustainability by providing a local and available source of water. The use of recycled water also reduces the amount of treated wastewater discharged into the Bay.

Recycled water is used in our region to irrigate landscapes (including golf courses), and crops; for process water, including power plant and refinery cooling water and washdown water at commercial and industrial facilities; and to augment freshwater flow to wetlands. Proposed new uses of recycled water include toilet flushing in commercial buildings, heating and cooling, and for groundwater recharge.

HEALTH INDICATOR

Recycled water is quantified as either the recycled water produced at wastewater treatment plants (WTPs), or the water supply that it replaces or creates.[25] The amount of recycled water being used is analyzed here by examining the type of water use that it replaces or offsets. This helps us understand the ecological benefits of this stewardship activity. Recycled water that replaces water that otherwise would be delivered by a municipal supplier is considered a "potable offset." Recycled water can also be used in a way that does not offset potable water, such as for creating and enhancing freshwater marsh habitat at Hayward Marsh, Peyton Slough, Palo Alto Marsh, and several North Bay streams.

Vineyards and dairies can also use recycled water instead of pumping groundwater or withdrawing surface water from a nearby stream. A WTP may also treat its wastewater to recyclable standards but not have a market for the water and will apply it to formerly non-irrigated land to grow grass or forage crops instead of discharging it into the Bay. In all of these cases, the recycled water is providing a local water resource, expanding our region's available water portfolio, and providing economic, environmental or social benefits. For public utilities that normally discharge effluent to the Bay, any reuse will reduce the amount of that discharge.

BENCHMARK

We evaluated water recycling success by comparing the amount recycled to the amount of wastewater flowing into treatment plants and to recycled water use targets and projections, or the potential demand for recycled water.

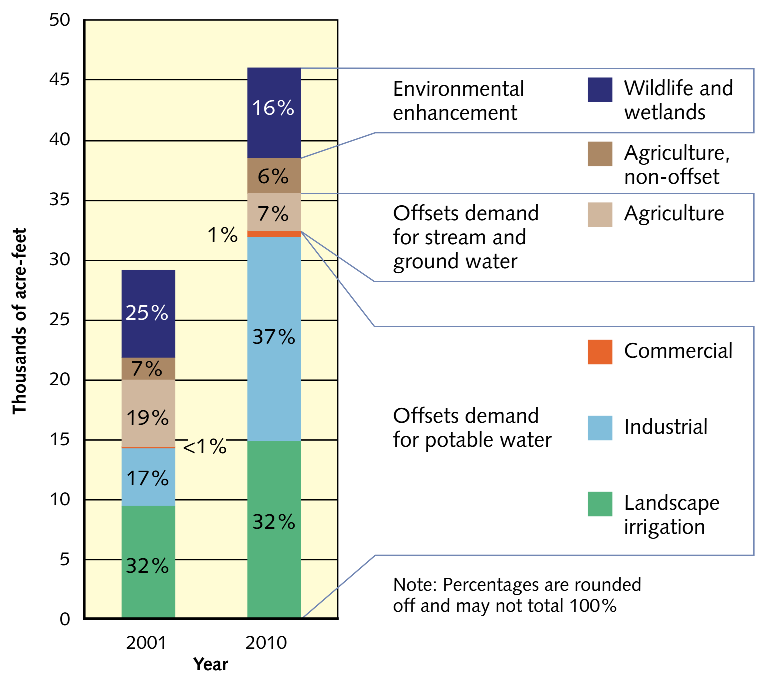
KEY RESULTS AND TRENDS

From 2001 to 2010, total recycled use in the Bay Area increased more than 50 percent to 46.1 thousand acre-feet (TAF) (Figure 28). The most significant increase was in use by refineries and power plants for process and cooling water.

Over 35 TAF of recycled water now replaces potable use and stream and groundwater use (nearly four percent of the total urban and agricultural water demand in the Bay Area), more than doubling the 2001 potable offset. (See 2010 column, Figure 29.) Most of the 35 TAF offsets potable supplies previously used for landscape irrigation and industrial uses, with a small offset for groundwater and surface water use by North Bay agriculture. The remaining recycled use does not offset potable uses but instead is used to sustain freshwater marshes around the Bay and to grow forage crops in the North Bay.

Recycled water use in 2010 fell considerably short of the projected 2010 target of 125 TAF established in 1999 by the Bay Area Regional Water Recycling Program (BARWRP). This is primarily due to project costs and funding limitations, reduced market demand, and customer/public acceptance. Currently, 27 project proposals (120 TAF/YR of yield) are in different phases of planning or funding procurement. This is still short of the 270 TAF of the potential market for recycled water that the BARWRP and North Bay Reuse Study identified for the year 2025.

Figure 28. Recycled water use volumes in the San Francisco Bay Area in 2001 and 2010, in thousands of acre-feet (TAF). Total use increased from 29.1 TAF in 2001 to 46.1 TAF in 2010. (Source: personal communication with treatment plant operators and Regional Water Quality Control Board staff, 2010 Urban Water Management Plans (draft), 96–011 reports from wastewater plant operators to the Regional Board)



The 46.1 TAF of currently recycled water is only seven percent of wastewater production from the WTPs, meaning there is plenty of potential supply. A portion of the wastewater stream may never be economically feasible to develop for recycling given the current mismatch between wastewater discharge locations and recycled water market locations.

Benefits for the Bay from recycled water use include increasing available habitat, reducing effluent discharge, and reducing water diversions from the watershed. However, as with urban water use reduction, the net benefit to the Bay and its watershed from recycled water use could be diminished by new freshwater diversion projects and extractions in the future.

SUMMARY

Recycled water use is becoming an increasingly important part of the Bay Area's water portfolio. Hopefully this will help offset increased potable uses and replace enough existing potable uses to reduce our reliance on imported supplies and increase freshwater outflows to the Bay from the Delta. If the potential market for recycled water is fully realized, demand for imported water could be significantly reduced and the region's water supply would be far more reliable. To fully realize this potential, Bay Area residents and businesses will need to overcome their concerns about the perceived risks of recycled water and embrace it as one of the most viable means of achieving a more sustainable water future.

STEVENS & PERMANENTE CREEKS WATERSHED COUNCIL

Volunteer efforts

The success of local environmental conservation and restoration efforts relies in large part on public interest and involvement. Bay Area residents volunteering their time in local restoration or cleanup activities is an expression of stewardship aimed at improving the health of the Bay. There are many ways that citizens can be involved, both directly and indirectly, in such stewardship activities. One example is Coastal Cleanup Day, an annual event organized by the California Coastal Commission, in which volunteers collect debris from the state's marine environments, including the Bay's shoreline and watersheds.

HEALTH INDICATOR

The number of volunteers participating in the annual Coastal Cleanup Day event in the nine-county region (Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco) is presented as an indicator of stewardship that improves the health of the Bay. This indicator does not represent all categories of volunteer activities, as there are many possible ways for Bay Area residents to volunteer their

ADRIENNE MILLER

Everyone knows that the Estuary needs enough fresh water rumbling in from its rivers to keep it alive and healthy. But its health is also increasingly tied to the hard work of the thousands of volunteers who clean trash and invasive plants from its shores, test its water quality, and restore its watersheds.

In Marin County, STRAW (Students and Teachers Restoring a Watershed) program—begun in 1992 by fourth graders as a classroom project to save the endangered California freshwater shrimp—has grown to rely on 2,000 teachers, students, parents, and other community members to put over 30 stream restoration projects in the ground every year, according to STRAW's Laurette Rogers. To date, more than 28,000 students have participated in over 300 restorations on rural and urban creeks, restoring over 21 miles of creek banks, says Rogers.

Save The Bay's community-based restoration program was created in 2000 and has used more than 50,000 youth and adults in hands-on restoration projects at 8 sites around the Bay, according to the group's Jessica Castelli. This year, over 5,000 volunteers will donate 20,000 hours to restore 120 acres of Bay habitats by hand. "That's the equivalent of 10 full-time employees," says Castelli. Save The Bay also has a huge contingent of citizen volunteers who regularly tackle trash "hot spots" in creeks.

"Most of our annual budget goes to pay one part-time person," says Femke Oldham of the San Pablo Watershed Neighbors Education and Restoration Society (SPAWNERS). "Otherwise our activity completely relies on volunteers. Lots of grants are contingent on using volunteers. We have contracts with cities and the county for big cleanups. They save money because we do the community organizing and supply the volunteers. It would be more expensive if city or county staff or a professional source did it." She says school groups, retirees, and corporate groups—490 participants last year—help with creek cleanups, weeding invasive plants, and planting natives. "We're guided by a volunteer steering committee, including native plant experts, that creates planting plans."

Berkeley's Codornices Creek Watershed Council hasn't had a paid coordinator for several years. "It's all volunteer now," says the San Francisco Bay Regional Water Board's Dale Hopkins, who volunteers for the Council. One focal point is a reach of the creek where steelhead have been observed in recent years: over 130 of them, many 18 inches or longer.

STEVENS AND PERMANENTE CREEKS WATERSHED COUNCIL

"A lot of what's going on now involves removing barriers to the steelhead," she adds. Volunteers have also weeded and planted along the creek as part of a stewardship project, developed in conjunction with a city-sponsored restoration. Hopkins says future directions may include an all-volunteer GPS mapping project.

In Oakland, Kimra McAfee of Friends of Sausal Creek says over 2,300 volunteers, the largest component from high school community service groups, pitched in during the last fiscal year (July through June) to propagate and plant native vegetation and remove invasives. That amounts to 6,140 service hours.

In the South Bay, on Alameda Creek, volunteers have donned hip waders every year to help carry threatened steelhead past barriers in the stream when needed (under permits from regulatory agencies), and to conduct regular creek cleanups. Farther west, the Stevens & Permanente Creeks Watershed Council relies on volunteers to monitor water chemistry, collect benthic macroinvertebrates for assessing aquatic habitat, map riparian areas, remove invasive plants and revegetate with natives, lead nature walks, and conduct community outreach, among many other tasks. Says the Council's Joanne McFarlin, "I have over 50 different volunteers working with me in an average month, with many of those volunteers working several hours several times during the month. Our volunteer hours totaled more than 3,700 last year. We would cease to exist without volunteers."

Some groups have brought in skilled specialists for tasks inappropriate for volunteers. SPAWNERS, for one, has hired heavy equipment operators in the past and has also worked with a documentary filmmaker, a professional environmental engineer, and a water-quality specialist. Friends of Sausal Creek paid an irrigation specialist last year. Still, volunteers are the heart and soul of these non-profits. "Where's the community spirit if you pay people to work on Earth Day?" asks Sausal Creek's McAfee.

For her masters' thesis at the University of San Francisco, Rachel Spadafore surveyed representative Bay Area organizations, including public agencies and nonprofits, on their use of volunteers in urban watershed restoration projects. Although the responses to her questionnaire pointed toward both challenges and strengths in reliance on volunteers, the overall sense was strongly positive.

Small watershed groups tapped several volunteer sources: 91 percent used short-term ("convergent") volunteers, 83 percent long-term volunteers, and 83 percent school students. Two-thirds of the groups worked with a combination of the three types. All of the larger organizations (e.g. Save The Bay) used all three categories.

"One of the biggest things large and small groups alike struggled with was recruiting and retaining volunteers," says Spadafore. "That surprised me. I expected it would be lack of ecological knowledge or training. It's difficult to build a set of long-term volunteers. The advantage to developing a set of skilled long-term volunteers is that they can then take more responsibility for future projects. Watershed groups without a lot of money or staff can benefit from having a core of volunteers who can train younger or less experienced volunteers in technical tasks." She singled out Contra Costa County's Department of Conservation and Development for its exemplary model for developing long-term volunteers.

Volunteers are typically used for basic tasks like removing invasive plants and planting natives that are nonetheless essential to the function of a restoration program, she says. Most organizations provided brief onsite training with oral instruction. "A few groups have volunteers doing technical work like water quality testing, benthic macroinvertebrate sampling, and irrigation installation. Friends of Sausal Creek, for one, has a program set up to train lay people in these technical tasks. Even school students can do it. In one group, long-term volunteers participated in the project initiation and design phases of restoration."

Apart from the free labor, the groups Spadafore surveyed saw the educational function of volunteer work as its most compelling rationale: "It's a perfect opportunity to educate a large group of people about the issues involving their watershed." Admittedly, large school groups can be a mixed blessing: "They're not necessarily there by choice, and there can be discipline problems, lack of interest, and distractions. On the other hand, you're cultivating understanding and experience with restoration at a really young age."

A slightly different version of this article first appeared in ESTUARY NEWS, April 2011.

STEVENS & PERMANENTE WATERSHED COUNCIL

time in stewardship activities (see "Hands in the Mud").

BENCHMARK

We used the number of Coastal Cleanup Day volunteers in 1998 as this stewardship benchmark.

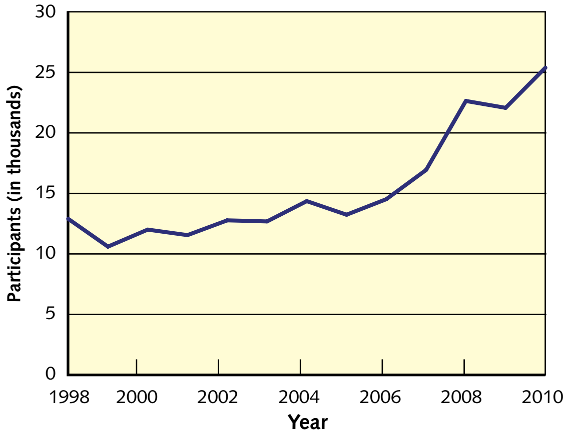
KEY RESULTS AND TRENDS

Based on data from the California Coastal Commission, Coastal Cleanup Day participation has increased steadily, with a near two-fold increase in volunteers since 1998 (Figure 29).

SUMMARY

Volunteer participation in stewardship activities, as represented by Coastal Cleanup Day, has increased steadily over the last decade. The interest shown by Bay Area residents in volunteering

Figure 29. Coastal Cleanup Day Participation in the nine county region, 1998–2010. Source: California Coastal Commission.



their time to take part in stewardship activities is an important outcome of public outreach and education efforts by many organizations and agencies around the region. Continued outreach and education efforts, combined with stewardship opportunities, will likely strengthen volunteer participation in the future, which will contribute to the ecological health of San Francisco Bay.

Public access

Access to the Bay and its surrounding watershed provides the public with the opportunity to appreciate these natural resources, which in turn helps to promote active involvement in protection and restoration efforts.

HEALTH INDICATORS

The public access indicator assesses the extent to which access to the Bay is being provided by evaluating the increases in mileage of the San Francisco Bay Trail and the Bay Area Ridge Trail over time.

ABAG

BAY AREA-WIDE TRASH CAPTURE DEMONSTRATION PROJECT

In 2009 the Estuary Partnership received $5 million in federal stimulus funds (the American Recovery and Reinvestment Act of 2009) to assist Bay Area towns, cities, and counties in reducing the amount of trash reaching local waters, the Bay, and the Pacific Ocean. The project is designed to facilitate municipalities' efforts to comply with the San Francisco Bay Regional Water Board's Municipal Regional Permit, which requires significant reductions in trash by 2014. The funding was made available by U.S. EPA, through the State Water Resources Control Board's Clean Water State Revolving Fund.

CITY OF SAN LEANDRO

Working in concert with the Water Board, the Partnership contracted with 12 suppliers of "full-capture" trash control devices—both small catch basin inserts and much larger devices installed at storm sewer junctions. The Partnership made those devices available to participating municipalities, allocating project resources based on population and commercial/retail zoned areas since commercial areas are known to generate the most trash. As this report went to press, 66 towns, cities, and counties had joined the project and were ordering and installing devices.

The Estuary Partnership's contribution to trash cleanup is considered a "demonstration project" because $5 million is only a small downpayment on the ultimate cost of solving the Bay Area's trash problem. The goal is to provide tools to help municipalities understand the types of trash collection strategies and trash control devices that will work best in specific situations. The project website allows municipal staff to upload both land use and maintenance data, and download it in ways that will help them compare the utility of devices and generate reports documenting permit compliance.

BENCHMARK

In 1989, the Association of Bay Area Governments (ABAG) established the goal of building a 500-mile regional hiking and bicycling trail around the perimeter of San Francisco and San Pablo Bays. In 1987, the Bay Area Ridge Trail Council established the goal of building 550 miles of trail for recreational use along the ridgelines surrounding San Francisco Bay. In 2006, the Council identified the near-term goal of completing 400 miles of trail by 2010. The indicators in this report were assessed by measuring the percentage of these goals that is currently being met.

KEY RESULTS AND TRENDS

Our analysis shows a steady increase in public access to the Bay. At the time of the Bay Trail Plan adoption, 130 miles of the Bay's shoreline were accessible to the public, up from just 4 miles in 1965. Currently, 310 of 500 planned miles of the Bay Trail are complete, or 62 percent of the goal for the entire system (Figure 30).

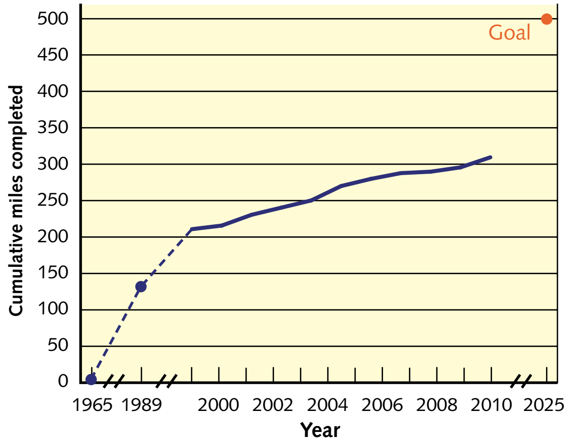
Since the dedication of the Ridge Trail's first segment in 1989, 330 of 550 miles of trail have been completed, or 60 percent achievement of the goal for the entire system and 82 percent achievement of the near-term goal set for 2010 (Figure 31).

SUMMARY

Public access plays an important role in promoting stewardship activities that improve the health of the Bay. Comprehensive planning efforts by a wide range of stakeholders over the past four decades have led to a significant

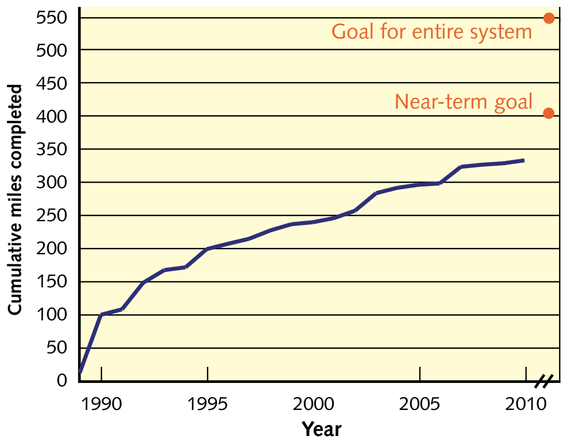
ABAG

Figure 30. Cumulative miles of San Francisco Bay Trail completed 1965–2010. Data from Association of Bay Area Governments.*



*Data for miles completed between 1966–1988 and 1990–1998 are interpolated.

Figure 31. Cumulative miles of Bay Area Ridge Trail completed 1989–2010. Data from the Bay Area Ridge Trail Council.



increase in the extent of the Bay accessible to the public. A framework for completion developed by ABAG in 2005 estimates that approximately $150 million is needed to complete the entire Bay Trail by 2025. Continued success at attaining the goals for access will rely on adequate funding and the continued collaboration of individuals, agencies, and organizations.

Successful stewardship through management: the LTMS

A broad array of regulatory and management programs are designed to improve the health of the Bay, including programs that will expand and enhance habitat, improve water quality and adjust freshwater inflow, and protect living resources. All of these programs can be considered an aspect of stewardship—people working to improve the health of the Bay.

It was not possible to review indicators for all of these programs in this report. Below is one example of stewardship through regulatory effort, the work done to improve management of material dredged from the Bay.

The Bay supports a thriving maritime industry that is critical to the region's economy. Navigational channels and ports must be dredged for safe navigation. Until the late 1980s, most dredged material was disposed of at three sites in the Bay. After environmentalists, the fishing community and resource managers raised concerns about the impacts of this practice on the Bay's ecosystem, the Long Term Management Strategy for the Placement of dredged material in the San Francisco Bay region (LTMS) was established by the San Francisco Bay Conservation and Development Commission, the San Francisco Bay Regional Water Quality Control Board, the San Francisco District of the U.S. Army Corps of Engineers, and the U.S. Environmental Protection Agency (EPA). The LTMS Management Plan includes goals for reducing the amount of dredged material disposed of in the Bay, and for maximizing the "beneficial reuse" of dredged material for projects such as wetlands creation and levee restoration.

In 1994, the EPA established the San Francisco Deep Ocean Disposal Site (SF-DODS) as the first major alternative to in-Bay disposal. To date over 15 million cubic yards of dredged material that would have been dumped back into the Bay have been diverted to SF-DODS. Under the LTMS, resource managers also began using dredged material in wetland restoration and

MASTER OF TOWING VESSELS ASSOCIATION

landfill cover projects. Nearly 20 million cubic yards of dredged material have now been reused beneficially for such purposes. The LTMS program has also continued to reduce the effects of dredging itself, by strengthening sediment testing standards and instituting a variety of impact avoidance measures ranging from Environmental Work Windows to Essential Fish Habitat protection requirements. Together, these management actions are good examples of stewardship: industry and government agencies taking action to improve the health of the Bay.

HEALTH INDICATORS

The success of the LTMS's management actions to reduce the negative impacts of dredging on Bay health can be measured by examining the annual volume of in-Bay disposal of dredged material and the relative amount of disposal directed toward beneficial reuse.

BENCHMARK

These indicators are evaluated using the goals of the 2001 LTMS Management Plan:

- In-Bay disposal is to be reduced over a 12-year period to approximately 1.25 million cubic yards per year, to be implemented with annual in-Bay disposal volume targets reduced by approximately 387,500 cubic yards every 3 years.

- Beneficial reuse is to increase, with a long-term goal of achieving a minimum of 40% and up to 80 percent reuse per year by 2012 (with ocean disposal at SF-DODS making up any shortfall in this percentage).

KEY RESULTS AND TRENDS

Results of this analysis show that LTMS management actions have significantly reduced in-Bay disposal of dredged material (Figure 32) and increased beneficial reuse of dredged material (Figure 33) compared to pre-LTMS volumes. The annual individual in-bay disposal site limits and the interim total in-Bay limits have been met for every three year period, and the long-term goal of reducing in-Bay disposal to 1.25 million cubic yards per year by 2012 is on track to being met. In fact, since 2000, the long-term goal of disposing no more than 20 percent of dredged material in-Bay was already met in one year and was close to being met in three other years. Similarly, although annual beneficial reuse volumes have fluctuated as large-scale projects have come on line and been completed, since 2000 the long-term goal of achieving a minimum of 40 percent reuse of dredged material has already been met in five of the years evaluated.

Less dredging being needed in the Bay has assisted in achieving these goals, since less sediment is being deposited in the Bay from its tributaries. In the early 1990s, resource managers projected that the annual volume of sediment dredged from the Bay between 1995 and 2035 would be 6 million cubic yards, but from 2000 to 2010, the annual average has only been half of this amount.

Figure 32. In-Bay Disposal of Dredged Material 1985–2009. Data from: BCDC Road Map (1998 and 1999); LTMS Management Plan (2001); DMMO annual reports (2000-2002, 2004, 2008); USACE database (tables from 2006–2009)

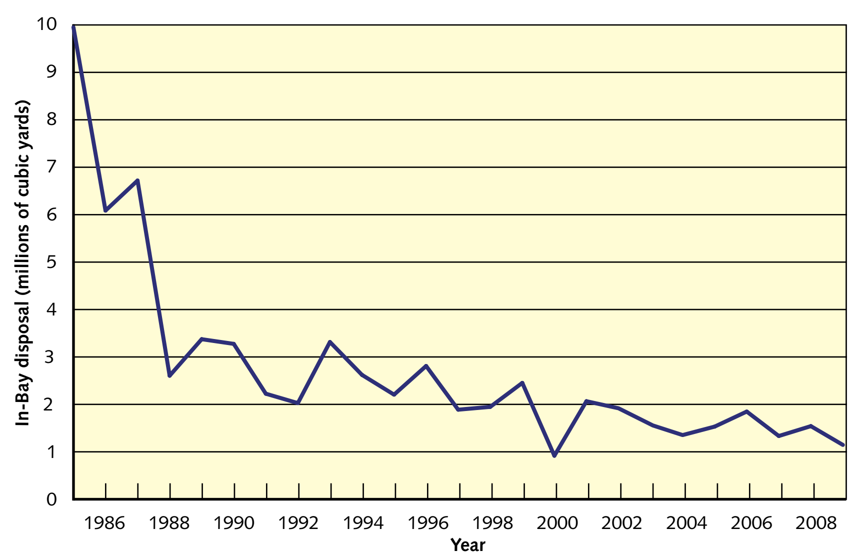
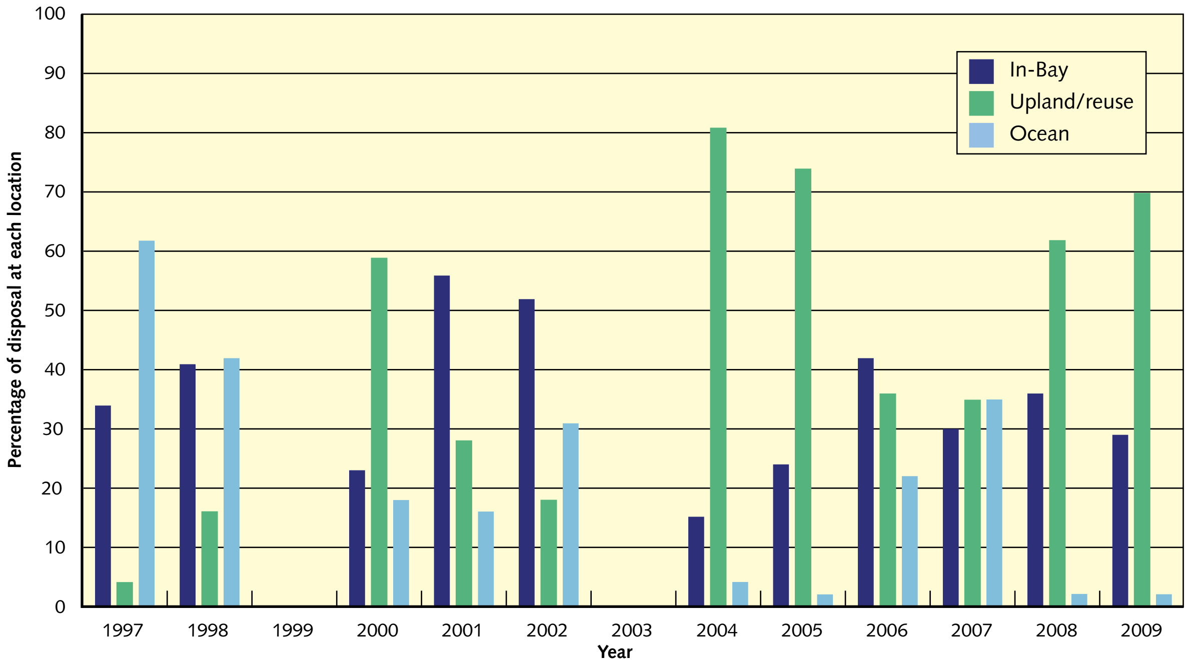


Figure 33. Distribution of Dredged Material by Disposal Location 1997–2009. Data from: BCDC Road Map (1998 and 1999) DMMO annual reports (2000–2002, 2004, 2008); USACE database (tables from 2006–2009)*



**Data not available for 1999 and 2003*

SUMMARY

Through the collaborative stewardship efforts of several resource agencies and a broad range of stakeholders, the amount of in-Bay disposal of dredged material has been greatly reduced, improving water quality and subtidal habitat in the Bay. At the same time, the emphasis on beneficial reuse has created and enhanced over 3,000 acres of wetland and other aquatic habitats. Continued collaboration and cooperation of these groups should not only allow the long-term goals of the existing LTMS Management Plan to be met, but also provide a basis for adapting that plan to help protect and improve the health of the Estuary in the future.