

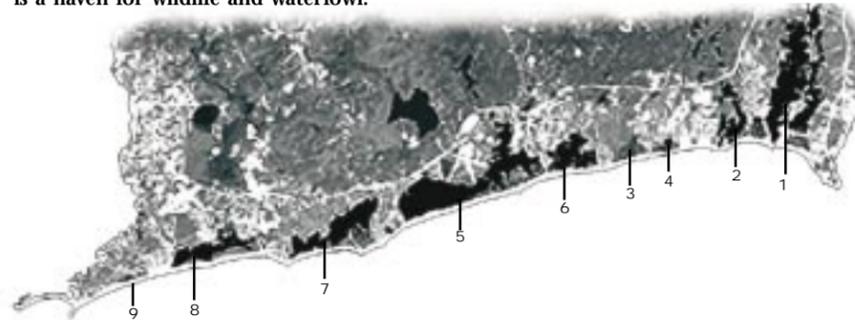
Restoring the Ponds Pond Profiles

In recent years, numerous towns, citizens, academic institutions, nonprofit organizations, and governmental agencies have started to focus on the restoration of Rhode Island salt ponds through projects such as eelgrass bed renewal, anadromous fish run restoration, and wastewater treatment improvement. Much of this collaborative effort was prompted by the January 1996 *North Cape* oil spill which released 828,000 gallons of home heating oil directly off the coast of Rhode Island, harming the water birds and juvenile lobster and shellfish of the salt ponds.

The pristine salt ponds that the ancient Indians once used for their settlements and food supply may never exist again. However, with the continued determination of citizen volunteers, careful adherence to the SAMP, and the completion of various restoration efforts, the obstacles currently threatening the salt pond region can be overcome.



1. Point Judith Pond is the only pond whose permanent breachway is dredged regularly by the U.S. Army Corps of Engineers. The breachway is maintained to accommodate Rhode Island's fishing fleet, one of the most modern in New England. Also, the state's most intensively fished recreational shellfish area is located in this pond along the escape road from Galilee.
2. Potter Pond, the deepest of the ponds, was formerly called Fish Pond because of its abundant fish stock. Stone walls built to close off smaller coves to create fish pounds can still be seen in the pond. Potter Pond's tidal inlet connects to Point Judith Pond rather than directly to the sea.
3. Trustom Pond, a National Wildlife Refuge, is the only coastal pond free from shoreline development. Boating, swimming, and fishing are prohibited. Some 300 bird species, including the protected piping plover and least tern, seasonally inhabit the refuge.
4. Cards Pond receives a significant supply of fresh water from Moonstone Stream, and its breachway is only intermittently open to the sea. These factors keep the salinity low. Parts of this pond are included in the Trustom Pond National Wildlife Refuge.
5. Ninigret Pond, the largest of the salt ponds, is used for a variety of recreational activities as well as oyster and quahog aquaculture. Extensive archaeological remains are found on its shores. Its barrier beach is protected from development by several wildlife refuges.
6. Green Hill Pond has a densely developed residential shoreline. Its tidal inlet connects to Ninigret Pond. Fresh water flows into the pond from both Factory Brook and Teal Brook. Both Green Hill and Ninigret ponds supported productive oyster spawning areas until a total oyster mortality was sustained in the late 1990s, possibly due to disease.
7. Quonochontaug Pond, or "Quonnie" for short, is the most saline pond and one of the deepest. Its south shore supports one of the largest and most pristine salt marshes in Rhode Island. The pond's western barrier beach, although privately owned, remains undeveloped.
8. Winnapaug Pond has one of the more densely developed shorelines, with a concentration of hotels, restaurants, and amusement rides adjacent to Misquamicut State Beach on the pond's southern shore.
9. Maschaug Pond is a small, brackish pond not permanently connected to the sea. Much of the pond is bordered by a golf course. Partly privately owned, Maschaug pond is a haven for wildlife and waterfowl.



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Salt Ponds of Rhode Island

A glance at a map of Rhode Island will show a series of coastal lagoons (locally called salt ponds) lying behind narrow barrier beaches along the state's ocean shore. This type of coastline is common along the U.S. Atlantic and Gulf coasts, as well as along low-lying seaboard the world over.

A glimpse at the ponds themselves will reveal the many critical functions that the salt pond system performs, including providing habitat for commercial and recreational finfish and shellfish, serving as resting and feeding stops for migrating waterfowl, and offering residents and visitors recreational opportunities.

A closer look will also identify the numerous pressures threatening the salt pond ecosystem: increasing residential development, bacterial contamination, algal blooms, and the decline of certain fisheries.

Pond Facts

Rhode Island's coastal ponds exist on both sides of Narragansett Bay, as well as on Aquidneck Island and Block Island. However, the nine ponds on the west side of the Bay have been the most thoroughly studied and are the focus of this report.

All nine ponds are shallow, with an average depth of 3.9 feet, and range in size from 40 to 1,700 acres. The salt pond watershed covers 32 square miles, and includes the towns of Westerly, Charlestown, South Kingstown, and Narragansett. The salinities of the ponds depend on the amount of fresh water entering the pond. Three of the ponds—Point Judith, Cards, and Green Hill—have significant streams flowing into them. For the others, groundwater and surface runoff are the principal sources of fresh water.



Formation of the salt ponds

Salt ponds are formed and continuously reformed by the interaction of coastal processes, including erosion, sediment transport, and gradually rising sea level. As the ocean waters rise—a phenomenon under way since the last Ice Age—they spill into depressions in the landscape, creating shallow estuaries. Meanwhile, longshore currents transport sand eroded from wave-battered headlands—higher, more durable points along the coast—and deposit it in low-lying areas. As the sand accumulates, it forms a barrier spit, or beach, that separates the pond from the ocean waters.

In most cases, a tidal inlet, or breachway, is created by either storm waves washing over the sand spit or from the pressure of fresh water swelling the pond from the landward side. This inlet provides a connection between the pond and the sea through which sediment and water are transferred. The interchange is usually seasonal: Winter storms choke the inlet with wave-churned sand, and spring runoff from streams and groundwater swells the pond until it bursts through the barrier. The more a pond is open to the sea, the more it is flushed with seawater, resulting in a higher salinity.

Salt ponds are also greatly influenced by powerful coastal storms. During severe winter storms, surging waves hurl sand eroded from the front of the barrier over the spit into the seaward side of the pond. The overwash from these strong waves spills water behind the newly deposited sand. It is during this process that salt ponds retreat steadily landward. For several thousand years, Rhode Island's entire barrier spit-coastal pond system has been migrating north—and will continue to do so.



People and the ponds

When humans first began to settle in the Northeast, they established a permanent village on the edges of a salt pond. Archaeologists believe this village, set up on Block Island's Great Salt Pond by ancestors of the Manisseean Indians, may have been the first year-round settlement in the Northeast. Additional early human activity existed in the form of a fishing encampment created by Indians on the west side of Potter Pond between 3,000 and 2,500 years ago. What made these early camps and villages unique was the existence of their thriving maritime economy 1,500 years before the first known agricultural settlement in the area.

In later years, the Narragansett Indians utilized the many resources of the pond during the summer months to fish for food and gather quahog for wampum—purple beads used for jewelry, gift-giving, and exchange. European colonial settlers also fished the ponds, as well as farmed the open space surrounding the salt pond area. The colonial farmers often hand dug channels from the ponds to the ocean to drain their fields after spring rains.

More deliberate alteration of the ponds came with modern commerce. Temporary breachways were dredged to accommodate large boats used to bring both agricultural and fishing products to market. But because salt pond systems are dynamic, artificial breaching was only a temporary solution. Natural processes refilled the dredged channels, prompting the construction of permanent breachways in most of the south shore ponds during the 1950s. The resulting uninterrupted flow of seawater into the ponds increased salinity sufficiently to change the habitat and thus the makeup of the ponds' fish populations.



Life in the salt ponds

In spite of the loss of a number of brackish-water (slightly salty water) fisheries, such as alewife and oysters, due to permanent breaching, the ponds today are still highly productive and popular fishing grounds. Recreationally fished species include summer flounder, striped bass, winter flounder, shad, white perch, mackerel, and tautog. Among shellfish, quahog is by far the most common species recreationally collected in the ponds, but (depending on the pond and the season) steamers, blue mussel, and bay scallop may also be found. Commercially fished species include quahog, steamers, oyster, eel, bay scallop, and mussel. In addition, green crab is harvested specifically for the bait industry, while blue crab is harvested recreationally.

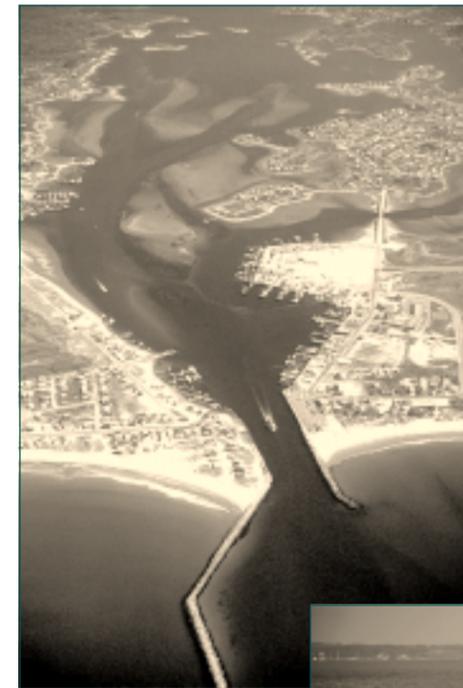
Not only are the salt ponds valuable spawning and nursery grounds for many aquatic species, but they are also prime feeding areas for migrating waterfowl, including Canada goose, greater scaup, and great blue heron. Even the endangered piping plover has taken advantage of the resources provided by the salt ponds.

Plant life is also an important component of the salt pond system. One of the most vital species of aquatic plant is eelgrass (*Zostera marina*), a form of seagrass that functions as a haven for fish larvae and shellfish. Some scientific research suggests that increased nutrient pollution from sewage disposal systems and fertilizer usage may be decreasing the extent of eelgrass in the ponds. The nutrients contribute to algal blooms that limit the amount of available sunlight, which the plant needs to survive.

Development in the salt pond region

Like coastal areas all over the country, the salt pond region has seen both increased tourism and rapid residential growth since the real estate boom of the mid-1980s. In the 10 years from 1990 to 2000, the average population of the four towns surrounding the salt ponds increased by 12.5 percent, nearly three times the state's growth. Charlestown grew the most, by 21 percent.

Commercial development has also been extensive, particularly around Point Judith Pond, which has the village of Wakefield at its head and Galilee, Rhode Island's largest fishing port, at its mouth. And the number of tourist-related businesses, such as hotels, shops, and restaurants, is increasing throughout the salt pond area—not surprising in light of the fact that the south shore barrier beaches rank as Rhode Island's number-one recreational resource.



Pollution in the salt ponds

Except for the village of Wakefield and the port of Galilee, the majority of the pond region is not sewered. Instead, residents use individual sewage disposal systems (ISDS) for sewage treatment. In some cases inadequate, antiquated, or poorly maintained sewage disposal systems allow wastewater to contaminate groundwater. Moreover, even a properly maintained septic system contributes nitrate to the groundwater. As residential development increases and more and more septic systems are constructed in a limited geographic area, nitrate contamination could become a significant problem.

Nitrate from both septic systems and lawn fertilizers contributes to eutrophication, a process that occurs when a body of water is excessively loaded with nutrients, promoting overgrowth of algae. Bacterial decomposition of this algae depletes the water of oxygen. When eutrophication is severe, fish and other marine organisms can suffocate.

Another threat from septic systems is the release of disease-causing viruses and bacteria that are carried in human feces. Fecal coliform—commonly referred to as *E. coli*—is the most prevalent bacteria detected in contaminated shellfish. Bacterial contaminations have resulted in several permanent shellfish closures in the salt ponds, including upper portions of Point Judith Pond, eastern portions of Ninigret Pond, and all of Green Hill Pond.

Pt. Judith Pond entrance from the ocean between Galilee and Snug Harbor



Recreational boaters enter the pond

Protecting the ponds

A group of citizens came together in 1985 to stave off the degradation of the ponds. These volunteer Salt Pond Watchers, originally sponsored by Sea Grant, monitor and observe the south shore ponds and provide policy makers with scientific data about water quality, bacteria levels, and contaminants for pond-use and land-use decisions. Sponsorship of the nationally recognized Salt Pond Watchers was transferred to the Salt Ponds Coalition in 1993.

Both local and state governments have also made efforts to manage development and pollution. In the mid-1980s, a Special Area Management Plan (SAMP) for the salt pond region was adopted and implemented by the Rhode Island Coastal Resources Management Council. Updated and strengthened in 1997, the plan serves as a watershed management guide and includes such information as land-use regulations, nitrogen removal technologies, recommended ISDS policies, vegetated buffer management tools, and nonpoint source pollution controls.

Trustom Pond

