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Information About Estuaries and Near Coastal Waters October 2001 - Issue 11.5

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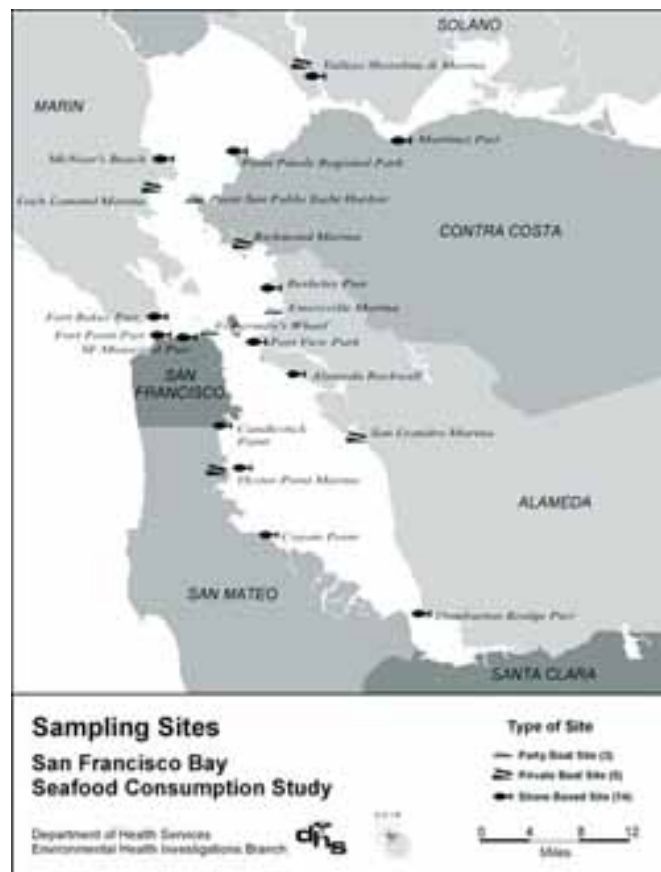
San Francisco Conducts Bay Seafood Consumption Study

Introduction

Elevated levels of contaminants in fish from San Francisco Bay have raised concerns for bay anglers who consume these fish regularly. High levels of mercury and polychlorinated biphenyls (PCBs) in bay fish led the state Office of Environmental Health Hazard Assessment to issue a health advisory in 1994 recommending that individuals limit their bay fish consumption and suggesting ways to prepare and eat bay fish that lessen chemical exposure. To learn more about San Francisco Bay anglers and their potential exposure to chemicals in bay fish, the San Francisco Estuary Regional Monitoring Program and California Department of Health Services sponsored a survey of San Francisco Bay anglers and their fish consumption habits.

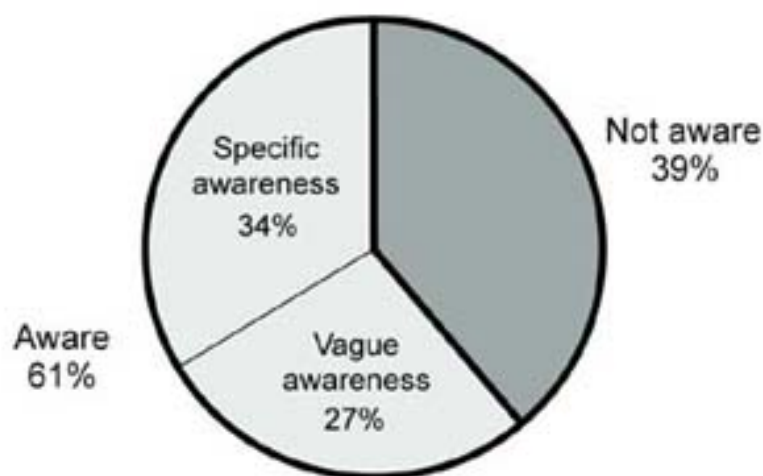
Collecting the data

Between July, 1998, and June, 1999, interviewers visited over 150 fishing sites from Fremont to Martinez and San Mateo to Vallejo and interviewed over 1,300 San Francisco Bay anglers. Five languages (English, Spanish, Vietnamese, Cantonese and Mandarin) were spoken among the ten interviewers of the study. Typically, a site was visited by a pair of interviewers, who attempted to interview all persons over 18 years of age holding a fishing rod. The survey included questions on ethnicity, income, education, age, amount of fish eaten within the last four weeks, species and parts of fish eaten, preparation and cooking methods, others in the household who eat the catch, and awareness and knowledge of the state health advisory. The entire interview took about 20 minutes per angler.



(Click on image for larger version)

Angler awareness of health advisory
All anglers



Results

Results indicate that the majority of people who eat fish from the bay do so safely, without exceeding the health advisory recommendations. However, about one in ten eats more than the recommended amount. Among ethnic groups, Asian anglers stand out as a group of concern due to their large numbers, consumption rates, and methods of preparation and consumption.

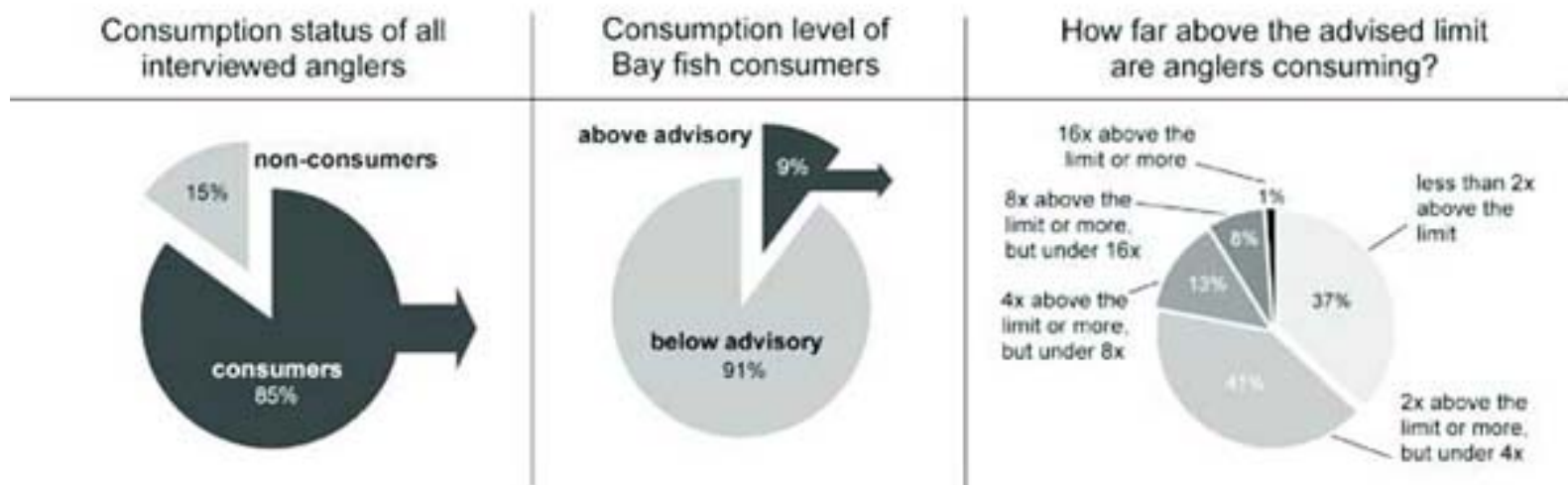
When asked about their recent bay fish consumption, anglers' responses ranged from no consumption to the equivalent of an 8-ounce meal of bay fish every day. Responses regarding consumption indicated that about 80% of anglers eat the equivalent of one meal a month or less, about 10% eats roughly two meals a month, and another one in ten eats more than two meals a month. The fish consumption health advisory suggests anglers consume no more than two meals of fish from San Francisco Bay per month (see sidebar). Among the 10% eating over the advisory level, about two-thirds are eating twice the advisory

level or more.

Anglers' likelihood of eating over the advisory limit varied with ethnicity, with Asians and African Americans more likely than other ethnic groups to eat above the limit. Differences in income, education, or fishing mode did not markedly affect anglers' likelihood of eating over the advisory limit.

The five most popular fishes eaten by bay anglers were striped bass, halibut, jacksmelt, sturgeon, and white croaker, in that order. Striped bass was by far the most popular, with over twice the angler share than the next most popular fish, halibut. The popularity of a fish often varied depending on the angler's fishing mode, ethnicity, income, and education. For example, Asians as well as people of lower income or education were more likely than other groups to consume white croaker, a fish of particular concern due to high contamination levels.

Angler consumption relative to the health advisory



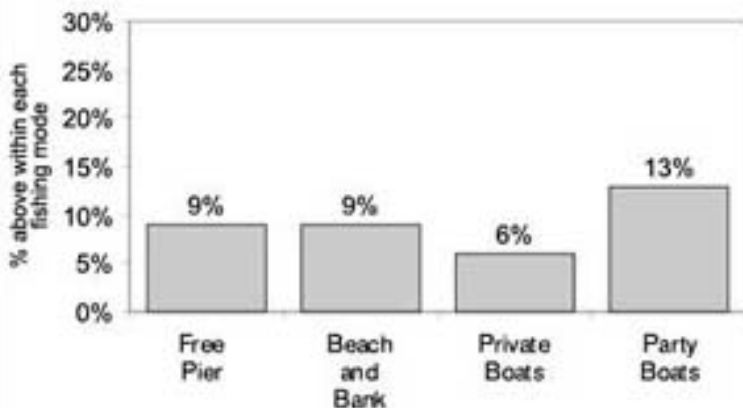
Some contaminants in fish, such as PCBs and pesticides, concentrate in fatty tissues, such as the skin and internal organs. The consumption of certain fish parts and the way the fish is prepared may have a considerable impact on angler exposure to these types of contaminants. For some of the commonly consumed fishes the study found that Asian anglers were more likely than other ethnic groups to eat the skin of the fish, eat the cooking juices, and eat the fish raw or in soup, thus increasing their exposure to contaminants. Shore-based anglers and anglers of lower income and education also consumed fish skin more frequently.

Many anglers reported that other household members ate some of the fish they caught from San Francisco Bay. About 40% reported that women of childbearing age eat some of the fish they catch. (In addition, about 5% of the fish-consuming anglers interviewed were themselves women of childbearing age). About 11% reported that children under the age of six eat the fish they catch, and 2% reported that pregnant or breastfeeding women eat a portion of their catch. Shore-based anglers were more likely to have fish-consuming household members than boat anglers.

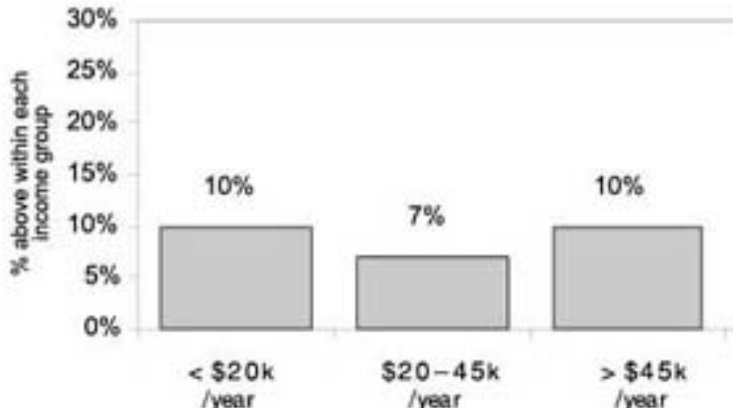
Percentage of anglers consuming above advisory recommendations

Anglers with Bay fish consumption

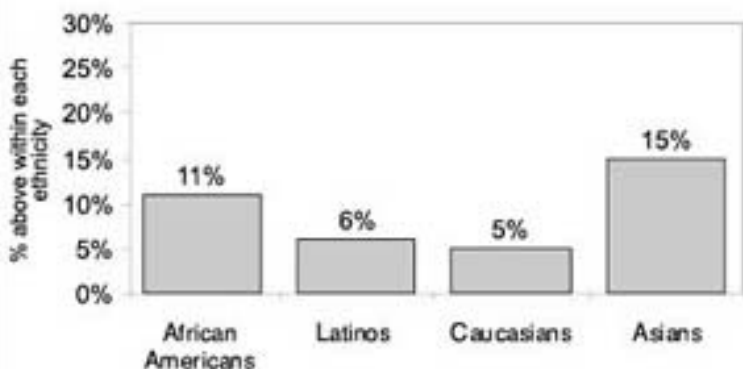
Anglers grouped by Fishing Mode



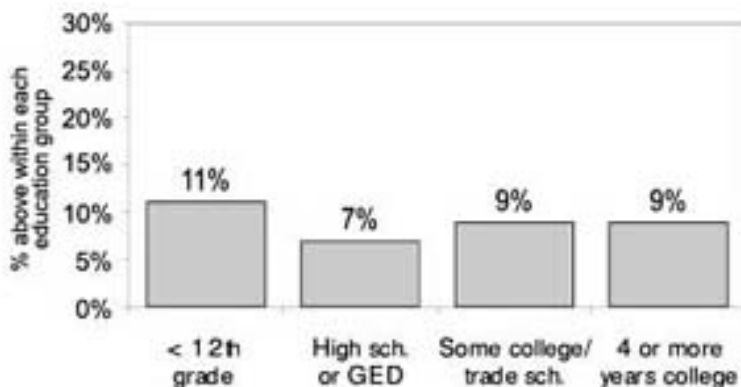
Anglers grouped by Income



Anglers grouped by Ethnicity



Anglers grouped by Education



Anglers with no fish consumption excluded from percentage calculations.

Education and Outreach

Of those interviewed, 61% said they had "heard or seen ... information or health advisories about eating fish from the bay." However, only about half of these anglers could recall specific health protective recommendations for eating bay fish. While anglers with high education or household income were more likely to recall specific health protective recommendations, they were not found to eat less fish than other anglers.

About one-third of those who had heard or seen cautionary information said they changed their behavior because of that awareness. The overall consumption rate of those who were aware of cautionary information was not significantly different from those

The Health Advisory

The health advisory issued by the California Office of Environmental Health Hazard Assessment recommends that anglers consume no more than two meals of fish from San Francisco Bay per month.* Nursing women, women who are or may become pregnant, and children under six years of age are advised to consume no more than one meal per month. The advisory defines meal size based on

who were not.

During the interview, anglers were asked how they preferred to receive information regarding fish consumption advisories.

Newspapers and television were the leading preferred methods, followed by fishing-site signs, friends and family, and text in the fishing regulations pamphlet. Although newspapers and television were the most popular, each was cited by only 35% of the anglers, indicating that a variety of approaches are necessary to reach all anglers.

Conclusions

The fact that the vast majority of San Francisco Bay anglers are eating within the limit recommended by the state health advisory is good news. However, the one in ten anglers who eat above the advisory levels remains a cause for concern. Among ethnic groups, Asian and African American anglers appear to be at greatest risk for chemical exposure. Asians are most likely to eat over the advised limit, to consume fish in a way that increases their exposure to organic contaminants, and most likely to eat white croaker, a fish known for its highest organic contaminants (such as DDT and PCBs). African Americans share many of the same high-risk consumption practices as Asians, though typically to a lesser extent.

For angler exposure to fish contaminants to be reduced, either anglers must change their consumption habits, or the contamination of the fish must be reduced. While the bay environmental management community is pursuing the latter as a long-term goal, even under the best circumstances, significant decreases will take many years. Meanwhile, anglers should make informed decisions regarding their consumption habits. With 40 percent of the fishing population having no knowledge of the advisory at all, outreach and education must be improved.

For further information, contact Rainer Hoenicke, San Francisco Estuary Institute, Phone: (510) 231-9539; Email: rainer@sfei.org, or read the San Francisco Bay Seafood Consumption Report, available from the website at <http://www.sfei.org/>. [EXIT disclaimer >](#)

body weight -- roughly one ounce of uncooked fish per 20 pounds of body weight. For example, a meal for a person weighing 154 pounds is eight ounces. For a 40-pound child, the meal size is two ounces.

** Note that the advisory does not apply to salmon, anchovies, herring, and smelt. In this study these fish were excluded from the consumption values that were compared to the advisory.*



Sampling Sites

San Francisco Bay

Seafood Consumption Study

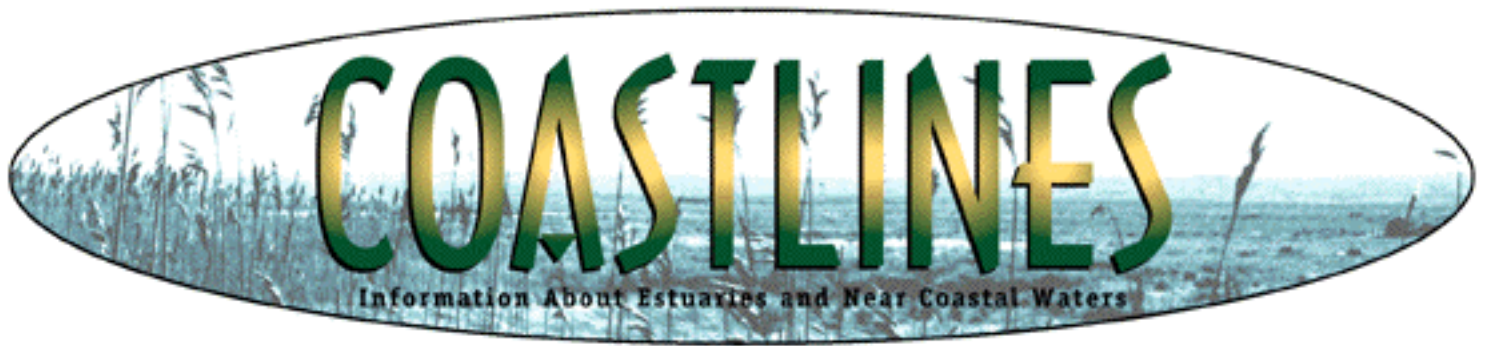
Department of Health Services
Environmental Health Investigations Branch



Type of Site

- Party Boat Site (3)
- Private Boat Site (5)
- Shore-Based Site (14)





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Preventing Bioinvasions in Australia Lessons from Down Under

Bioinvasions in marine and freshwater environments continue to occur at an unprecedented rate. The latest analysis from Australia suggests that at least 250 marine species have been introduced into Australian waters since European colonization. This is undoubtedly an underestimate since biologists have traditionally overlooked certain taxonomic groups.

At least 13 man-made mechanisms of transport have been responsible for spreading marine organisms beyond natural biogeographic boundaries (Table 1). The dominant transport mechanisms vary over time and with geographical region. In Australia, hull fouling, accidental release associated with mariculture (predominately oysters) and ballast water are the dominant means of transport; while in San Francisco Bay, hull fouling and ballast water are the most important means of transport, followed by mariculture of the Atlantic oyster *Crassostrea virginica* and the Pacific (Japanese) oyster *Crassostrea gigas*.

The majority of marine organisms, perhaps as many as 90%, introduced into a new locality will have little, if any, noticeable effect to the untrained eye. A small minority of exotic organisms, however, will have large-scale impacts on economic and environmental values within near shore environments, threatening natural habitats, aquaculture, fisheries, aesthetics, tourism and in some cases human health.



The challenge facing coastal managers in an era of increasing globalization is how to eliminate established populations of marine pests, and to slow the increasing onslaught of new invasions, in particular targeting potential "high impact" species.

An obvious solution to this problem is to copy the biosecurity strategies developed in terrestrial environments (for agricultural diseases and pests) into the marine environment. An effective biosecurity strategy should include the following components:

- pre-border analysis of the vector hazard (who travels where, when and how often) and the species hazard (which organisms are present/absent and which threaten valued components of the marine environment);
- border surveillance that maximizes the probability of detecting new organisms and eradicating them before they establish a foothold; and,
- post-border containment and/or eradication of established pests.

In practice it is much harder to achieve biosecurity in the marine environment than the terrestrial environment because: a) it is virtually impossible to "quarantine" infected parts of near shore environments; and, b) a large number of unregulated vectors, such as small pleasure craft, operate within and between different coastal communities. Despite these difficulties, a number of nations around the world have embarked on a series of initiatives that represent the first seeds of a marine biosecurity strategy. Australia, for example, is implementing the following components:

- A ballast water Decision Support System to assess the bio-invasion risk posed by international vessels that intend to discharge ballast water into Australian ports and near-shore environments;
- Identifying "potential next pest" species that have a demonstrated invasion history and impact overseas but have yet to arrive in Australia;
- A nationwide Coordinating Committee for Introduced Marine Pest Emergencies to facilitate a rapid response to marine pest incursions;
- Detection kits that allow local stakeholders to identify and recognize the arrival of a new species in their communities;
- A centralized database holding information on invasive species, their relevant biological characteristics and techniques that have been used around the world to successfully eradicate them; and
- Genetic techniques that allow rapid and accurate identification of marine organisms and may ultimately provide an environmentally friendly means to eradicate established marine pests.

These initiatives are the first steps towards an effective biosecurity strategy for Australia's marine environment and offer valuable lessons to other countries. These initiatives can be integrated into an international framework that encourages information sharing between nations and allows "early warning" of the emergence of new and existing marine pests. The International Maritime Organization has begun the process of developing a global framework for ballast water risk assessment (GloBallast), with funding through the Global Environment Facility of the United Nations Development Programme. Much remains to be done, however, particularly for transportation mechanisms other than ballast water.

Man-made transportation mechanisms	
Ships:	accidental with vessel fouling (including boring into wooden hulls)
Ships:	accidental with solid ballast (rocks, sand, etc.)
Ships:	accidental with ballast water

Fisheries:	deliberate translocations of fish and shellfish to establish or support a new fishery
Fisheries:	accidental with deliberate translocations of fish and shellfish (particularly oysters)
Fisheries:	accidental with seaweed packing for bait and fishery products
Plant Introductions:	deliberate translocation of plant species (e.g., for erosion control)
Plant Introductions:	accidental with deliberate plant translocations
Biocontrol:	deliberate translocation as a biocontrol agent
Biocontrol:	accidental translocation with deliberate biocontrol release
Canals:	natural range expansion through man-made canals
Individual Release:	deliberate and accidental release by individuals (e.g., aquarium discards)
Scientific Release:	deliberate and accidental release as a result of research activities

For further information, contact Keith Hayes, Risk Analyst, Centre for Research on Introduced Marine Pests, CSIRO Marine Division, Australia; E-mail: keith.hayes@marine.csiro.au



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Balancing Coastal Public Access and Wildlife Habitat Needs

The increase in human demand for water-oriented experiences and shoreline development, concurrent with shrinking wildlife habitat area, raises the potential for interaction between the public and wildlife along the shoreline. Several issues arise when balancing these two needs, including:

- Understanding if public access adversely affects wildlife and, if so, how;
- Determining which types of access affect which species; and
- Determining if public access can be provided near habitats of sensitive species and if so, how the access should be sited, designed, constructed, and managed to avoid or minimize habitat degradation and impacts on the species.



While these issues are often raised to resource managers and coastal regulatory agencies during the deliberation process, the information may not be readily available. Moreover, as more state and local

governments and special districts (park, recreation and open space districts) require public access as part of their shoreline projects and planning permit authority, better information is needed to guide public policy decisions regarding human interaction with wildlife.

The San Francisco Bay Conservation and Development Commission (BCDC) has a twofold mission: to protect the Bay and its wildlife resources, and to provide maximum feasible public access to and along the Bay. Over the last 30 years, BCDC's policies on public access have evolved from the fundamental goal of creating and expanding public access, to the development of more complex policies that attempt to balance public access needs with wildlife



and habitat protection and enhancement. However, in the many years since BCDC's policies were created, available information on the effects of public access on wildlife has increased and concern over this issue has grown. To address these concerns, the BCDC embarked upon an in-depth two-year research and policy development process, called the Public Access and Wildlife Compatibility Policy Development Project.

To ensure public participation, a broadly representative Policy Advisory Committee was formed that met over the course of a year. The Policy Advisory Committee provided a forum for public input and debate and helped facilitate consensus among regional public agencies and non-profit organizations on policy recommendations. The Committee comprised individuals representing a wide range of professional fields, geographic areas and public interests, including biologists (consultant, academic and agency), resource managers, regional park district employees, environmental planners, landscape architects, and non-governmental organization activists, including both recreation and wildlife protection advocates.

A nationwide opinion survey of natural resource area and park and recreation managers was conducted concerning the effects of public access on wildlife and the use of siting, design and management strategies to avoid or minimize potential adverse effects on wildlife. The selected survey participants manage local, state, and federal reserves, parks, refuges, open spaces, recreation areas, and wildlife management areas in Great Lakes and coastal states nationwide.



The combined information gathered from the survey, extensive literature searches, speaking with experts and government agency representatives, and attending site visits and conferences allowed the following conclusions to be drawn from the project:

- Access to the Bay allows the public to discover, experience and appreciate the Bay's natural resources and can foster public support for Bay resource protection.
- Studies indicate that public access may have immediate effects on wildlife (including flushing, increased stress, interrupted foraging, or nest abandonment) and may result in adverse long-term population and species effects.
- Different kinds of disturbances have different effects on different species - effects are context dependent. Accurate characterization of site, habitat and wildlife conditions, and of likely human activities, provides information critical to understanding potential effects on wildlife.
- Potential adverse effects from public access may be avoided or minimized through the employment of siting, design and management strategies, such as education and outreach programs, activity type and user behavior restrictions, buffers, and periodic public access closures.
- Providing diverse and satisfying public access opportunities can reduce the creation of informal access routes which will decrease interaction between humans and wildlife, habitat fragmentation, and vegetation trampling and erosion. Formal public access also provides for more predictable human actions, which may increase the ability of wildlife to adjust to human use.
- There is a need for more scientific studies on the types and severity of effects of specific human activities on wildlife. More studies are also needed on the effects of siting, design and management strategies on the type and severity of impacts of human activities on wildlife.

The BCDC's Public Access and Wildlife Compatibility Project culminated in the revision and adoption of the BCDC's *San Francisco Bay Plan* public access findings and policies. The revised findings and policies better reflect current knowledge on the interactions of public access and wildlife and provide more detailed policy guidance on providing maximum feasible public access while protecting wildlife from significant adverse effects. As a component of the revised findings and policies, BCDC staff is currently updating its advisory, *Public Access Design Guidelines* to include information on specific siting, design and management strategies to avoid or minimize adverse effects of public access on wildlife.

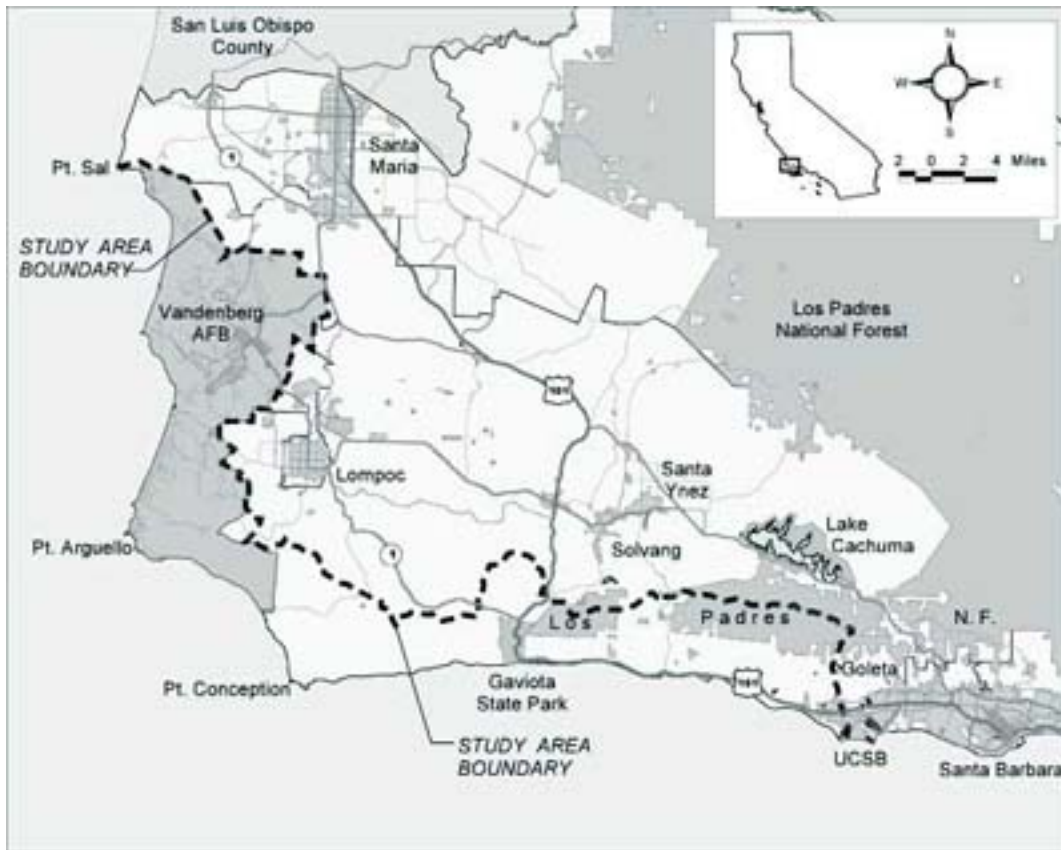
For more information, contact Caitlin Sweeney, Coastal Planner, San Francisco Bay Conservation and Development Commission, 50 California Street, Suite 2600, San Francisco, CA 94111; Phone: (415) 352-3643; E-mail: caitlins@bcdc.ca.gov.



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The Future of the Gaviota Coast Southern California's Last Coast



West of Santa Barbara lies a 76-mile stretch of coastline that some call the "Last Coast." While it includes only 15 percent of the total coastline in southern California, it contains 50 percent of the remaining rural coastline and represents the last significant relatively undeveloped stretch of coast. But the situation is changing. Large acreages of privately owned lands along the Gaviota Coast are on the market and proposed for development. Decisions and investments in the next five years will largely determine how much of the remaining rural coastline of Southern California will be protected or developed.

For the last decade, conservationists have sought to elevate the debate over how to protect this unique coastline. In November, 1999, Congress directed the National Park Service to conduct a special resource study of the Gaviota Coast to evaluate alternatives for protection, including whether or not portions of it should be included in the National Park System.



The 200,000-acre study area contains 76 miles of scenic coastline between Coal Oil Point at University of California-Santa Barbara and Point Sal, where the Guadalupe Mountains meet the Pacific Ocean. The study area is a mosaic of publicly and privately held land, including Vandenberg Air Force Base (102,000 acres), Los Padres National Forest (29,400 acres), California State Parks (3,000 acres), Bixby Ranch (24,500 acres) and Hollister Ranch (14,500 acres).

The National Park Service study concluded that the Gaviota Coast is nationally significant for its natural, cultural and recreation values. The natural resource array is especially rich due to the convergence of the south coast and the central coast bioregions along the crest of the east-west Santa Ynez Range. The south coast bioregion is one of five places in the world in which the rare Mediterranean Ecosystem/Floristic Province occurs.

Other natural resource characteristics that contribute to the area's uniqueness include the convergence of two major ocean currents off Point Conception, and the Santa Ynez and San Antonio Rivers as well as many coastal canyons, which support some of the richest riparian habitats in the Southwest. Fourteen thousand species have been documented along the Gaviota coast, including 13 threatened and endangered species and 54 species of concern. The area's cultural and historical significance is underscored by the density and integrity of 9,000 year-old Chumash archeological sites, historic sites representing Spanish settlement and Mexican ranchos, as well as historic space launch sites. Many expansive coastal scenic vistas and outdoor recreation opportunities add to the area's significance.

While over half the area is protected through public ownership, there are major concerns over future uses on many of the private lands.



Historically, agriculture was the major land use, but high land values and a strong market for "trophy estates" and houses are driving land speculation and converting agricultural operations to subdivisions, resorts and large home estates. The median home price on the south coast of Santa Barbara County reached \$629,000 in 2000. The pressure to develop is more apparent in the eastern portion of the study area where many land owners are not renewing their Williamson Act contracts, which keep the land reserved for agricultural use. Some land owners sued the County over lot line adjustments, which limited the development potential of their properties. And more development proposals are now being brought before Santa Barbara County officials



Some large parcels of open space have already been permanently lost to the public. Hollister Ranch, which includes eight miles of the Gaviota Coast, was subdivided into 100-acre lots before the California Coastal Commission was established and is completely closed to public access. Last year, the historic Naples subdivision plat was upheld by the California Supreme Court, enabling unprecedented densities along this stretch of coast. The Bixby Ranch has been proposing subdivisions over the last two decades and, along with several other large properties, is currently on the market.

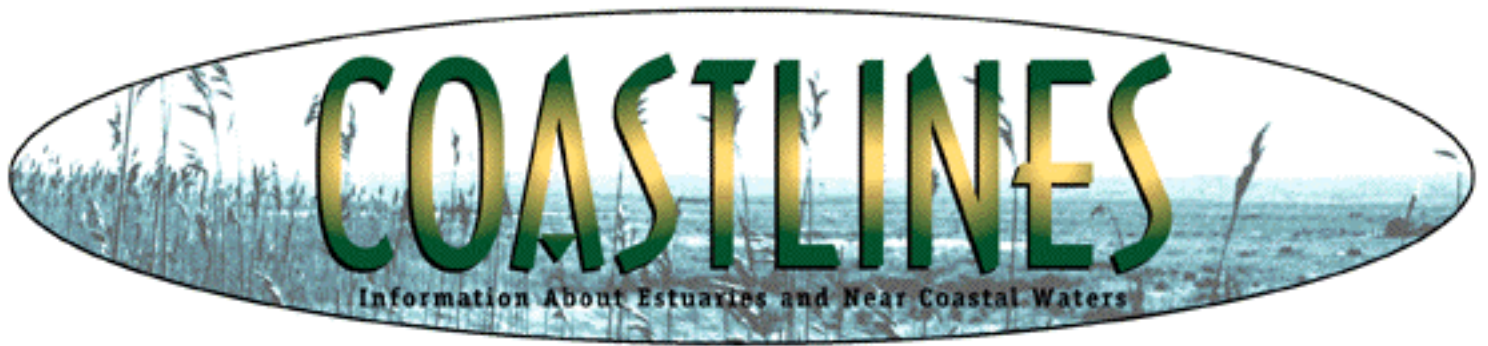
But there are some encouraging signs for protecting the Gaviota Coast, including the purchase of the 700-acre Arroyo Hondo Ranch, for a nature preserve, and two have sold agricultural easements to a local land trust. A locally-initiated protection strategy, referred to as Common Ground, is beginning to focus its efforts after a highly contentious first 10 months. And through a Special Resource Study, the National Park Service is evaluating how exceptional, nationally significant landscapes and resources in the study area can best be protected, how compatible uses such as agriculture can be sustained, and how public access and educational opportunities can be assured for future generations.

It is obvious that an adequate degree of long-term protection can only be guaranteed through acquisition of fee ownership and agricultural and conservation easements. Given the acreage and high market prices of land along the Gaviota coast, timely protection efforts will require the combined focus of local, state, federal, and nonprofit agencies.

A draft of the National Park Service's Gaviota Coast Special Resource Study Report will be available in early 2002. Public review and comment on the draft report will hopefully advance the debate over the future of the Gaviota Coast.

For further information, contact Ray Murray, National Park Service, Planning and Partnerships Team Leader; Phone: (510) 817-1439; E-mail: PGSO_Gaviota@nps.gov or visit the website

<http://www.nps.gov/pwro/gaviota/>. 



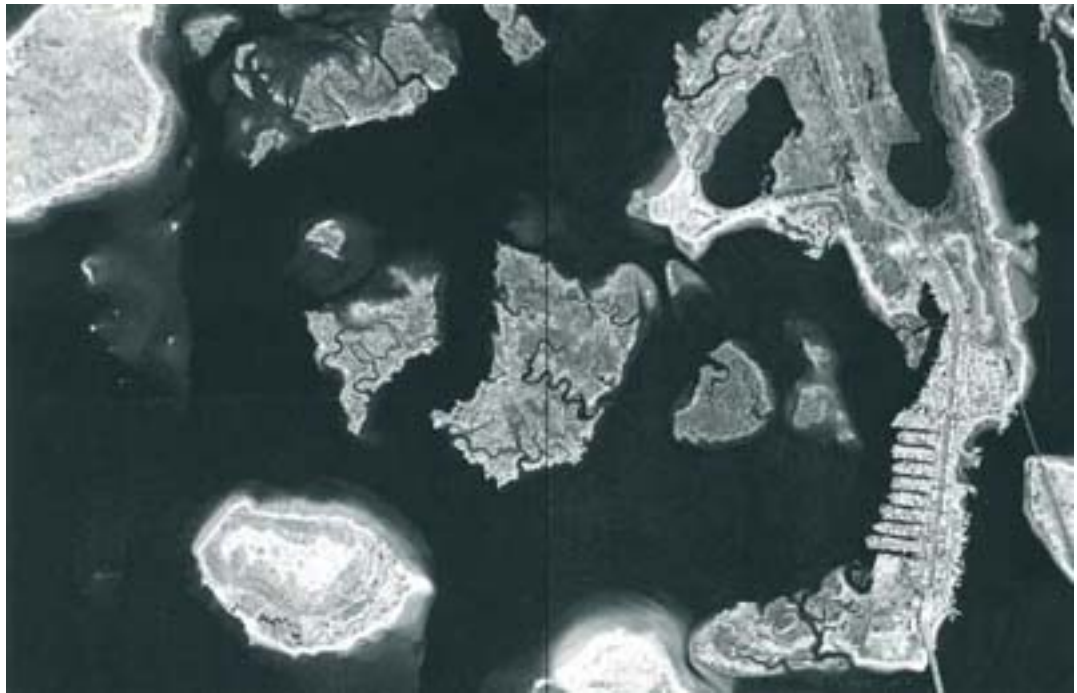
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Where Did All The Grass Go? Sudden Marsh Loss in Jamaica Bay, New York

Jamaica Bay, located at the southwestern end of Long Island, New York, consists of a mosaic of marsh islands separated by intertidal flats and deeper channels. Recent catastrophic losses of tidal marsh vegetation within the bay prompted the creation of a Blue Ribbon Panel convened by the Gateway National Recreational Area. The Panel was charged with developing ideas about the causes of the problem and suggesting possible remediation measures.

With little site-specific data, the Panel examined the problems via a conceptual model of the natural system. Based on historical maps and regional geology, the Panel assumed that the marshes originally developed in the bay when vegetation colonized sandy overwash and inlet deposits that resulted from the east-west movement of Rockaway Inlet, the entrance to Jamaica Bay. Once marsh vegetation was established on these sandy bars, it maintained itself by accumulation of fine sediments and plant matter at a more rapid rate than historical sea level rise.



A number of man-made alterations have occurred in the Jamaica Bay estuary – many of which alone might not present a major threat to the system, but cumulatively appear to have stressed the marshes to their limit. The potentially important changes noted by the Panel included:

- The position of Rockaway Inlet was stabilized, potentially limiting the exchange of sediments between the bay and ocean below historic levels.
- Dredging in the vicinity of the inlet has altered the way in which sediment moves into the system from the ocean.
- The shorelines around the edge of the bay have been stabilized and the barrier beach developed, effectively limiting overwash of sands during storms that historically may have contributed sediment to the marshes.
- The hydrodynamics and circulation of the bay have been severely altered by the construction of a causeway to support a road, the dredging of navigation channels, the dredging of deep burrow pits to provide fill for JFK airport, and the extension of one of the airport runways into the bay.
- Both landfills and wastewater treatment plants have contributed massive amounts of nutrients and contaminants to the bay.
- Changes in land use and thus runoff within the watershed of the bay have altered the character and amount of freshwater and sediments delivered to the bay.

In general terms, the Panel identified two types of marsh loss: lateral erosion, which occurs around the edge of marsh islands, and interior ponding and submergence, which occurs in the central parts of islands even when the edges are still intact.

The Panel identified the three factors that most likely caused the marsh loss:

1. The dredging of channels and borrow pits in the bay has resulted in a sediment sink, thus removing a source of sediment that was historically available to maintain marsh elevation against sea level rise. The lack of sedimentation increases water depth and wave activity across the tidal flats.



2. Dense banks of mussels (*Guekensia demissa*) along the marsh edge can block small marsh drainage channels. This causes water to pond on the marsh surface for long periods after high tides, waterlogging the marsh soil and stressing marsh vegetation.

3. Inlet stabilization and dredging activities near the inlet have reduced the amount of sediment coming into the bay from the ocean. Reduced sediment supply, combined with sediment sinks in the dredged areas, limits sedimentation on marshes and tidal flats.

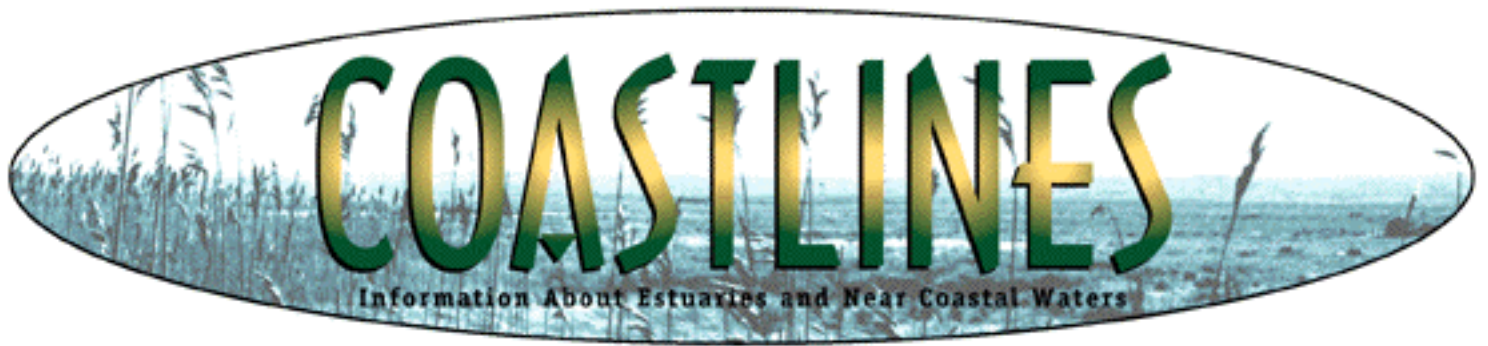
Other potential causes of marsh loss include the effects of vigorous sea lettuce (*Ulva* sp.) growth, probably stimulated by high nutrient loading which smothers other marsh vegetation and limits growth; the effects of increased boat traffic causing wakes that erode marsh edges; and a period of increased sea-level rise during the 1990s that may have further exacerbated waterlogging of marsh soils. Lastly, the Panel considered that as erosion proceeds and marsh islands diminish in size, fetch will increase across the bay, producing more wave action and thus creating more erosion.

The Panel recommended focused studies to assist the Gateway National Recreational Area in its evaluation of Jamaica Bay. These included experimental studies to determine the role of mussels and sea lettuce on the marsh surface, sediment cores and surveys to define flooding regimes and sediment sinks, and a more detailed spatial and temporal analysis of aerial photography.

The Panel also urged that some trial remediation projects begin soon. These might include building marsh islands in some areas by placing clean dredged material and planting vegetation, or protecting the remaining marsh islands from wave action by using structures or by altering the slope of the marsh edge.

These investigations and pilot projects will increase understanding of the problem and demonstrate that continued catastrophic marsh loss is not inevitable in Jamaica Bay. However, even if management and restoration actions increase future marsh acreage, the ecosystem will still be fundamentally impaired unless existing and proposed human alterations of the Jamaica Bay estuary are addressed.

Copies of the Blue Ribbon Panel report are available from Dr. John Tanacredi, Chief of the Division of Natural Resources at Gateway National Recreational Area; Phone: (718) 354-4520. For further information, contact Denise J. Reed, Department of Geology and Geophysics, University of New Orleans, New Orleans LA 70148; E-mail: djreed@uno.edu



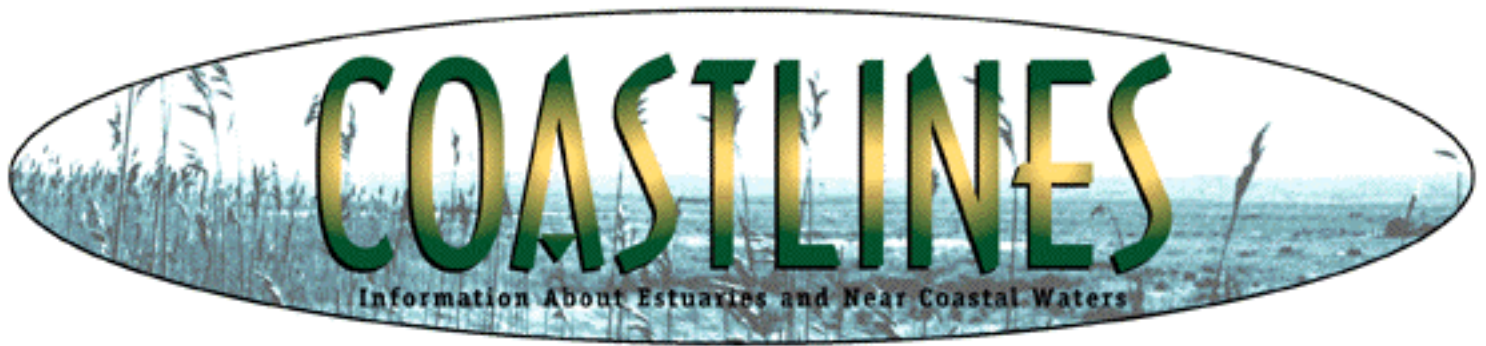
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EPA Makes Grants Available to States for Beach Monitoring Programs

EPA is announcing the availability of approximately \$2 million in grants for coastal and Great Lakes states to protect human health at our nations' beaches. Last year, monitoring data were submitted for approximately 2,000 beaches nationwide. Of those beaches, one-third were either closed to swimming or had swimming advisories issued due to poor water quality at least once during the season. With an estimated 910 million Americans visiting our coasts each year, communities need an effective way to notify the public of potential threats. The grants, made possible under the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000, will assist states and territories to develop programs for monitoring and informing the public of bacterial contamination in recreational waters.

For further information on the BEACH Act grants, contact your EPA Regional beach program representative or Charles Kovatch; Phone: (202) 260-3754; E-mail: kovatch.charles@epa.gov or visit the EPA website at: <http://www.epa.gov/waterscience/beaches/grants/>.



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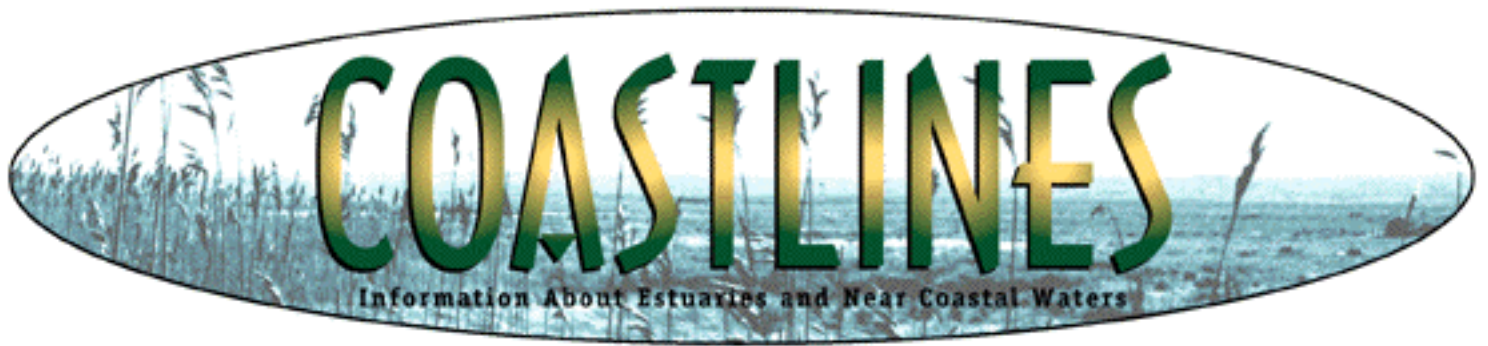
Guiding Principles for Constructed Treatment Wetlands

The EPA's Wetlands Division has released a report, entitled "Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat" (EPA843-B-00-003). This report is the result of the collective efforts of the Interagency Workgroup on Constructed Wetlands to promote the development of environmentally beneficial constructed wetlands for water treatment systems. The report provides concise information on the legal, policy, and technical issues associated with these systems, as well as guidelines for those developing and managing constructed treatment wetlands. It also features guiding principles for planning, siting, design, construction, operation, maintenance and monitoring of constructed treatment wetlands.

Copies of the report are available from the EPA's Wetlands Help line; Phone: (800) 832-7828, or via FAX: (703) 748-1308. The publication is also available on line at:

<http://www.epa.gov/owow/wetlands/constructed/guide.html>.

For further information, contact Judy Long, US EPA, Washington, DC; Phone: (202) 260-7594



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Interagency Campaign to Celebrate National Estuaries Day over the Internet

On Saturday, September 29 the 13th Annual National Estuaries Day commenced and communities across the country learned about the importance of estuaries. The National Oceanic and Atmospheric Administration's National Estuarine Research Reserve System hosted a live field trip over the Internet on, called "Estuary Live." The Environmental Protection Agency, the Ocean Conservancy and Coastal America worked with NOAA's estuarine reserve system to participate in and promote the program.



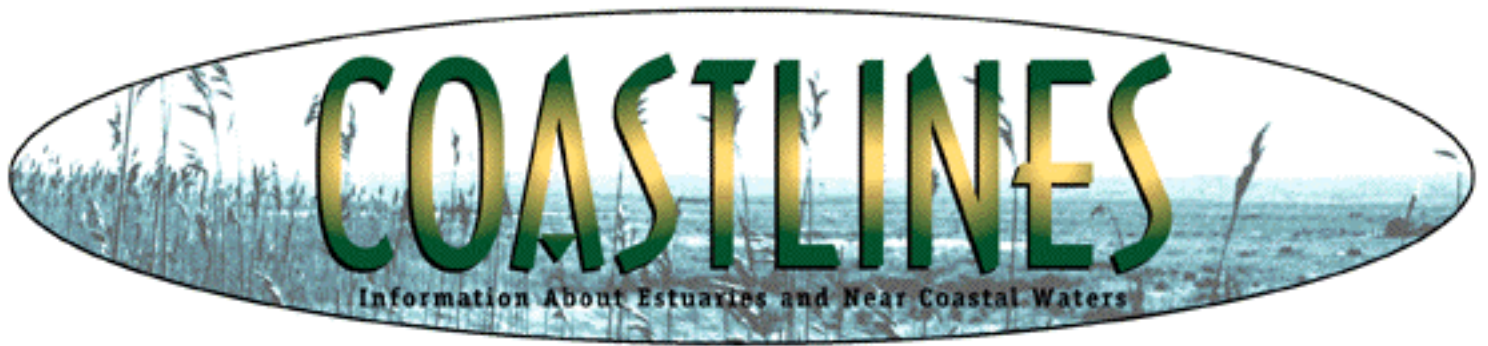
During Estuary Live, participants were able to E-mail questions to a naturalist and hear the response during the Internet broadcast. The program highlighted estuaries as nursery areas for fish and shellfish, buffers that protect coastal areas from flooding and important habitat for birds and other wildlife. A portion of the Estuary Live program was in Spanish, highlighting the Jobos Bay National Estuarine Research Reserve, in Puerto Rico. Another segment featured NOAA's National Ocean Service, National

Weather Service, National Marine Fisheries Service and the connection between these agencies and estuaries.

The North Carolina National Estuarine Research Reserve has been conducting Estuary Live programs for four years. This is the first time the broadcast included multiple live sites. The Jacques Cousteau National Estuarine Research Reserve, in New Jersey, and the North Inlet-Winyah Bay Reserve, in South Carolina, provided educational programs live over the Internet during the Estuaries Day session. In addition, pre-recorded material on estuaries in Maine, New Hampshire, Massachusetts, Rhode Island, Ohio, Maryland, Washington, Oregon and other areas were showcased.

"The Estuary Live program was a great success. We had entire classrooms log on to watch," stated Amy Saul, coastal education specialist at the North Carolina Reserve. "We had a positive response from students and teachers from all over the country. It was a great way to connect the nation and share information about an important coastal area that is under great stress."

More information about National Estuaries Day, Estuary Live and the partners who participated can be found at <http://www.estuaries.gov/>. [EXIT disclaimer >](#)



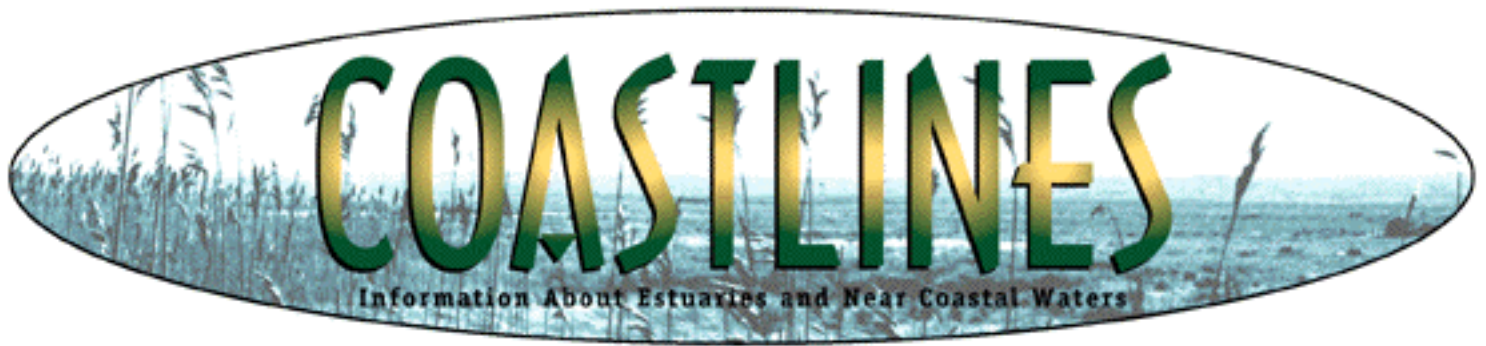
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Using Remote Sensing to Address Coastal Management Issues: The Maine Project

Recent improvements in computer software and hardware have allowed remote sensing and geographic information systems to play an increasing role in the management of the nation's coastal resources. This CD-ROM provides examples of the ways in which many organizations in Maine are using this information and technology.

Copies of this CD-ROM may be requested by contacting the NOAA Coastal Services Center Clearinghouse, 2234 South Hobson Avenue, Charleston, South Carolina, 29405-2413, Phone: (843)-740-1210; FAX: (843) 740-1315; or E-mail: clearinghouse@csc.noaa.gov



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Fisheries in Hot Water! Remote Sensing and Thermal Impacts in Mt. Hope Bay

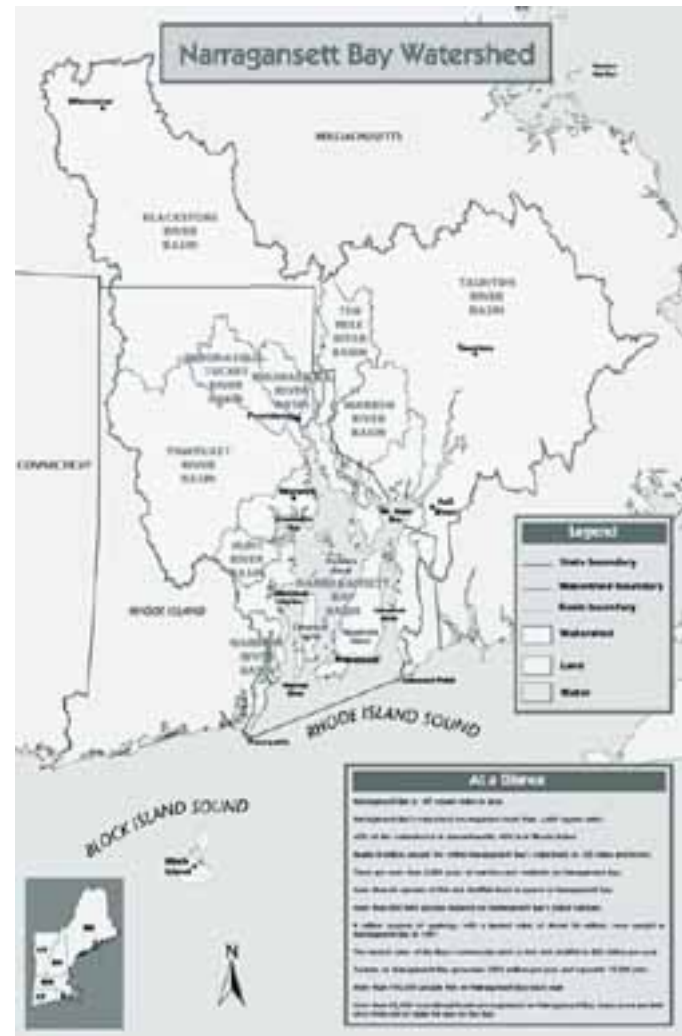
Fisheries Decline in Mt. Hope Bay

Mt. Hope Bay is a 14 square mile estuary shared by Rhode Island and Massachusetts, part of the larger Narragansett Bay ecosystem. In 1986, fisheries biologists from the Rhode Island Department of Environmental Management (RIDEM) were startled at the results of monthly fish surveys taken in Mt. Hope Bay. Eighteen of twenty-one key species showed dramatic reductions and several species, including winter flounder with an 87% decline, had virtually disappeared. Subsequent years' data showed similar trends, adding to the concern over the declines. In Mt. Hope Bay, the Providence Journal reported, there existed a "unique, across-the-board loss in aquatic life."

In the mid-1990s, state and federal officials formed an advisory committee to investigate the Mt. Hope Bay

issues. Pursuant to the advisory committee discussions, RIDEM fisheries scientists issued a report in 1996 documenting the declines in fish populations. The report identified the Brayton Point power generating plant, situated at the head of the bay in Massachusetts, as the "most likely" cause of the reductions. The plant is allowed to discharge cooling waters (thermal effluent) that are up to 23 degrees higher than the bay's ambient temperature, with a maximum cap at 95 degrees Fahrenheit. The report pointed to changes in the plant's operating permit in 1985 that allowed a 30% increase in the amount of water drawn by the plant for cooling purposes. The plant currently cycles through up to 1.4 billion gallons a day, exchanging approximately the entire volume of Mt. Hope Bay in one month.

Although a direct causal relationship had not been established, RIDEM scientists suspected that the plant's thermal effluent was having negative impacts on the bay ecosystem. Changes in temperature can affect the metabolism, reproduction and recruitment success of fish and other organisms; beyond a certain tolerable range, prolonged exposure can be lethal. RIDEM also presented data indicating that the heated plume of water from the plant exceeded Rhode Island's standards for thermal change. In 2000, the State of Rhode Island requested that power plant officials consider voluntary reductions in the amount of water used for cooling; state officials also alluded to a possible nuisance suit to remedy a lack of action by the plant. Plant officials demurred, stating that they would not make any changes until required by the Environmental Protection Agency's permit conditions. The power plant, owned by an affiliate of Pacific Gas & Electric, is one of an older generation of fossil-fueled power plants holding "grandfathered" permit conditions less stringent than newer plants.



(Click on image for larger version)

Application of Remote Sensing Technology to the Problem


In 1995, R. I. Congressman Patrick Kennedy asked the National Aeronautic and Space Administration (NASA) to apply its expertise in remote sensing technologies to an applied management problem in Narragansett Bay. The Mt. Hope Bay thermal effluent issue provided an excellent opportunity to apply these technologies in the context of a private/public partnership.

Scientists at the Brown University Department of Geological Sciences, led by Dr. John Mustard and in partnership with NASA, the RIDEM Narragansett Bay Estuary Program, Save The Bay, Inc., Applied Science Associates, Inc. and the Environmental Protection Agency. The project used digital images from satellites and thermal sensing and optical data gathered via aircraft-based sensors to show the timing and

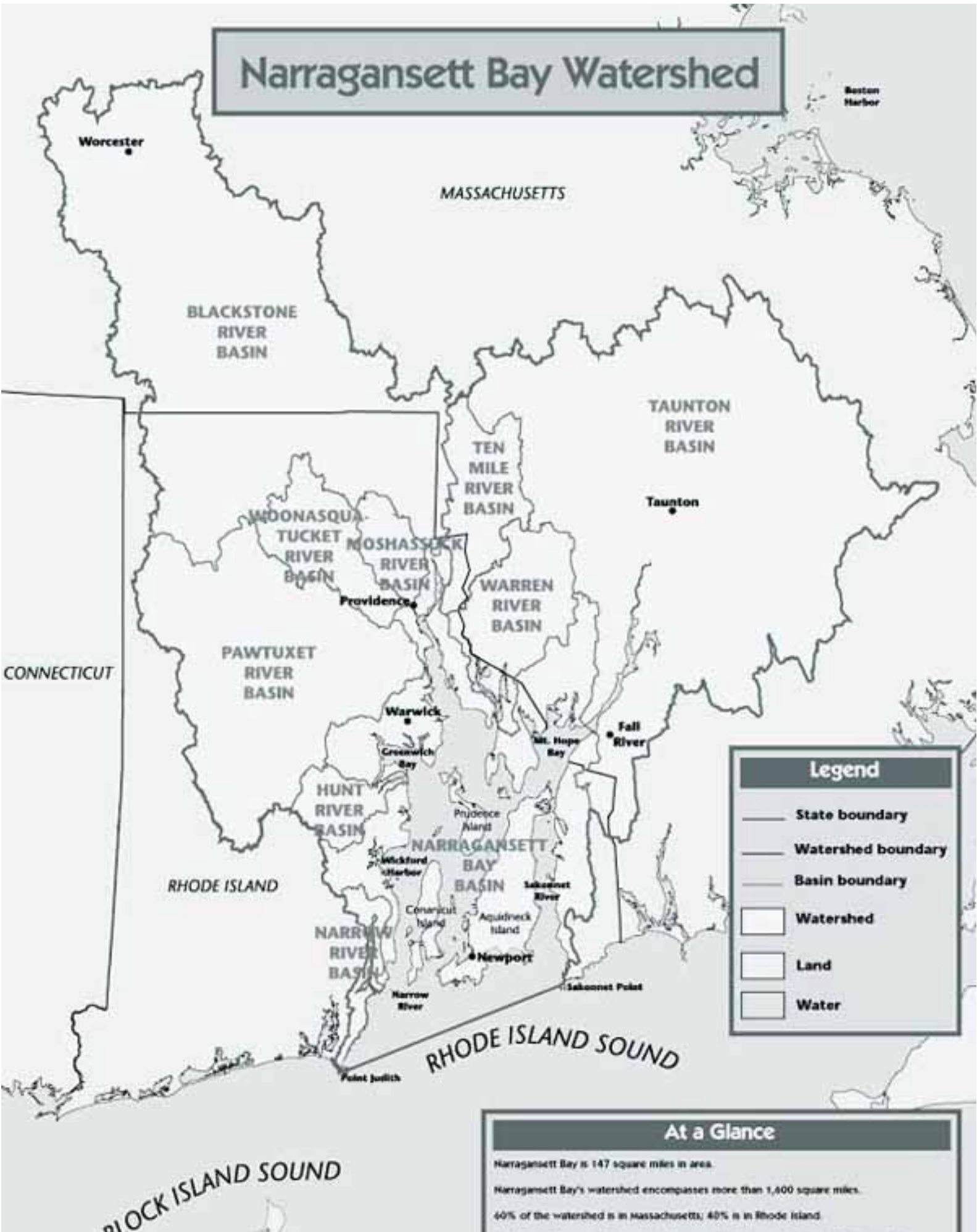
extent of heating in Mt. Hope Bay. The project consisted of three elements:

- 1) a time-series analysis of the surface temperature of Narragansett Bay from Landsat data covering the time period 1984 to the present;
- 2) a study of the dynamics of water temperatures over the tidal cycle, with extensive field work to verify and validate the remotely acquired data; and
- 3) detailed 3-D hydrodynamic modeling of water movements in Narragansett Bay.

With funding from NASA and the Rhode Island Aquafund, the project spanned from 1996-2000. A project report released in June, 2001, confirmed what R.I. DEM had suspected: the plant had raised the average summer and fall bay temperature by as much as 2 degrees Fahrenheit, and the effects of the heating covered a larger area than previously thought. The report concluded, "The simplest and most likely explanation for the relatively warm year-round temperatures in Mt. Hope Bay is the constant discharge of thermal effluent into the bay by the Brayton Point Power Station." Dr. Mustard stated that the plant indisputably alters the bay habitat and that "...it is clear in most people's minds that the decline in the fish population in the 1980s corresponds with the opening of another generator in 1985." The project results strengthen the argument that the plant's thermal discharges are related to the fisheries declines. Referring to the position of the plant's owners, Congressman Kennedy said, "They won't be able to ignore this...they are looking at a liability." Though plant's operating permit expired in 1998 it is still operating under the old permit conditions while its parent company and regulators negotiate a new permit.

This collaborative project, entitled "Narragansett Bay from Space: A Perspective for the 21st Century" was designed to help state and local agencies apply NASA's technology to environmental problems, integrating the resulting data in planning and decision-making while providing opportunities for small businesses who would benefit by incorporating remotely sensed data into their operations. One promising result of the project is potential use of remote sensing technology to monitor bay conditions, particularly in assessing phytoplankton activity and concentrations. Further information on the project is available at <http://www.planetary.brown.edu/~mustard/apurva/index.html>. 

For further information, contact Richard Ribb, Director, Narragansett Bay Estuary Program; E-mail: rribb@dem.state.ri.us; Christopher Deacutis, Ph.D., Scientific Coordinator, Narragansett Bay Estuary Program; E-mail: deacutis@etal.uri.edu or John Mustard, Ph.D., Associate Professor, Department of Geological Sciences, Brown University; E-mail: mustard@porter.geo.brown.edu



BLOCK ISLAND



40% of the watershed is in Massachusetts; 40% is in Rhode Island.

Nearly 2 million people live within Narragansett Bay's watershed, in 100 cities and towns.

There are more than 3,500 acres of marshes and wetlands on Narragansett Bay.

More than 60 species of fish and shellfish feed or spawn in Narragansett Bay.

More than 200 bird species depend on Narragansett Bay's island habitats.

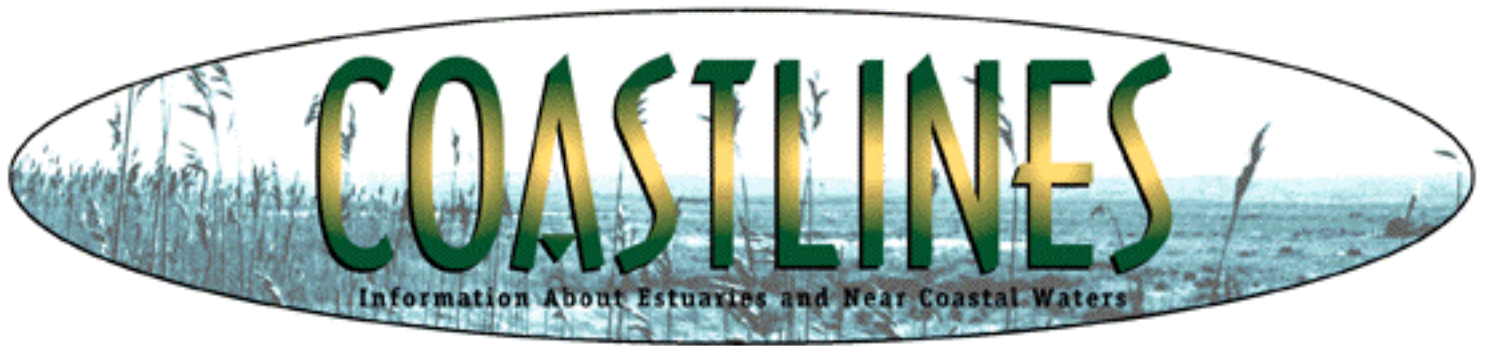
8 million pounds of quahogs, with a landed value of about \$4 million, were caught in Narragansett Bay in 1997.

The landed value of the Bay's commercial catch of fish and shellfish is \$25 million per year.

Tourism on Narragansett Bay generates \$400 million per year and supports 15,000 jobs.

More than 100,000 people fish on Narragansett Bay each year.

More than 29,000 recreational boats are registered on Narragansett Bay; many more are trailered from out of state for use on the Bay.



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Rhode Island Coastal Eelgrass Habitat Maps Now Available Through Interactive Website

The Rhode Island Coastal Resources Management Council (CRMC) and the University of Rhode Island Environmental Data Center have collaborated to produce a collection of coastal Rhode Island eelgrass (*Zostera marina*) data sets in a geographic information system, which are available over the Internet. The purpose is to provide a single, comprehensive repository for geographic eelgrass data in Rhode Island, and to provide resource managers and the public with an interactive way to access the data.

Areas of eelgrass were mapped in the early 1800s. Since then, numerous groups have contributed maps of eelgrass habitats. The most notable and recent data are the Narragansett Bay Estuary Program's Marine and Estuarine Habitat Maps, which show eelgrass bed habitats larger than an acre in Narragansett Bay. Other initiatives include studies of historic eelgrass presence by Rhode Island Sea Grant and the Narragansett Bay Project, maps completed as part of research projects at the University of Rhode Island, and 1999-2000 state surveys.

With this information, resource managers and biologists can better determine what areas are in need of protection, further mapping or research, and the public can learn more about the status of eelgrass resources in Rhode Island.

For further information, visit the Coastal Resource Management Council, Natural Resource and Environmental Management website at <http://www.edc.uri.edu/eelgrass/>. [EXIT disclaimer >](#)