

State of the Bay

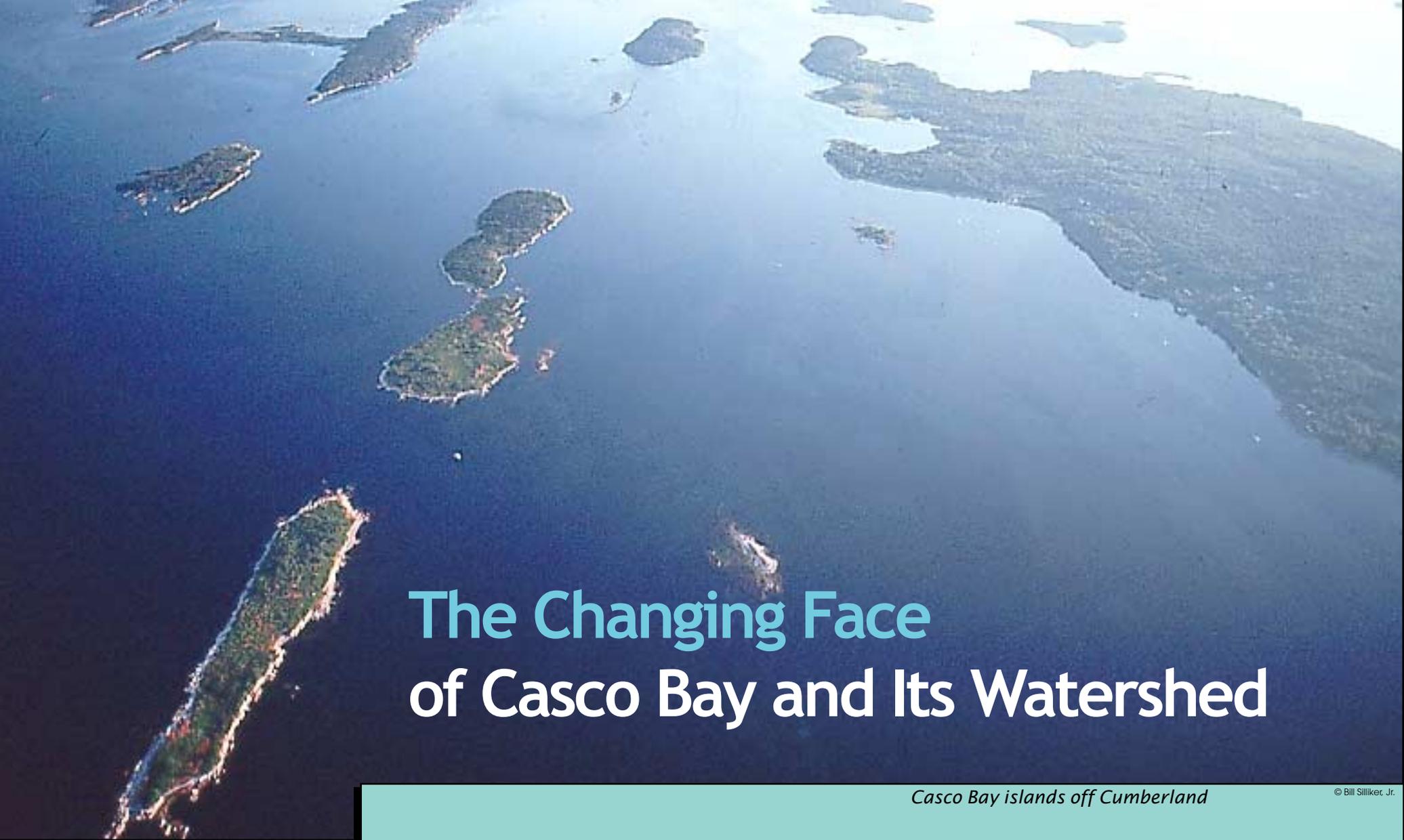


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Casco Bay Estuary Project





The Changing Face of Casco Bay and Its Watershed

Casco Bay islands off Cumberland

© Bill Silliker, Jr.



Life on the shores of Casco Bay brings constant change—the Bay is a dynamic ecosystem ceaselessly moving in response to weather, season and tide. Some of the change comes from natural cycles; some from human activity.

This flyer describes how we are affecting the Bay and its watershed—for worse and for better. Toxic pollution, degraded wildlife habitat and diminished water quality have taken a toll on the Bay's resources. Fortunately, the Bay has a tremendous *human* resource: a corps of devoted volunteers working to protect its health. The following pages describe what's in Casco Bay, how it got there, and what individuals and groups are doing to sustain the watershed.

Starting in 1990, citizens and groups joined forces to shape a plan for the Bay's future. The *Casco Bay Plan*, completed in 1996, now fuels collaborative projects around the watershed involving municipal and state officials, community groups, businesses and citizens. The Casco Bay Estuary Project, which coordinates these efforts, represents the sum of its partners—a dedicated and caring group of people who work tirelessly to care for the Bay.

On the following pages, you'll read about what these partners have accomplished in the past four years—with generous support from the U.S. Environmental Protection Agency and the Maine Department of Environmental Protection.

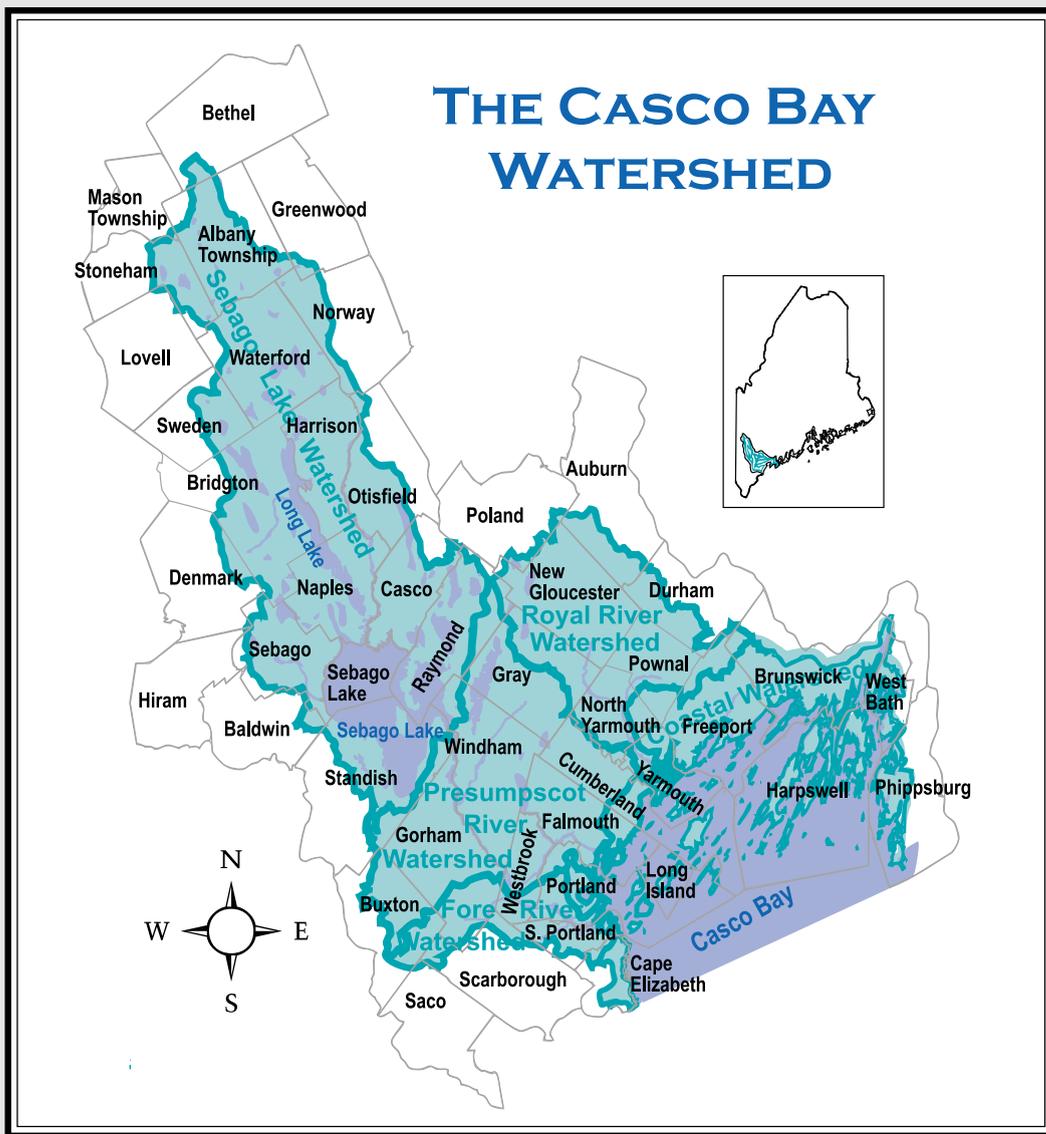
Imagine how much more could be done if everyone in the watershed got involved. This flyer suggests ways you can help, from taking small household steps to joining in community projects. By changing our own actions, we can help sustain the health of Casco Bay.

Katherine Groves

Katherine Groves
Director, Casco Bay Estuary Project

© Steve Delaney

State of the Bay 2000



WHEN WE LOOK AT MAPS of our home communities, we typically see town and county lines, roadways, and perhaps some waterways. Maps rarely show the boundaries of our watershed: all the terrain over which water travels when flowing into a particular river, lake or estuary. Major estuaries like Casco Bay have a large watershed that encompasses many smaller watersheds.

- The watershed of Casco Bay contains only 3 percent of Maine’s land mass but a quarter of its population (270,000 people).
- The watershed encompasses 41 municipalities, extending over a 985-square mile area that reaches west to Bethel.
- Casco Bay has 578 miles of shoreline, including 758 islands. The Bay reaches from Two Lights in Cape Elizabeth to Cape Small in Phippsburg. The principal rivers that flow into Casco Bay are the Fore, Stroudwater, Presumpscot and Royal.
- A 1994 study estimated the value of Casco Bay’s fishing industry at \$120 million a year, with tourism and recreation around the Bay generating another \$250 million a year.

Fishing contributes greatly to the Casco Bay region’s economy.



What Is an Estuary?

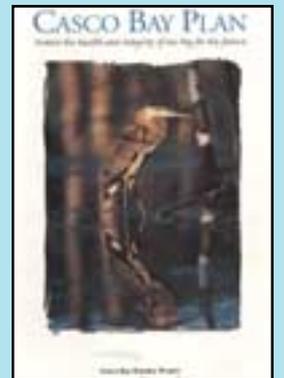
ESTUARIES ARE COASTAL AREAS where fresh and salt water mix, creating some of the most productive habitats on earth. Estuaries act as “nurseries of the sea:” more than two-thirds of fish species depend on them during part or all of their life cycles. They provide vital habitat for wildlife and protect the land from storm erosion.

Many of the country’s estuaries have been hard hit in recent decades by pollution, habitat loss and development. To help protect coastal waters, Congress established the National Estuary Program in 1987. Casco Bay is one of 28 estuaries that receives major funding from the U.S. Environmental Protection Agency for coastal research, public education and community action.

Casco Bay Estuary Project

THE CASCO BAY ESTUARY PROJECT seeks to preserve the Bay’s diverse values, collaborating with partner groups to ensure sound environmental stewardship through public involvement and cooperative management. In 1990, the U.S. Environmental Protection Agency designated Casco Bay “an estuary of national significance” and provided substantial support to help plan for the Bay’s future. Area citizens worked closely with representatives of federal, state and local government, business and industry, and research institutions to develop a plan for managing the Casco Bay watershed. Since the *Casco Bay Plan* was adopted four years ago, area residents and groups have taken measures to:

- protect wildlife habitat;
- improve water quality;
- reduce pollution from stormwater runoff and combined sewer overflows;
- reduce toxic pollution; and
- protect and restore clamflats and swimming areas.



Volunteers clean up Back Cove in Portland



Testing the Waters: *How Clean Is Casco Bay?*

© Bill Stillker, Jr.

Is the Bay's Water Quality Improving?

IN ASSESSING THE HEALTH OF CASCO BAY, it's essential to know whether water quality is improving or declining. Friends of Casco Bay, with support from the Casco Bay Estuary Project, has begun creating a baseline of information—monitoring surface waters at 106 sites throughout the Bay. Since that effort began in 1993, 300 trained volunteers have tested water samples—from April through October—for water temperature, dissolved oxygen, pH, salinity, and water clarity.

Results from the last six years of testing represent the *only* long-term collection of Casco Bay water quality data, providing an invaluable resource for municipal and state planners and local conservation and shellfish commissions. Preliminary findings reveal that the Bay's water quality is generally good but cause for concern remains in certain areas. Ten sites in Casco Bay fell below the recommended state standard for dissolved oxygen, particularly near the mouth of key

tributaries and where tidal flushing is limited (such as Quahog Bay and the New Meadows River). Test results should help communities around the Bay clean up existing pollution sources and prevent future contamination from occurring.

Consistent water quality tests can help address concerns such as red tide, algal blooms and elevated bacterial counts that close areas to swimming and shellfish harvesting. One potential problem, low dissolved oxygen or hypoxia, occurs in warm weather when levels of dissolved oxygen drop naturally and can fall to dangerously low levels in areas with increased nutrients and poorly mixed waters. These conditions were responsible for past pogy kills in the New Meadows River. The Casco Bay Estuary Project is funding ongoing tests for hypoxia around the Bay to help determine what role human actions might play in triggering these events.



Friends of Casco Bay



Friends of Casco Bay

Above: Frank Leavitt, a volunteer monitor with Friends of Casco Bay, prepares a titrator for a dissolved oxygen test. Left: Low oxygen levels brought about massive pogy kills in Quahog Bay during 1991-92.

What You Can Do

- ✓ Fix oil and gas leaks in your vehicles as soon as you notice signs of leakage.
- ✓ When boating, bring human waste and trash back to shore for proper disposal.
- ✓ Use nontoxic household cleaners and properly dispose of oil, gas, and paint.
- ✓ Volunteer to monitor water-quality. Contact any of the following groups for further information:

Friends of Casco Bay, 799-8574 or pmilholland@cascobay.org

Friends of the Royal River, John MacKinnon at 829-4730 or jmackini@maine.rr.com

Presumpscot River Watch, Helen Chabot at 822-6356

Friends of the Presumpscot River, 892-8381 or coveredbridge@skywizard.com

New Meadows River Watershed Project, Alan Houston at 725-6639

Lakes Environmental Association, 647-8580 or lakes@megalink.net

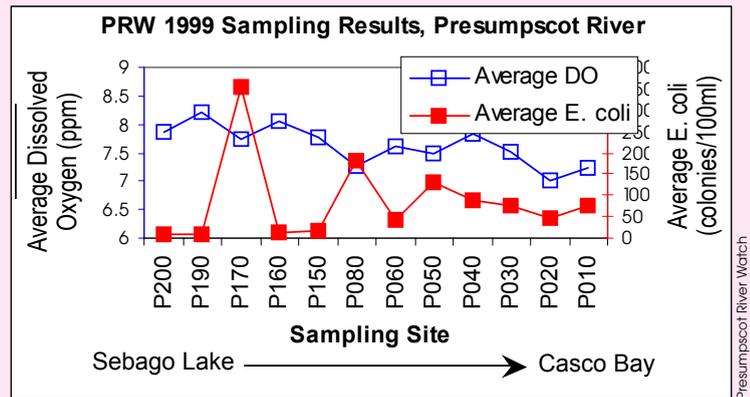
Volunteer Lakes Monitoring Program, 225-2070 or vlmp@megalink.com

Highland Lake Association, Keith Williams at 892-8391

Maine Department of Environmental Protection, Don Kale at 822-6319 or donald.kale@state.me.us

Portland Water District, Paul Hunt at 774-5961, x3322 or www.pwd.org

For more information on water quality testing, visit the Cooperative Extension website on water quality: www.umext.maine.edu/topics/waterqual.htm and the U.S. EPA's Surf Your Watershed site: www.epa.gov/surf



Presumpscot River Watch

Results from sampling done by Presumpscot River Watch show a gradual decline in dissolved oxygen and rise in E. Coli bacteria at sites nearest the coast.

Who's Monitoring the Bay's Tributaries?

CASCO BAY'S WATER QUALITY depends—in large measure—on what comes down the rivers. To assess the health of the Bay's tributaries, local volunteers conduct routine water quality tests. The largest freshwater input to Casco Bay comes from the Presumpscot River which drains 648 square miles. Volunteers with Presumpscot River Watch test water at 26 sites from Standish to Falmouth, analyzing them for temperature, dissolved oxygen and harmful *E. coli* bacteria. While most sites fall within state limits, several locations have high bacterial concentrations or low dissolved oxygen levels—especially those near the coast. Presumpscot River Watch, Friends of the Presumpscot River and other partners are working to draft a Restoration and Resource Management plan for the river.

Along another tributary, Friends of the Royal River has compiled seven years of water quality data. The main stem of the river generally meets state standards for dissolved oxygen, but several tributaries have low levels. Monitors also have found abundant *E. coli* bacteria following storm events.

Representatives from five towns and the state have joined to study the New Meadows River watershed, and celebrate it with a Community Watershed Day this June. Throughout the Bay's upper watershed, volunteers with the Lakes Environmental Association and Volunteer Lakes Monitoring Program test lake water quality. The Portland Water District is also instrumental in testing water quality and working with landowners and communities on water quality issues. For more information on the work of these and other groups, see "What You Can Do."

Friends of the Royal River

Faces of the Bay

Brian Whitney, a volunteer water quality monitor for Friends of the Royal River, prepares a water sample for testing. Although the river generally meets state standards for dissolved oxygen, some tributaries have tested low.



Invisible Pollution:

Are There Toxics in Casco Bay?



Toxic substances such as heavy metals and pesticides can pose a serious threat to wildlife and humans. These pollutants can accumulate in the tissue of organisms, becoming more concentrated as they move up the food chain.

What Toxics Occur in Casco Bay?

IN 1991, SCIENTISTS RECORDED ELEVATED CONCENTRATIONS of toxics throughout Casco Bay, with the highest levels around Greater Portland. Toxics tend to settle into sediments close to where they enter the Bay, and later may migrate on the Bay's currents. A diverse array of toxics appeared in Bay sediment samples:

- **Heavy metals (such as lead, zinc, cadmium, mercury and silver)** occur at elevated levels in some locations, primarily around Portland where contaminants are discharged through outfall pipes and "combined sewer overflows" (which release untreated sewage during heavy rains to prevent treatment plant overloading).
- **Polychlorinated biphenyls (PCBs)**, banned in the late 1970s because they can cause cancer, are still found in sediments of the Fore River near Portland.
 - **Pesticides**, including types banned decades ago, continue to affect Bay ecology through illegal disposal, leaching from old dumps, and polluted runoff from lawns, golf courses, managed forests and agricultural fields.
- **Tributyltin (TBT)**, used in anti-fouling paint on boats and piers, appears at highest concentrations around boating centers.
- **Dioxins and furans**, discharged by industries, were detected at low levels throughout the Bay—with greatest concentrations near the Presumpscot River.
- **PAHs, polycyclic aromatic hydrocarbons**, are the most prevalent form of toxics in Casco Bay. They are released in fuel spills and through burning of fossil fuels in vehicles, power plants, furnaces and incinerators. Many sediment sites around Casco Bay registered high levels of PAHs compared to other bays around the country.



WHILE MAINE WATERS may appear pristine, toxic pollution occurs in many coastal areas and can harm wildlife and humans. Some chemicals and elements persist for decades: Casco Bay still contains toxics from industries that operated more than a century ago.

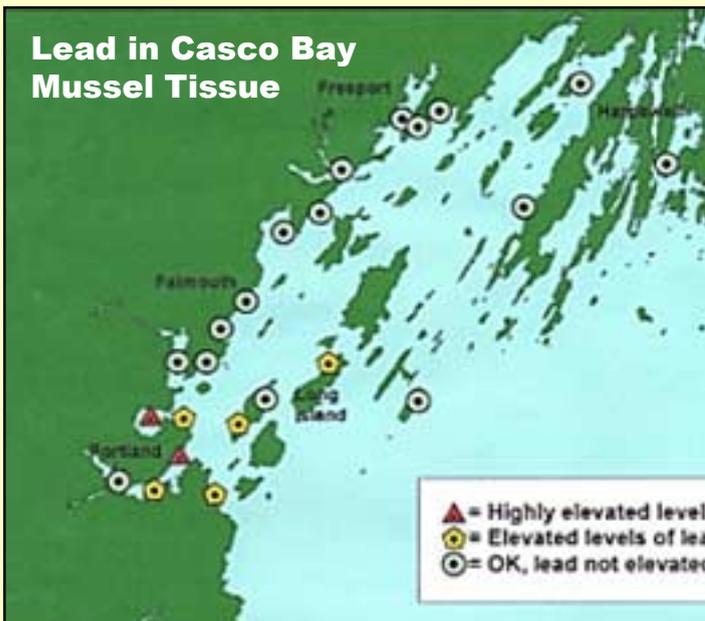
To learn more about how toxics affect the Bay's health, the Casco Bay Estuary Project has studied contamination levels in surface sediments and in the tissues of blue mussels and lobsters.

The Casco Bay Estuary Project will conduct a second round of sediment sampling this summer. Through long-term testing, the Project can assess whether toxicity levels in the Bay are rising or falling. Other sections of this flyer describe ways that the Project is working to reduce toxic pollution that enters the Bay. Since toxic chemicals in soils and waters are difficult and expensive to remove, prevention is a less expensive and more effective approach.

Are the Shellfish Safe to Eat?

BECAUSE SHELLFISH ARE FILTER-FEEDERS, they concentrate pollutants from the water. By testing tissues of the native blue mussel, scientists can evaluate what the presence of toxics might mean for human health. The Casco Bay Estuary Project has monitored mussels at eight locations and lobsters at two sites. In some locations, mussel tissue exceeded the state level for posting health advisories (based on eating shellfish once a week) due to elevated lead, dieldrin, PAHs, PCBs, dioxin and furans. Further tests are being done to confirm these results.

While lobster meat appears safe to eat, the liver (the green tomalley) may contain toxics. The State has issued an advisory recommending that people do not eat lobster tomalley (call 287-3281 for a copy).



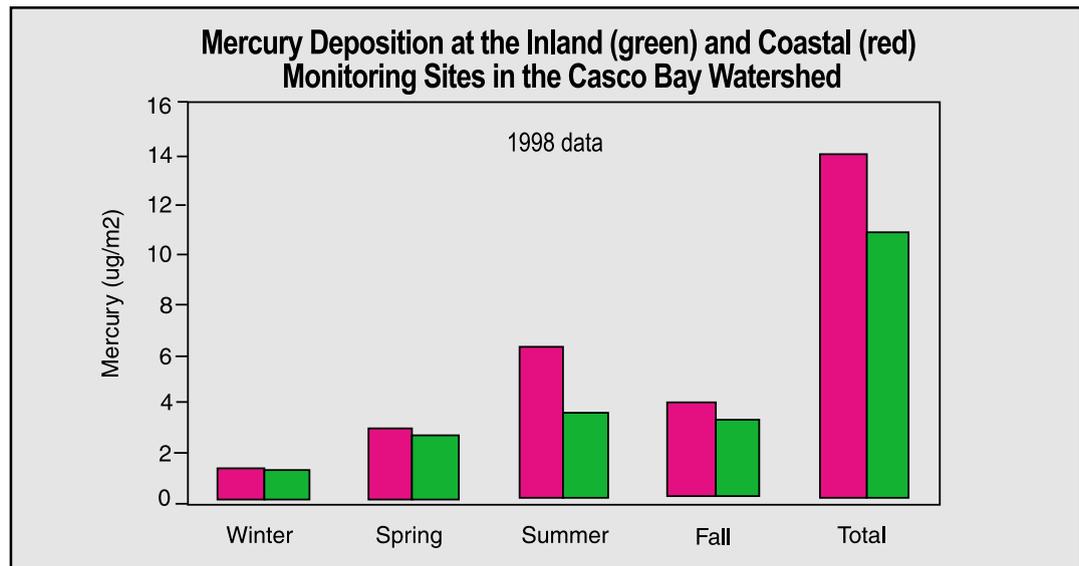
Pollution from the Sky

TOXIC POLLUTANTS ARE FOUND in Bay sediments far from waterborne sources, suggesting that they may fall from the air as dry particles or in rain and snow. With grant funding from the U.S. Environmental Protection Agency and Maine Department of Environmental Protection, the Casco Bay Estuary Project has established a coastal monitoring site at Wolfe's Neck Farm in Freeport. Data from this site, along with results collected at an inland site in Bridgton, will help determine patterns of air pollution in the Casco Bay watershed. The monitoring program began in 1998 and will continue through 2000, tracking the deposition of mercury, cadmium and other trace metals; PAHs (polycyclic aromatic hydrocarbons); nitrogen; and the concentration of fine particulates.

Initial data (see graph at right) suggest that the atmosphere is a significant source of pollution for Casco Bay. Precipitation carries pollutants to the Bay, especially during the wetter seasons of spring and summer. Rainfall in Freeport contained PAHs, a common toxic pollutant in Casco Bay, at levels equal to an urban test site near Boston.



Motor vehicles produce airborne pollution that affects Casco Bay.



Due to the complex interactions of fog, wind, water, and salt where land and sea meet, the coastal site in Freeport registered higher levels of rainfall and higher concentrations of pollutants such as mercury (a toxic metal that can accumulate in fish and wildlife) and sulfates (the primary component of acid rain).

(NADP/MDN Monitoring Network, 1998 data.)

What You Can Do

- ✓ Minimize driving and keep your car well-maintained. Choose a vehicle that is fuel-efficient.
- ✓ Make use of household hazardous waste collection days in your community. Take used oil to a service station or oil collection center. Most oil pollution in coastal waters comes, not from commercial tanker spills, but from careless dumping, small spills and stormwater runoff.
- ✓ Encourage workplace reduction of toxics. For advice on ways to prevent pollution from your business and potentially save money, call Chris Rushton at the State's Pollution Prevention Program, 287-7100.
- ✓ Use lawn and garden chemicals only as a last resort. For suggested alternatives, contact Friends of Casco Bay at 799-8574. You can learn more about farming and gardening without pesticides at the Maine Organic Farmers and Gardeners website: www.mofga.org.
- ✓ Request a copy of the "Household Product Management Wheel" from the Casco Bay Estuary Project (CBEP, USM, Room 408 Law School, PO Box 9300, Portland, ME 04104, bbsmith@usm.maine.edu), describing how to dispose of household chemicals and use less toxic substitutes.

Faces of the Bay

"Our system for capturing sediments before they enter the Bay has made us more attractive to potential clients because we can now market a cleaner facility. That marketing advantage, combined with the savings incurred from reduced housekeeping costs, makes sense from both an environmental and economic perspective."

P.D. Merrill, President of Merrill Industries

Merrill Industries has adopted many Best Management Practices on their property to reduce pollution entering the Bay, including installing oil and grease separators for stormwater, purchasing a sweeper to collect debris, and using silt fences and hay bales to reduce runoff pollution.





Great blue heron

© Bill Silliker, Jr.

The Biological Diversity of Casco Bay

- Casco Bay is home to a tremendous variety of species. The Bay has 50 seabird nesting islands and six heron rookeries.
- Wildlife live in varied habitats around Casco Bay—including salt marshes, eelgrass beds, tidal creeks, islands, rocky shores, and richly mixed estuarine waters. The most prevalent habitat areas, intertidal mudflats, nourish important shellfish and worm species and provide food for migrating shorebirds.
- Casco Bay has the largest and densest concentration of eelgrass beds mapped along the coast of Maine. Eelgrass beds provide shelter for some small fish and food for wintering waterfowl.



Harbor seals frolic in the surf

What's the Primary Threat to Wildlife Habitat in the Casco Bay Watershed?

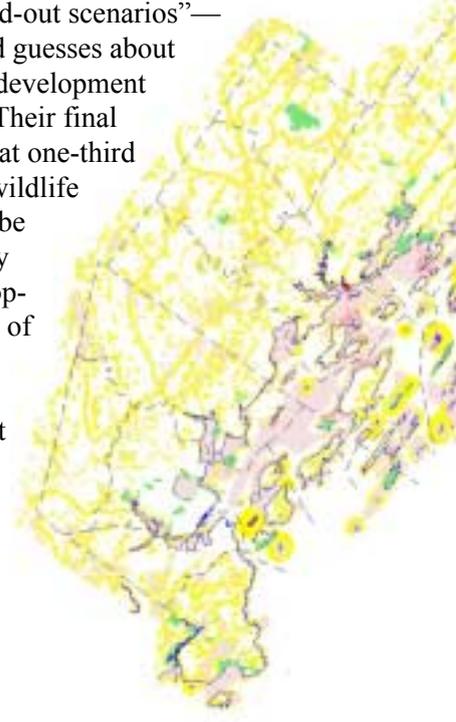
THE FATE OF AREA WILDLIFE may be determined by sprawl, the pattern of residential and commercial development that spreads out from urban centers—overtaking farmland and open space. Sprawl endangers wildlife habitat through direct destruction and through degradation. Roads and buildings fragment large natural areas; developments of all kinds disrupt natural drainage patterns and increase runoff pollution (of road salt, petroleum products and other toxic materials); and homeowners introduce pets and non-native plants, apply pesticides and herbicides, and increase human disturbance. Already sprawl has taken a toll on wildlife around the Bay: a recent state report notes that almost all the land-based animal species on Maine's endangered and threatened species list are native to southern and coastal areas.

What can be done to prevent sprawl and protect important wildlife habitat? Municipal and regional planners should determine which areas are significant and develop ordinances that direct growth toward suitable areas. It's especially important to maintain open corridors that allow wildlife to move among undeveloped blocks of land. Private landowners can take action, placing legal restrictions called conservation easements on their property to limit future development. Landowners can also choose to participate in state programs that offer tax incentives for keeping their land in agriculture, forest or open space.



Which Habitats Are at Risk?

TO CONSERVE WILDLIFE HABITAT effectively, it's essential to assess which habitats in the lower watershed were most important to coastal and marine plants, fish and wildlife. Using aerial photos, maps of ownership and land use to produce "build-out scenarios"—well-informed guesses about where future development might occur. Their final map shows that one-third of the Bay's wildlife habitat could be endangered by human development, but few of the highest value habitats face imminent threats.

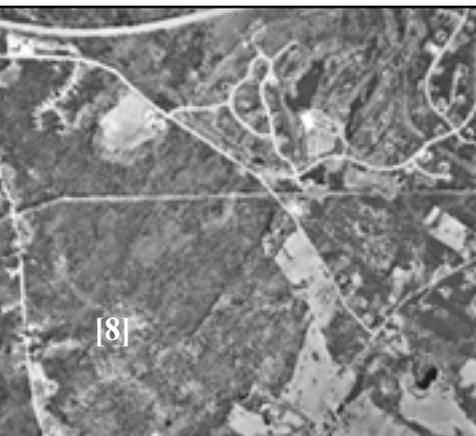


Sprawl: Before and After



James W. Sewall Co./Greater Portland Council of Governments

Above, 1976; below, 1995



Wildlife: Will it Last?



© Bill Stilliker, Jr.



© Bill Stilliker, Jr.

What You Can Do

- ✓ Plant native vegetation around your property to enhance wildlife habitat. For planting suggestions, call the Cumberland County Soil and Water Conservation District at 839-7839. If you own waterfront property, be sure to maintain a vegetative buffer along the shore.
- ✓ Nearly every community surrounding Casco Bay has a land trust dedicated to protecting open space and maintaining wildlife habitat and recreational trails. Join and support your local land trust!
- ✓ If you own land with significant habitat value or want information on the state's Farm, Forest and Open Space tax classifications, contact your local land trust or Forrest Dillon at Maine Coast Heritage Trust (729-7366).
- ✓ For information on ways to protect wildlife habitat, contact the U.S. Fish & Wildlife's Gulf of Maine Project (781-8364 or <http://fws.gov/~cep/maine.html>); Maine Audubon Society (781-2330 or www.maineaudubon.org); or the Maine Department of Inland Fisheries & Wildlife (657-2345 or <http://janus.state.me.us/ifw>).

al to know which areas are most sensitive. In 1995 Fish & Wildlife Service's Gulf of Maine Project at risk, mapping habitats of 27 significant species g these data, researchers created a set of maps that valuable habitats. Next they examined regional



Legend

- Cons./Public Lands
- Coastline
- Town Lines
- Important Habitat**
 - highest value
 - medium value
 - lower value
 - sensitivity zone

Important Habitat in the Lower Casco Bay Watershed

source: Robert Houston, USF&WS, Gulf of Maine Project, 1995 data (updated 1999)

Protecting Valuable Lobster Habitat

SEDIMENTS CARRIED IN RIVER RUNOFF gradually accumulate on the Bay floor and can obstruct major shipping channels. To keep these passages open, the U.S. Army Corps of Engineers periodically conducts dredging—a process that disturbs bottom sediments and can endanger the lobsters that live there.

To address this concern in the recent dredging of Portland Harbor, the Casco Bay Estuary Project hired a contractor to conduct underwater video surveys of proposed dredge areas. The videos revealed important lobster habitat, even richer than had been realized. Consultants then developed a mitigation plan to protect the lobsters, which recommended timing the dredging to coincide with lobster migrations and relocating lobsters outside the dredge area.

Before dredging began, the consultants teamed up with staff and volunteers of Friends of Casco Bay, local lobstermen, a lobster pound owner, Maine Department of Marine Resources staff and others to move 34,012 lobsters of sub-legal length outside the harbor zone. The team also tagged 4,000 lobsters to help determine the project's success.

Seven months after the dredging ended, lobster density in certain areas had rebounded close to pre-dredging levels—suggesting that lobster relocation may help diminish the impacts of dredging and allow populations to recover more rapidly.

Friends of Casco Bay



Sustaining Clamming in Casco Bay



© Bill Stillker, Jr.

Clams harvested from Casco Bay generate income for local residents, but pollution keeps many areas off-limits. A pumpout boat (inset, right) operated by Friends of Casco Bay helps boaters keep waters clean and shellfish beds open.



Friends of Casco Bay

SOFT-SHELL CLAMS are an important resource for the Casco Bay region, generating an estimated \$12 million in economic activity (according to a 1994 study). While there is growing demand for Casco Bay clams, diggers are working just over half of the Bay's shellfish flats: the remainder are closed due to high bacterial levels that indicate a potential health risk for human consumption.

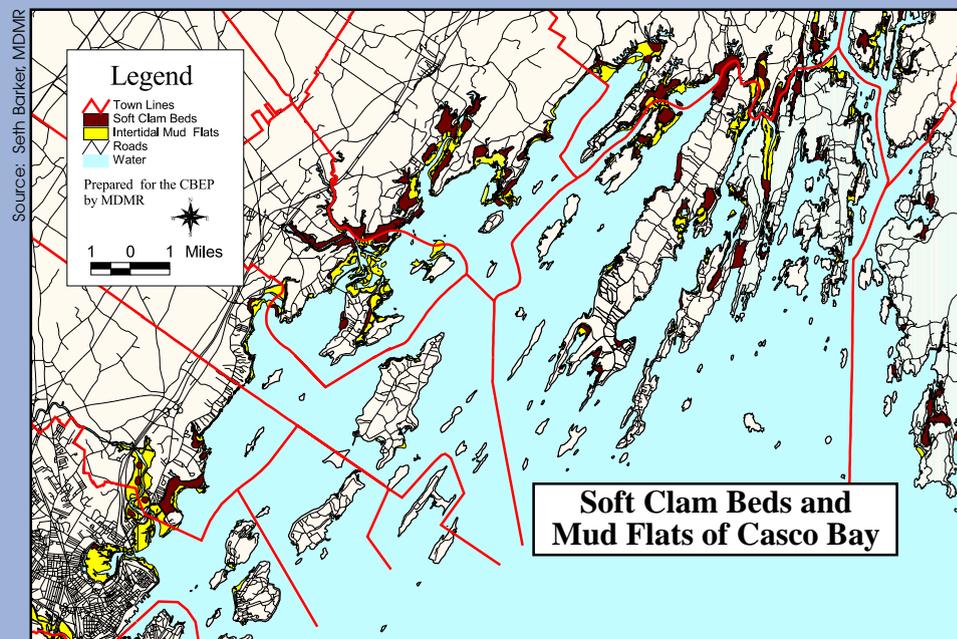
Over the past six years, 36,902 acres of formerly closed shellfish areas have been opened. The Casco Bay Estuary Project is working with state, local and citizen partners to reopen the flats that remain closed. This effort promises ecological and economic benefits: closed flats in Casco Bay could provide clam harvests worth \$3.7 million/year. Beyond the potential for extra earnings, many local residents take great pleasure in harvesting their own food from the sea.

High bacterial levels from any of these sources can force the State to close flats to harvesting. Because every open flat must be surveyed routinely to make sure it is free of harmful bacteria, lack of water quality data can lead the State to close flats as a precautionary measure. The State also closes flats periodically due to red tide, a microscopic plant that produces a toxin in shellfish that can threaten human health. Local municipalities may close flats to conserve small clams for future harvesting or to prevent overharvesting of adult clams.

The map below illustrates the extensive shellfish habitat in Casco Bay. Although some beds remain closed to harvesting because of pollution, over 36,902 acres of formerly closed areas were opened in the past six years.

What Causes Shellfish Flat Closures?

- Failing septic systems discharge untreated sewage containing bacteria and viruses directly into groundwater, streams or coastal waters.
- Overboard discharge systems (see sidebar) release polluted effluent if not well-maintained.
- Boaters illegally discharge holding tanks close to shore.
- Stormwater runoff carries wastes from farm animals, domestic pets and wildlife.
- Overflow from wastewater treatment plants may be routed directly into coastal waters during heavy rainstorms.



Reopening Clam Flats in Casco Bay

THE CASCO BAY ESTUARY PROJECT and its partners are working to reopen Casco Bay clam flats, building on work done by towns and state agencies to eliminate local pollution sources. A team of clam flat managers, scientists and environmental advocates joined with local clam diggers and consultants to identify the most productive shellfish beds and work to reopen them. In the first round, they targeted more than 140 acres of flats in Phippsburg, West Bath, Brunswick, Harpswell and Freeport. Determining the sources of contamination in each area required some detective work—reviewing water quality data under different



conditions to pinpoint potential sources, and using shoreline survey results to identify illegal septic systems and straight pipes.

Now the team is developing strategies to ensure a viable clam flat population over time—including rotating flat closures, seeding mudflats with baby clams, and tracking clam populations to determine how many harvesting licenses to issue. Shellfish resources require collaborative regional management to remain productive and prevent overfishing. Harvesters and planners around Casco Bay recently formed a Soft Shell Clam Advisory Council to discuss the best means for sustaining good shellfish yields.



What You Can Do

- ✓ Maintain your septic system, having it pumped out every 3-5 years. If your system was installed before 1974, consider replacing it. Avoid using septic cleaners or additives.
- ✓ If you own a boat, dispose of waste at one of the Bay's boat pumpout facilities or use its mobile pumpout service (call 799-8574 for more information). With 1,900 boat slips and 3,400 moorings in Casco Bay, illegal boat discharges pose a major hazard for clambers and swimmers.
- ✓ If you own an old Overboard Discharge System, consider replacing it. There are state funds available to assist in this process. Contact your town office for more information.
- ✓ To find out more about the status of shellfish beds in your community, contact your local shellfish commission (through your town office). You can also contact the Department of Marine Resources to discuss getting a local clam flat onto the State's priority list for reopening. Call Laura Livingston at 633-9533 for more information.

What Is an Overboard Discharge?

MANY CLAM FLATS ARE CLOSED simply because they are located near an "overboard discharge" system (OBD). These sand-filtered septic systems were designed to treat effluent before discharge into local waters. Without routine maintenance, many systems fail and release untreated waste—which led to a ban on any new OBDs after 1987. Some older systems remain, however, contaminating local clamflats. In areas where OBDs cause clam flat closures, towns may receive state funds to help remove them.

Casco Bay has more than 200 OBDs. To help reduce this number, the Casco Bay Estuary Project formed an agreement with the Maine Department of Environmental Protection to manage their OBD removal program. The State had funds allocated but no staff to oversee this effort, while the Casco Bay Estuary Project had staff to help communities and landowners in removing the systems. This agreement benefited both parties and—most importantly—the clam flats of Casco Bay!



One alternative to an OBD is a recirculating biological filtration system.

Faces of the Bay

"Through the work of the Casco Bay Estuary Project and their consultants, we've been able to open additional clam flats around Casco Bay. These flats will prove to be increasingly productive in years to come."

Dana Wallace, of Brunswick, has worked on clam flat issues in Maine for decades.



Stormwater: What Is Washing into Casco Bay?

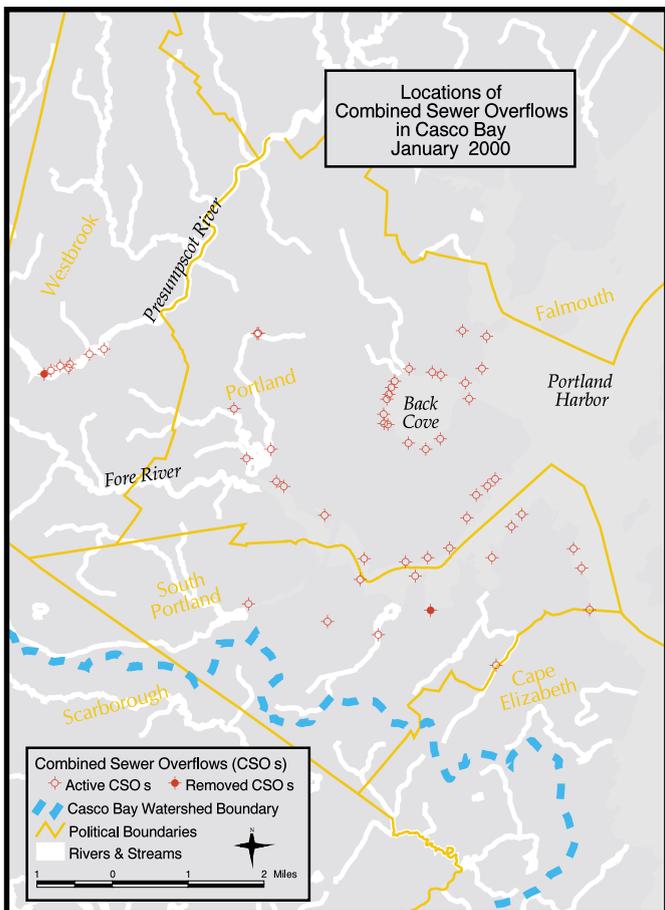


During heavy rains, untreated municipal wastewater can flow directly into Casco Bay through outlets like these combined sewer overflow pipes along Portland's Back Cove.

MOST OF THE POLLUTION that enters Casco Bay comes from countless small sources throughout the watershed. Exhaust particles or oil from your car, for example, might land on a road far inland. When rain falls, pollutants wash into a brook and are carried downstream to a river. By the time they reach Casco Bay, they've mixed with other contaminants picked up along the way—animal wastes, fertilizers and pesticides from homes and agricultural operations, and soil from construction sites. Polluted stormwater creates a host of problems downstream.

Why Is Stormwater a Concern?

- It causes soil erosion, which degrades water quality. Silt carried into streams and rivers can cover the breeding ground of fish and the habitat of aquatic insects. Soil deposition in the Bay creates the need for periodic dredging—an expensive process that disrupts bottom habitats.
- Nutrients carried by stormwater runoff can over-fertilize lakes, streams and coastal waters, causing undesirable algal blooms which deplete the oxygen needed by fish.
- In some urban areas, stormwater can overload municipal sewage systems so that sewage is released directly into the Bay. Elevated levels of bacteria in area waters pose a public health risk, requiring swimming bans and shellfish closures that put clambers out of work.
- Runoff washes toxic oil and metal contaminants from roads and parking lots into streams, sewers and—ultimately—the Bay.



Ways to Reduce Stormwater Runoff

Best Management Practices

BMPs, AS THEY'RE KNOWN, are methods of design and construction that can reduce water pollution—such as planting vegetative buffers along waterways and creating ponds to temporarily hold stormwater (which helps settle out pollution). The Maine Department of Environmental Protection publishes BMP guidelines for managing stormwater and controlling pollution: call 287-3901 to order.



Volunteers plant a vegetative buffer strip

Combined Sewer Overflows

MANY OLDER SEWER SYSTEMS were designed so that when heavy rains overload the treatment plant, the system releases untreated sewage and stormwater directly into rivers and bays through Combined Sewer Overflows (CSOs). Fortunately, these antiquated systems are being replaced with systems that separate sewage and stormwater. The next step in reducing pollution involves treating the stormwater that has been separated, a major challenge for communities. The Casco Bay Estuary Project is working with Friends of Casco Bay, Maine Department of Environmental Protection and municipalities to maintain progress eliminating CSOs.

Faces of the Bay

"Freeport has reopened almost all of our previously closed clamflats. The stormwater management we have undertaken will protect those flats for future generations."

Jacki Cohen
Freeport Town Planner



Demonstration Projects

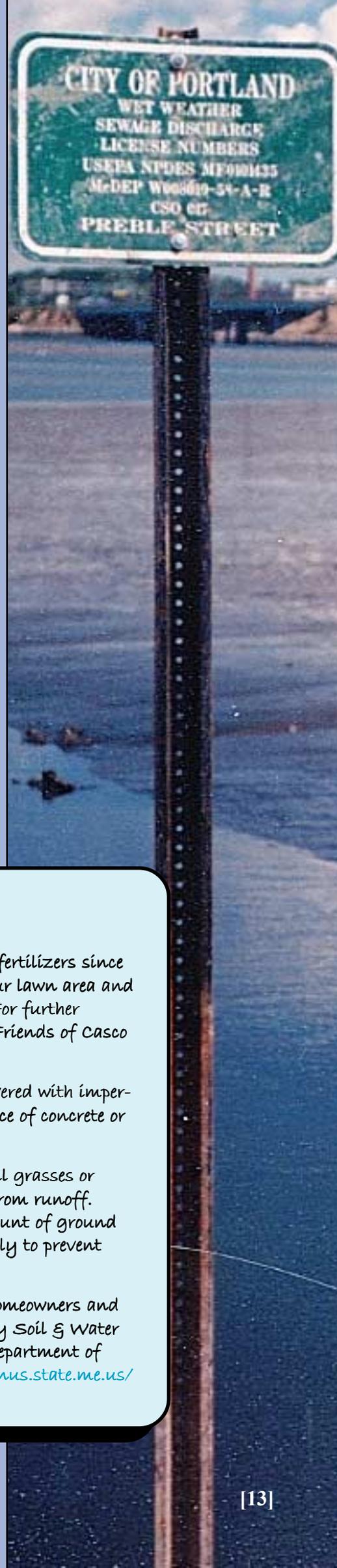
COMMUNITIES IN THE CASCO BAY WATERSHED are devising creative solutions to address the expensive and difficult problems associated with stormwater pollution. The Town of Freeport, for example, has begun to retrofit stormwater management structures to control pollutants such as bacteria, particulates and nutrients. Using BMPs and technical assistance from the Cumberland County Soil and Water Conservation District, the Town devised ways to make sediments and pollutants settle out in detention basins instead of in the Bay. The techniques involved:

- raising emergency spillways and the pond outlet to detain water longer;
- installing filter berms to slow water flow entering the basin; and
- reducing the outlet pipe diameter, slowing water flow from the basin.

For more information on these and other methods, contact the Cumberland County Soil and Water Conservation District at 839-7839.

What You Can Do

- ✓ Reduce or eliminate use of lawn chemicals and fertilizers since rainwater washes these into the Bay. Reduce your lawn area and leave clippings on your lawn to enrich the soil. For further information on reducing pesticide use, contact Friends of Casco Bay at 799-8574.
- ✓ On your land, minimize the amount of area covered with impervious surfaces. Use gravel and stone dust in place of concrete or asphalt.
- ✓ On sloped lands, maintain a ground cover of tall grasses or shrubs since these plants help filter pollutants from runoff. During construction projects, minimize the amount of ground that is disturbed and replant and mulch promptly to prevent eroded soil from washing into waterways.
- ✓ To learn about best management practices for homeowners and municipal officials, call the Cumberland County Soil & Water Conservation District, 839-7839 or the Maine Department of Environmental Protection, 287-3901 (<http://janus.state.me.us/dep/blwq>).





Activities for Small Fry

Word Search

Find the following words in the fish:

Casco	Watershed	Habitat
River	Stream	Estuary
Clam	Mussel	Lobster
Seal	Gull	Island
Bay	Swim	Sail
Fish	Beach	Mudflat
Rock	Sand	

MAERTS
 TALFDUMBC
 LDEHSRETAWG
 RHCAEBMGIYLAESR
 VOEBMYRAUTSEMDHE
 ACCTGULLDNASBNDV
 HKFLSHOCSACSUISI
 TATIBAHWYRUTWGR
 EDRAOEVAWMIS
 WISLANDM
 LHSIF



Casco Bay: Whose Job?

Casco Bay, blue and serene,
It's not that dirty but it's not pristine.
Whose job is it to see that it's clean?

There are island people and folks on the shore.
They are the closest: the Bay's at their door.
But inland towns are growing more and more.

From ponds, lakes and streams every day,
The water flows down—it's nature's way,
Carrying pollution into the Bay.

From parking lots, driveways and fertilized lawns,
Rooftops and cars—the pollution moves on,
Bit adds to bit until clean water's gone!

But if every day, everyone, everywhere
Will think before doing, take every care
We can get and keep clean the water we share.

Casco Bay, blue and serene,
It's not that dirty but it's not pristine.
It's everyone's job to see that it's clean!
It will take us all—of that there's no doubt!
Working together is what it's about!

by Jean Dyer,
Chebeague Island

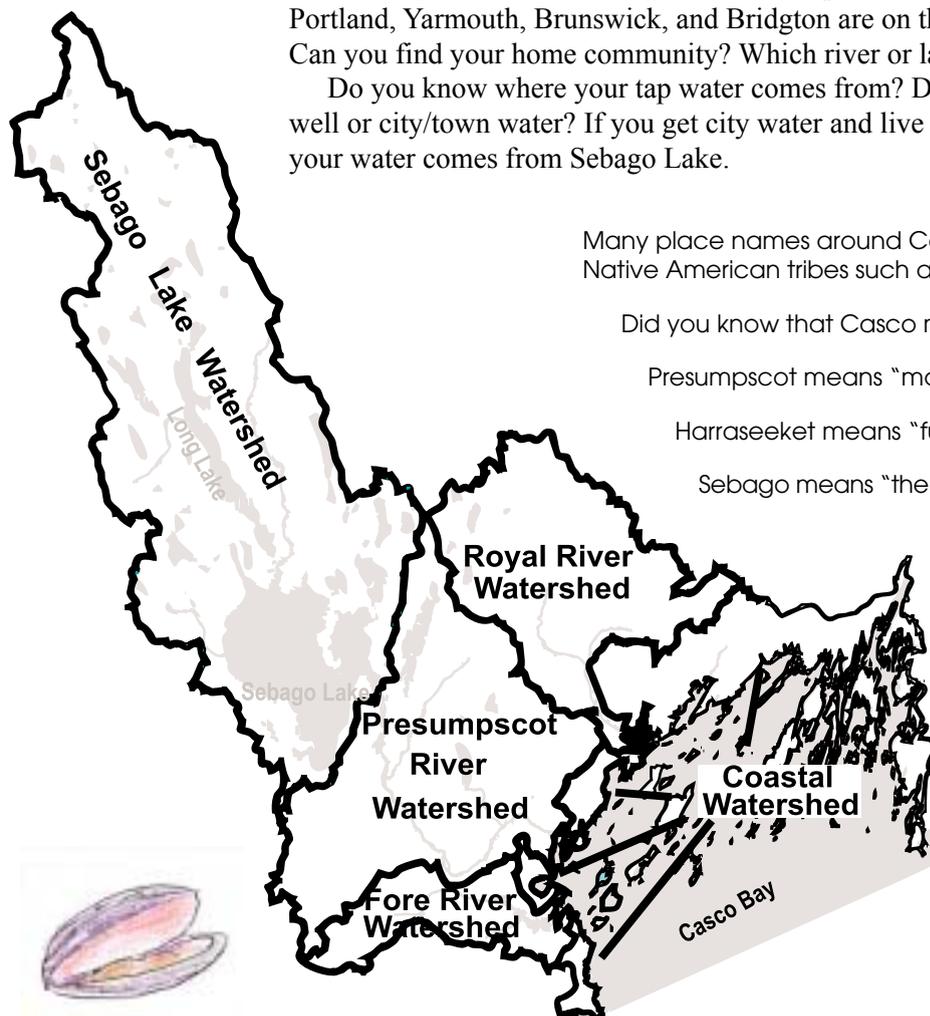


Color in the Watershed Map

This map shows the Casco Bay watershed. All water in this area flows into Casco Bay eventually. There are five smaller watersheds within the Casco Bay watershed.

Color each of the smaller watersheds a different color. Identify which watershed you live in. Looking at another map for comparison, mark where Portland, Yarmouth, Brunswick, and Bridgton are on the watershed map. Can you find your home community? Which river or lake is nearest to you?

Do you know where your tap water comes from? Does your home use a well or city/town water? If you get city water and live around Portland, your water comes from Sebago Lake.



Many place names around Casco Bay come from Native American tribes such as the Abenaki.

Did you know that Casco means "muddy"?

Presumpscot means "many falls river."

Harraseeket means "full of obstacles."

Sebago means "the big stretch of water."





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(who work tirelessly in their own agencies to advance CBEP goals)

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Casco Bay Estuary Project Partners

Governmental Agencies

U.S. Environmental Protection Agency New England
U.S. Fish & Wildlife Service, Gulf of Maine Project
Maine Department of Environmental Protection
Maine Department of Marine Resources
Maine Department of Transportation
Cumberland County Soil & Water Conservation District
Army Corps of Engineers
Town Officials, Shellfish Commissions & Harbor
Commissions in watershed communities

Regional and Local Groups

Friends of Casco Bay
Presumpscot River Watch
Friends of the Royal River
Friends of the Presumpscot River
Lakes Environmental Association
Portland Water District
Maine Coast Heritage Trust

Area Businesses

Albert Frick Associates
Normandeau Associates
MER Assessment Corporation
Portland Trap Company
New Meadows Lobster
A. L. Griffin, Inc.
The Bait Lady
Resource Trading Company
Mackworth Environmental
Portland Pipeline Corporation
Merrill Industries Incorporated
Cargill Incorporated
Sprague Energy
Koch Materials Company
Mobil Oil Corporation
Gulf Oil Limited Partnership
Land and Water Associates

Countless Citizens and Landowners

State of the Bay 2000



THE CASCO BAY ESTUARY PROJECT coordinates many partnerships within the watershed, involving the organizations and individuals listed here. By helping to reinforce connections among existing groups, the Project enhances the capacities of all those working to protect the Bay.

Support for the Casco Bay Estuary Project is provided by the U.S. Environmental Protection Agency (under Section 320 of the Clean Water Act) and the Maine Department of Environmental Protection. Additional funds are provided through grants and contributions. The Project is administered by the Edmund S. Muskie School of Public Service at the University of Southern Maine in Portland and the Marine Law Institute at the University of Maine School of Law.

Surfing Casco Bay: Web Site Links

- Casco Bay Estuary Project
www.cascobay.usm.maine.edu
- Casco Bay Online
www.cascobay.com
- Gulf of Maine Aquarium
www.gma.org
- Maine Audubon Society
www.maineaudubon.org
- Maine Coastal Program
janus.state.me.us/spo/mcp/mcp.htm
- Maine Department of Environmental Protection
janus.state.me.us/dep
- Maine Department of Marine Resources
janus.state.me.us/dmr
- Portland Water District
www.pwd.org
- USDA Natural Resource Conservation Service
www.me.nrcs.usda.gov
- US Environmental Protection Agency New England
www.epa.gov/region1
- US Fish and Wildlife Service Gulf of Maine Project
www.fws.gov/~cep/maine.html



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State of the Bay 2000

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Get to Know Your Bay!

Field Trips Around Casco Bay

THE FOLLOWING SITES will introduce you not just to the shores of the Bay, but to the main rivers that flow into it: the Stroudwater, Fore, Presumpscot, Royal and Harraseeket. For a free map that shows places to explore around Casco Bay and for a schedule of upcoming trail events, contact Portland Trails (775-2411).



Eastern Promenade Trail, Portland: Enjoy expansive views of Casco Bay from this 2-mile trail along the Portland peninsula's eastern edge. You can start at the India Street end of Commercial Street or at the Eastern Prom boat launch.

Stroudwater Trail, Portland: A natural oasis in an unlikely setting, this 1.25-mile trail follows the Stroudwater River out toward Westbrook. Parking is off Outer Congress Street 0.1 mile beyond Westbrook Street (look for a steep gravel driveway on the right).

Fore River Sanctuary, Portland: This 85-acre property has a 3.5-mile network of trails winding through woods and marshlands at the head of the Fore River. There's even a 25-foot waterfall! Park off Rowe Avenue (north end) or off Frost Street in the Maine Orthopedics lot (south end).

Pettengill Farm, Freeport: First settled in the late 18th century, this 140-acre saltwater farm has a trail system through woods and meadows along the Harraseeket River. The saltbox house, built around 1800, is listed on the National Register of Historic Places. Special tours and programs are offered regularly (865-3170) or you can explore on your own. Take Bow Street across from L.L. Bean and go 1.5 miles, turning right on Pettengill Road. Park at the gate and walk one-half mile on the dirt road.

Royal River Park, Yarmouth: This mile-long walkway through the heart of Yarmouth follows the lower Royal River, just up from the river's last active mill. You can park across from the Water District on East Elm Street and walk downstream or launch a canoe and paddle upstream.

Giant Stairs, Bailey Island: Harpswell Heritage Trust's Macintosh Trail along the bold eastern shore of Bailey Island provides panoramic views by a fascinating rock formation known as the Giant Stairs. An easy half-mile loop trail leads along ledges above the shore. Take Route 24 to Bailey Island and turn left on Washington Avenue 1.7 miles beyond the cribstone bridge. Proceed 1/4 mile and park across from the church.



Freeport Historical Society

Friends of Riverton Trolley Park (postcard image circa 1900)



Riverton Trolley Park, Portland: City residents once took streetcars from downtown to visit this park's casino, band stand and trout pond. While the structures are gone, the park continues to provide a serene setting along the Presumpscot River. Friends of Riverton Trolley Park offer regular walking tours every other Saturday morning (766-2970), or you can explore on your own. Located at Outer Forest Avenue and Riverside Street, with parking at the Riverside Street ball field.