

Coastal Features

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INSIDE THIS ISSUE:

Mohegan Bluffs Collapse	1
Eelgrass Maps On-Line	2
Aquaculture Report Released	3
Marine Bioinvasive Species: Preliminary Findings	4
Mettatuxet Beach WAT	5
Mohegan Bluffs Collapse: Photo Essay	6-7

Block Island Loses Chunk of Mohegan Bluffs to the Sea

BLOCK ISLAND - Just in case you were wondering, Mother Nature is still in charge. Or at least she was on April 10, when a huge chunk of the Mohegan Bluffs detached from Block Island's southern shore and crashed, virtually intact, to the beach below.

This type of landslide is called a slump block by geologists, due to the dynamics involved in its collapse. Distinguished from an avalanche, for example, where a mass of loose material experiences mixing as it flows along in a stream-like manner, a slump block remains essentially intact, detaching as a single solid chunk that experiences little mixing during its collapse. Even the grass that was formerly growing about 100 feet above its final resting place was clearly visible on the surface of the Mohegan Bluff slump block after its collapse.

Slump blocks are a predictable phenomenon on Block Island. In fact, slump blocks are a primary erosional mechanism that shapes the Island's bluffs. Erosion is perhaps typically thought of as a gradual process, where wind, rain, and freezing slowly wear away at solid materials over long stretches of time. Slump blocks are a type of catastrophic erosion, where physical processes and forces cause solid materials to undergo a very rapid, often violent transformation.

A general description of the Mohegan Bluffs' geology and its interaction with certain physical processes, is helpful toward understanding how the April 10 collapse occurred. In general, there are two different layers of material that make up the bluffs, a less porous base layer that consists primarily of clay and compacted sediment, and a more porous upper layer that is characterized by a mix of sand, gravel, and boulders. Ocean waves, a saturated upper layer, and gravity, are other key elements in the occurrence of a slump block. First, the base layer of the bluffs is undermined by ocean waves. Next, rainwater seeps into the more porous



On Edge: Ken Anderson, CRMC Supervising Civil Engineer, takes measurements to establish setbacks from the new edge of the bluff face at the collapse site. Photo: Janet Freedman, CRMC

(continued from page 1)

sandy upper layer, saturating it and adding a considerable amount of weight. Some saturation also occurs in the base layer, which decreases its structural strength, and reduces its weight bearing capacity.

Finally, the combination of these processes overwhelms the structural properties of the bluff. The saturated, unstable, heavy upper layer tears away from the bluff and slides downward on the saturated, and thus lubricated, base layer.

The catastrophic collapse that occurred at the Mohegan Bluffs on April 10 should serve as a reminder - if not a warning - that living on the coastline in Rhode Island carries with it both risk and reward.

And in the case of Block Island, just as surely as hurricanes are predictable forces of nature that shape the Rhode Island shoreline, slump blocks will continue to carve the Island's coast. Mother Nature's coastal *caveat emptor*.

So, if you are among the fortunate souls that live along the edge of the sea on Block Island, keep in mind: that edge may be closer than you think.

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Editors Note: There is an error in the "Rhode Island Harbor Masters" list in *Coastal Features*, Vol. 9, Issue 2 on page 7. The Charlestown harbormaster is incorrectly identified as Len Cabral. Len Wood has been the town's harbor master for several years. Apologies to Mr. Wood for any inconvenience.

Rhode Island Coastal Eelgrass Habitat Maps & Data Available Through Interactive Web-site

The Rhode Island Coastal Resources Management Council 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 that are available over the internet (<http://www.edc.uri.edu/eelgrass/>). The purpose is two-fold: to provide a single, comprehensive repository for Rhode Island eelgrass geographic data, and to provide resource managers and the public with an interactive way to access the data.

Eelgrass data has been geographically represented in Rhode Island since the U.S. Coast and Geodetic Survey performed hydrographic analyses including depth and bottom type of various locations in Narragansett Bay in the early 1800s. Since then, numerous groups have contributed geographic representations of eelgrass habitats. Most notable and recent are the Narragansett Bay Estuary Program's Marine and Estuarine Habitat Maps, which show eelgrass bed habitats larger than 1/2 acre in Narragansett Bay. Other initiatives include historical studies of eelgrass presence by RI Sea Grant and the Narragansett Bay Project, maps completed as part of research projects at the URI Graduate School of Oceanography and Natural Resources Science, and the CRMC/RIDEM Fish and Wildlife Shoreline Surveys of Eelgrass for 1999-2000.

With the development of new technologies that allow geographic data to be available over the internet, CRMC hopes to provide resource managers and the public with an interactive way to access eelgrass data that has been collected to date. 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 more information, go to the web-site listed above.

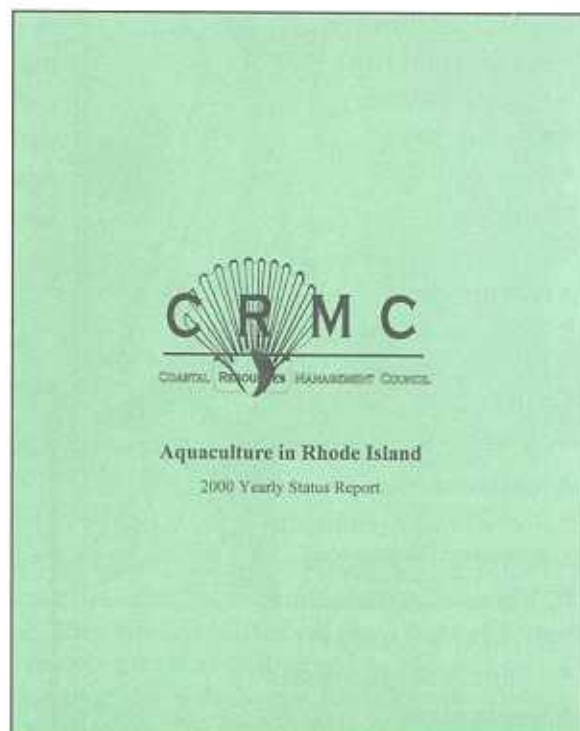
CRMC Releases Annual Aquaculture Report

According to the CRMC's recently released report *Aquaculture in Rhode Island, 2000 Yearly Report*, the past year was a good one for aquaculture in the state. The farm gate value of aquaculture products raised in Rhode Island during this period reached its highest level since a renewed interest in aquaculture began during the 1970's. The \$314,977 production value for the year 2000 was a 47% increase that eclipsed the previous year's value of \$213,861. This also represents the continuation of a positive growth trend: it is the 4th double-digit increase during the past five years.

While the economic data bodes well for the aquaculture industry at present, an emerging cooperative regulatory approach is showing promise for continued future growth. A CRMC working group on aquaculture and fisheries was initiated as a forum to discuss problems and create solutions that benefit stakeholders with an interest in Rhode Island's coastal waters. The group includes representatives of both the commercial and recreational fisheries, the aquaculture industry, academia, and regulatory agencies. A major step toward addressing use conflicts among the various stakeholders is a mapping project that identifies the portion(s) of coastal waters that each group considers to be essential to its activities. The resultant partitioning of the state's coastal waters helps to simultaneously protect stakeholder interests, and indicate areas where aquaculture operations may be sited without provoking the opposition that has proven to be the major impediment to the industry in recent times.

The following list highlights only a few of the facts and figures that describe aquaculture in Rhode Island today. For more comprehensive information on the current status of aquaculture in Rhode Island, contact the CRMC to obtain a copy of the annual report shown below.

- * The Eastern oyster and the quahog are the top species cultivated. The total acreage under cultivation increased to 30 acres in 2000.
- * Aquaculture related industries in RI had gross revenue of \$3.1 million during 2000.
- * Two RI universities conducted aquaculture related research valued at \$1.9 million in the year 2000.
- * The total contribution of aquaculture to the RI economy in the year 2000 was \$5.4 million.
- * Government agencies with jurisdiction over aquaculture continued to make progress in streamlining the permitting process during the year 2000.
- * Government agencies continued to involve stakeholders in the planning and regulation of aquaculture during the year 2000.



Annual report available from the CRMC

Narragansett Bay Marine Bioinvasives Research: Preliminary Findings

This article is the second in a series that will describe a rapid assessment survey for marine bioinvasive species that took place in Narragansett Bay, August 12-18, 2000.

BRISTOL - The preliminary findings of a Narragansett Bay Rapid Assessment Survey (RAS) were presented at Roger Williams University on April 11 as part of the Mark D. Gould Memorial Lecture Series on Rhode Island's Fauna, Flora, Geology, & Ecosystems. Kevin R. Cute, a CRMC Marine Resource Specialist, who planned and managed the RAS, presented a preliminary list of marine invertebrate species that were determined to be non-indigenous to Rhode Island's coastal waters by the RAS team that conducted the survey during the summer of 2000. The species list is shown below.

Preliminary List of Bioinvasive Species in RI Coastal Waters

Algae

- * *Codium fragile*
- * *Grateloupia doryphora*

Porifera

- * *Halichondria bowerbankia*

Cnidaria

- * *Cordylophora caspia*
- * *Garveia franciscana*
- * *Diadumene lineata*

Lophophorates

- * *Bowerbankia sp.*
- * *Bugula neritina*
- * *Conopeum sp.*
- * *Barentsia sp.*

Mollusca

- * *Littorina littorea*

Arthropoda

- * *Chthamalus fragilis*
- * *Corophium sp.*
- * *Carcinus maenas*
- * *Hemigrapsis sanguineus*

Asciidiacea

- * *Botrylloides violaceus*
- * *Botryllus schlosseri*
- * *Diplosoma listerianum*
- * *Asciidiella aspersa*
- * *Molgula manhattensis*
- * *Styela clava*
- * *Styela canopus*

It is important to note that this list is a work in progress. It will be updated as additional data is received from RAS team members. The preliminary results identified 22 bioinvasive species.

An additional 16 "cryptogenic" species, which may be bioinvasive, but due to uncertainty in historical databases related to their occurrence in Rhode Island's coastal waters, were classified as cryptogenic. This term, which indicates a possibility that a species may be bioinvasive, was coined by Dr. James Carlton, who led the RAS and is generally acknowledged as the leading expert on marine bioinvasive species in the world.

A final report on the findings of the RAS will be produced and made available for distribution later this year. The report will contain a complete description of the Narragansett Bay RAS, including a final list of bioinvasive species, where they were first reported in local waters, and the probable vector(s) by which they were introduced.



Thanks to the Narragansett Bay Rapid Assessment Survey Sponsors

- * Rhode Island Coastal Resources Management Council
- * Rhode Island Sea Grant
- * Rhode Island Department of Environmental Management (*Narragansett Bay Estuary Project*)
- * Rhode Island Natural History Survey
- * Narragansett Bay National Estuarine Research Reserve

Narrow River Nonpoint Source Pollution Control Project Recruiting Watershed Action Team

NARRAGANSETT - The Southern Rhode Island Conservation District (SRICD) has begun working on a project to reduce nonpoint source pollution in the Narrow River. This project was previously reported in *Coastal Features (Volume 9, Issue 1)*, when it was announced that the SRICD had been awarded an Aqua Fund grant to fund the work. The two primary goals are: 1) design a best management practice (BMP) to reduce nonpoint source pollution from stormwater that discharges directly into the Narrow River at Mettauxet Beach; and, 2) recruit and train a Narrow River Watershed Action Team (WAT).

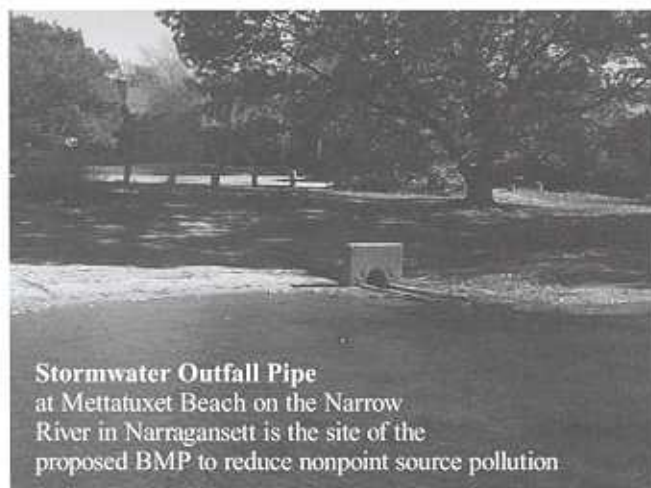
Alicia Lehrer, the SRICD District Manager, led a recent meeting with the project partners, including representatives from the Coastal Resources Management Council, the Town of Narragansett, the Narrow River Preservation Association, and the Department of Environmental Management. The SRICD is the project manager. While the design work for the BMP will proceed as a collaboration between various regulatory agencies and other organizations, the success of the other project goal, recruiting and training a WAT, is dependent upon the commitment of individuals with an interest in improving the environmental quality of the Narrow River and its watershed.

A primary task of the WAT will be to conduct a Shoreline Survey of the Narrow River. WAT members that participate in conducting the survey will first receive training in proper survey methods from the project partners. WAT members will learn a great deal about how everyday activities effect water quality and critical habitats. They will also not only learn how individuals can effect positive changes for the Narrow River and its watershed, they will lead others in doing so. In effect, the individuals that make up the Narrow River WAT will be the "voice of the watershed."

For information on the Narrow River Watershed Action Team please contact Susan Letendre (SRICD) at 822-8832 or the the Narrow River Preservation Association at:
<http://www.nrpa@netsense.net>



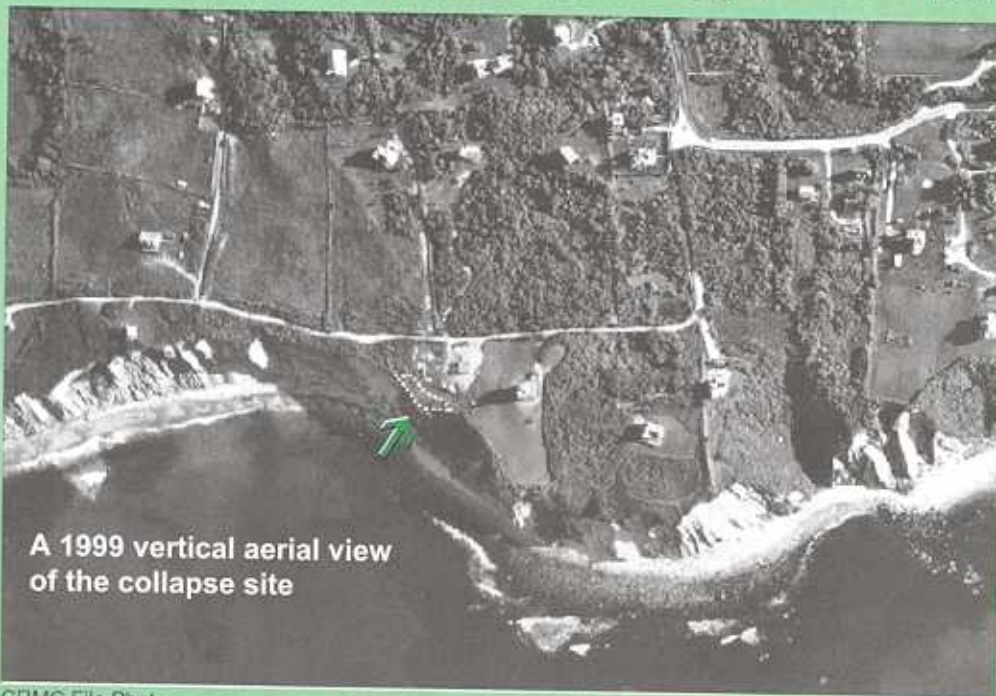
Narrow River Watershed: You can play a direct and crucial role in protecting the Narrow River and its watershed by becoming a member of the Narrow River Watershed Action Team. (Map source: *The Narrow River Handbook/Used by permission of the Narrow River Preservation Association*)



Stormwater Outfall Pipe
at Mettauxet Beach on the Narrow River in Narragansett is the site of the proposed BMP to reduce nonpoint source pollution

Photo: Kevin Cute, CRMC

Photo Essay: April 10 Catastrophic Erosion Event at Mohegan Bluffs, Block Island

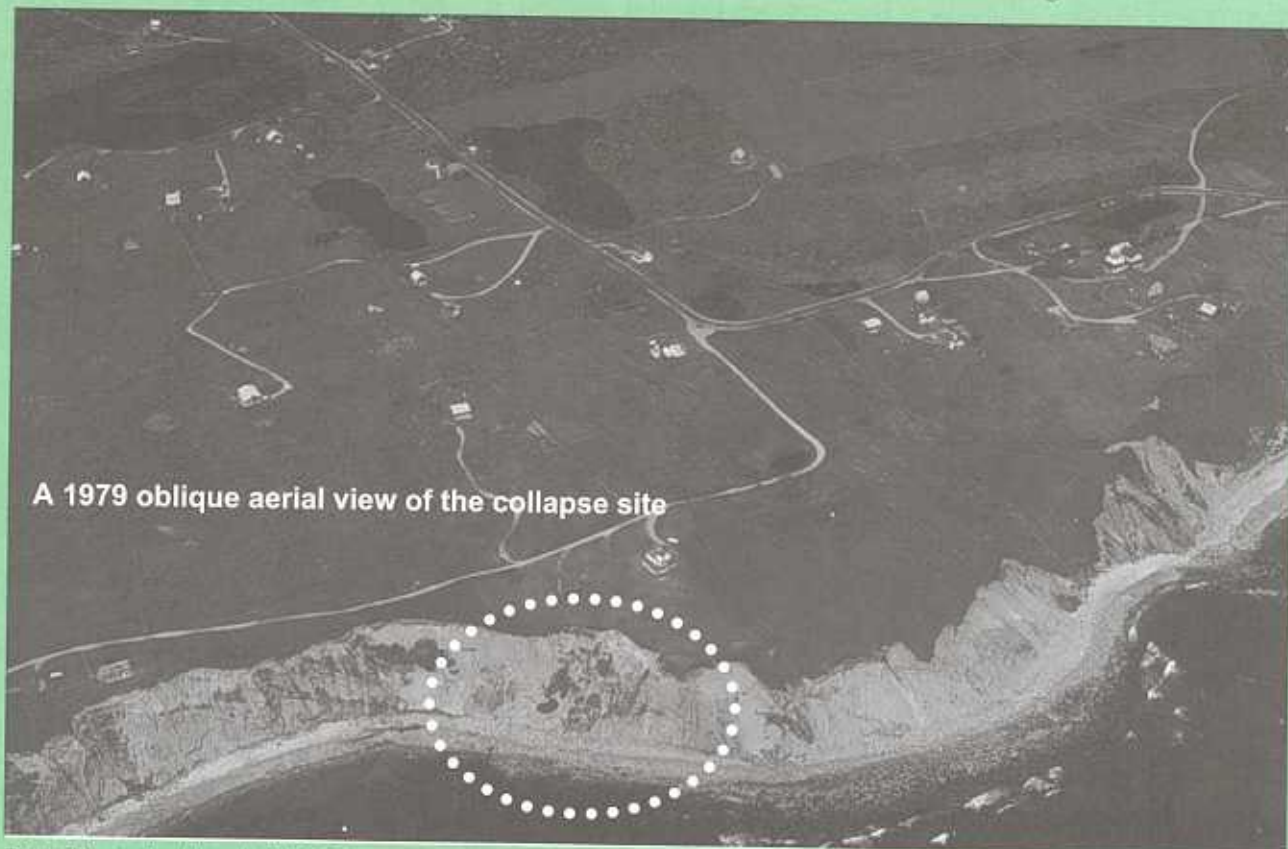


A 1999 vertical aerial view of the collapse site

The photo at left shows an outline of the approximate area at the top of the bluff that was lost when the slump block occurred

CRMC File Photo

The photo below shows the site as it appeared 20 years ago. Compare this with the above photo and note how much erosion has occurred during this time.



A 1979 oblique aerial view of the collapse site

Photo: Dr. Jon Boothroyd, URI (1979)

Photo taken on April 11, 2001

This photo shows the slump block extending like a peninsula from the shoreline the day after the collapse



Photo: Phillips Real Estate

Photo taken on May 19, 2001

Waves rapidly eroded the slump block back to the original shoreline

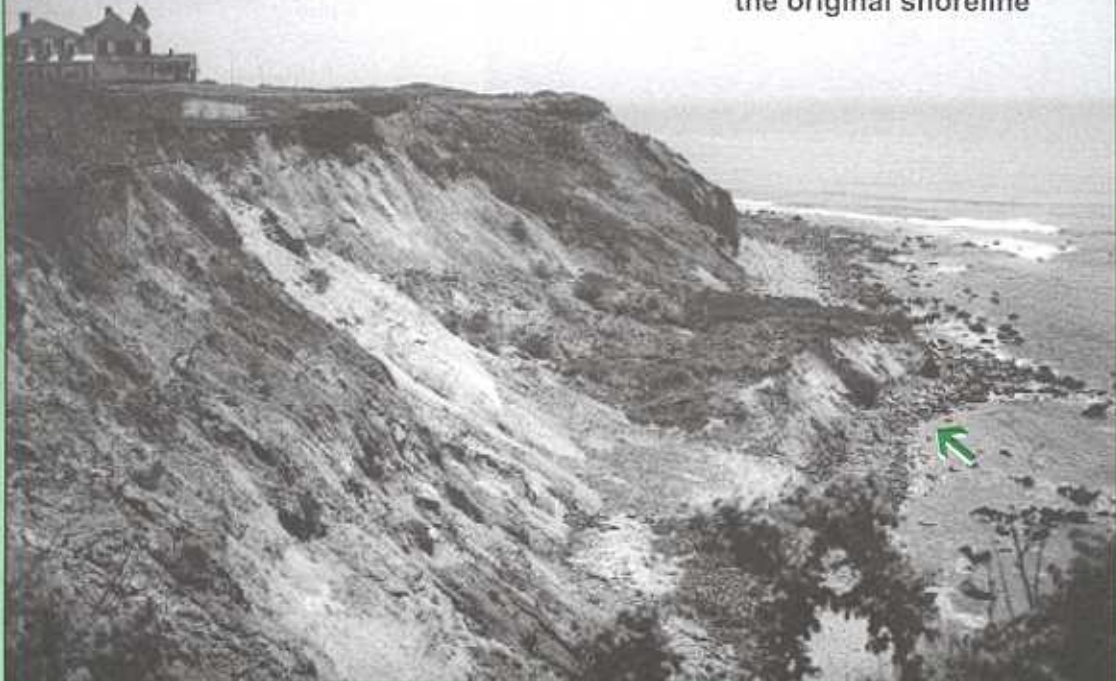


Photo: Janet Freedman, CRMC



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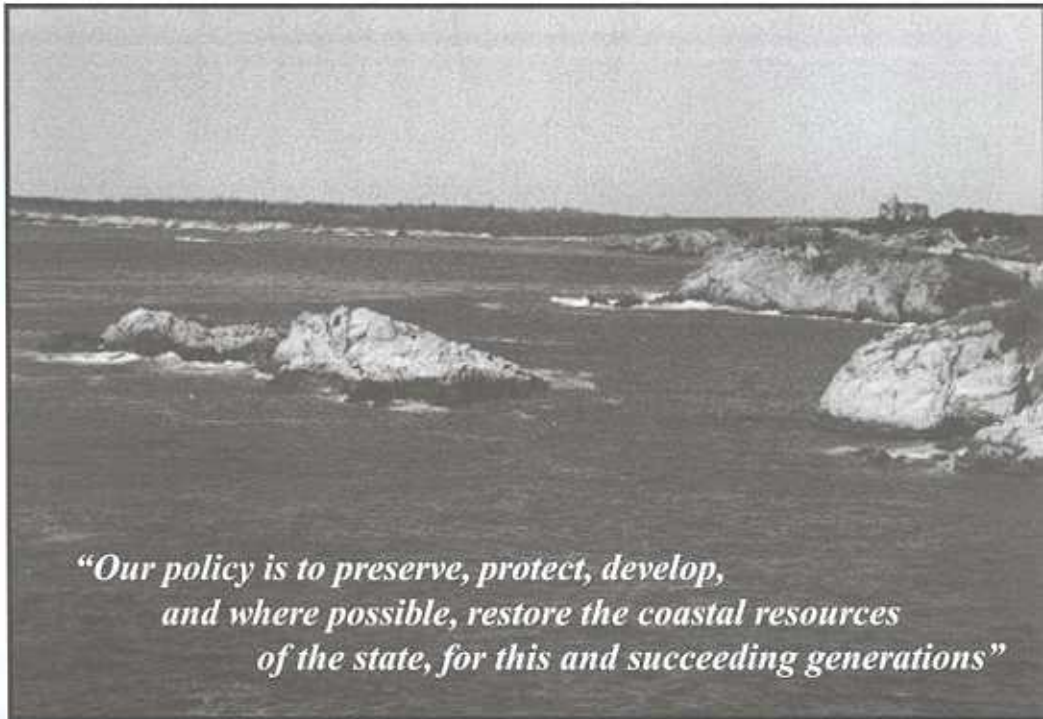
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*"Our policy is to preserve, protect, develop,
and where possible, restore the coastal resources
of the state, for this and succeeding generations"*

CRMC File Photo

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