



**TOWN OF KINGSTON  
CONSERVATION COMMISSION**

# Memo

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**To:** Kevin Donovan, Town Administrator

**From:** Maureen Thomas, Conservation Agent *MT*

**Date:** 2/14/06

**Subject:** Pilgrim Nuclear Power Station Re-Licensing

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Attached are comments regarding water resource concerns relating to the re-licensing of Pilgrim Nuclear Power Station (PNPS). In bold are the main points that could be addressed through the review of the re-licensing application or as a condition of the re-licensing. It is evident that some studies and monitoring efforts have been conducted at PNPS as a result of regulatory action or as a condition of the initial licensing, but it seems that much more could be done in this area in order for the Town of Kingston to know if our marine resources are adversely impacted by the ongoing operation of PNPS. If more extensive studies were conducted in the past, I am unaware of them and if this is the case, perhaps they could be provided to us.

The comments are based on the fact that PNPS is proposing to retain their once-through cooling system which, according to Entergy, EPA has determined to be the best technology available for minimizing adverse environmental impacts as required under the Clean Water Act for point source discharges.

If you need further information or have questions regarding my comments, please let me know.

Thank you.

## **Kingston Water Resource Concerns on Re-licensing of Pilgrim Nuclear Power Station (PNPS)**

**February 14, 2006**

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Based on a summary review of readily available information, it appears that more research is needed to determine exactly how the Pilgrim Nuclear Power Station (PNPS) affects marine organisms in the area of Kingston Bay and the larger Plymouth-Kingston-Duxbury embayment system. Though there has been some research on the affects of the intake of cooling water for the once-through heat dissipation system and the discharge of the heated effluent from PNPS on finfish, it does not appear that any studies have been conducted on the possible affects of temperature changes or thermal plumes on nearby shellfish beds and aquacultural operations that are plentiful in Kingston, Plymouth and Duxbury Bays. The bays support a wide variety of shellfish including soft shell clams (*Mya arenaria*), razor clams (*Ensis directus*), quahogs (*Mercinaria mercenaria*), bay scallops (*Argopecten irradians*), Blue Mussels (*Mytilus edulis*), oysters (*Ostrea conchaphila*) etc. The Environmental Report (ER)(<http://www.nrc.gov/reactors/operating/licensing/renewal/applications/pilgrim/environ-report.pdf>) submitted to the Nuclear Regulatory Commission (NRC) by Entergy for its operating license renewal application seems to have focused mainly on lobsters which are an important commercial species, but one of many shellfish resources that could be impacted by the once-through cooling system at PNPS.

In addition, the ER states that PNPS is consistent with MA Coastal Zone Management (CZM) Ocean Resources Policy # 1 that requires the company to support the development of environmentally sustainable aquaculture, both for commercial and enhancement (public shellfish stocking) purposes. CZM Ocean Resources Policy #1 also requires that Entergy ensure that the review process regulating aquaculture facility sites (and access routes to those areas) protects ecologically significant resources (salt marshes, dunes, beaches, barrier beaches, and salt ponds) and minimizes adverse impacts upon the coastal and marine environment. In the ER, Entergy certifies to the NRC that the renewal of the PNPS operating license complies with and will be conducted in a manner that is consistent with the federally approved MA CZM principles and policies. **Entergy justifies its compliance with Ocean Resources Policy # 1 by claiming that it is "aware of no aquaculture near the site" and "is aware of no PNPS impacts on aquaculture and no reason for license renewal to alter this."** There are, however, many aquacultural operations in the Plymouth-Kingston-Duxbury embayment system that include both public shellfish beds and private commercial ventures.

PNPS currently sponsors a pilot winter flounder hatchery in Chatham, MA to investigate using the farm raised winter flounder for the purpose of restoring populations of this species lost as a result of impingement of adults and entrainment of eggs and larvae during the intake of water from Cape Cod Bay for cooling the facility. Although Entergy states that the pilot winter flounder studies have indicated that this is a viable restoration technique, it would be helpful to the communities within the 10 mile radius of PNPS if Entergy could support more local aquacultural endeavors as well as unbiased scientific investigations on the potential affects of PNPS on these marine resources. For instance, it is important for the Town of Kingston to know if their recently opened public shellfish beds consisting of soft shell clams, razor clams, quahogs, blue mussels and oysters are adversely impacted by thermal pollution

**from the discharge of heated effluent that is a by-product of the once-through cooling system used by PNPS.**

**In addition, further studies on the impact of the thermal plume emanating from PNPS in relation to anadromous fish such as rainbow smelt, alewife and blueback herring would be helpful in assessing or eliminating possible causes for the recent decline in the migratory fish populations of streams in Kingston including Smelt Brook and the Jones River which is one of the largest smelt runs in the Commonwealth and the largest river in Cape Cod Bay. There are many other migratory fish runs in other coastal rivers of Plymouth and Duxbury. The ER states that "thermal discharges . . . affect only a small area in the immediate vicinity of PNPS, and have resulted in no adverse impacts to the representative important species populations or to the integrity of the aquatic ecosystem of Cape Cod Bay." The ER goes on to say that "the thermal discharge does not adversely affect the propagation or protection of a balanced indigenous population of fish, shellfish, and wildlife in Cape Cod Bay." It would be helpful for nearby communities to know what the "small area in the immediate vicinity of PNPS" means in terms of a measurable distance and also how the geographical extent of the thermal discharge as well as how the range of temperature fluxes have been assessed and will continue to be evaluated in determining potential impacts to the sensitive marine environment surrounding PNPS.**

There are also other sensitive resources in the Plymouth-Kingston-Duxbury embayment including one of the most extensive eel grass beds in southeastern Massachusetts and extensive salt marsh systems. These areas are crucial habitat for shellfish and migratory species (See attached Environmental Sensitivity Index and Maps along with the BioMap produced by Natural Heritage and Endangered Species Program (NHESP) for the area). It would be helpful to know if these habitats are harmed in any way as a result of the ongoing once-through cooling system at PNPS.

The impingement of fish on intake screens at the entry of the intake bay for the PNPS cooling system affects mortality rates of many species of fish including the winter flounder as mentioned above, but also the rainbow smelt and other migratory species. **The affect the impingement events have on local populations of rainbow smelt is of particular importance to the Town of Kingston because the Jones River has historically been the largest smelt run in the Plymouth-Kingston-Duxbury area and in Cape Cod Bay as a whole. An article by Gerald M. Szal of the Massachusetts Department of Environmental Protection entitled, *Pilgrim Nuclear Power Station: review of intake and discharge effects to finfish* (August 2005) (<http://www.pilgrimwatch.org/environ4.html>), provides finfish impingement data from 11 years (1994-2004) of monitoring at PNPS and provides rainbow smelt losses among other fish species due to impingement on intake screens. Though losses from impingement totaled 6,200 in 1978 and 9,464 in 1994, losses have generally decreased since that time though there were still 2,257 losses of individual rainbow smelt in 2004. The losses assessed in 1978 prompted a 3-year study to evaluate the adult rainbow smelt population of the Jones River and how a loss of 6,200 fish may affect the overall population. The study found that the loss in 1978 may have reduced the Jones River spawning population by less than one percent. Though the 11 years of impingement monitoring data at PNPS is valuable in itself, assessments of rainbow smelt populations in the Jones River have not occurred on a regular basis and therefore, make it difficult to assess the potential impact of PNPS impingement**

**events on the Jones River population. Studies conducted by the Division of Marine Fisheries (DMF) in 2004 and 2005 show that there has been a sharp decline in the rainbow smelt and other migratory fish populations in the Jones River since the late 1970's, but the cause of the decline is not known. If Entergy could help support the monitoring efforts of agencies such as the DMF or local groups, it would be possible to conduct more frequent surveys that would provide better data for evaluating the relationship between declining migratory fisheries and PNPS. In comparison to other potential impacts on fisheries such as acid deposition, stormwater inputs, increased sedimentation due to rapid development, it is possible that the ongoing operation of PNPS has negligible impacts on fisheries as it did back in 1978, but without more substantial data it is impossible to assess the causes of the declines in local fisheries.**

**Impingement also affects invertebrates such as crabs, shrimp and jellyfish that may not be as important from a commercial, recreational or economic perspective, but ecologically, these species are crucial to the food chain and are keystone species upon which the more economically important species depend. Preserving the overall biological diversity of Cape Cod Bay is therefore essential to the local fishing economies as well as the recreational and ecological integrity of the area. PNPS support of these interests through sponsoring further scientific studies on the potential affects of the once-through cooling on various invertebrate species would be helpful to the towns of Kingston, Plymouth, Duxbury as well as other regulatory agencies concerned with the management of marine resources as a whole.**

**Perhaps PNPS has conducted studies similar to those suggested above and could provide evidence of those studies to assure the town of Kingston and the towns of Plymouth and Duxbury that species dependent on the marine environment are not being adversely affected by PNPS' similar dependency on Cape Cod Bay. Further studies, however, will certainly be needed in the future and PNPS' support of the efforts of regional agencies and local communities would help us in protecting the marine environment we share and on which we all depend for a sound ecological, recreational and economic future.**

# MASSACHUSETTS

## SHORELINE HABITAT RANKINGS

- 1A) EXPOSED ROCKY SHORES
- 1B) EXPOSED, SOLID MAN-MADE STRUCTURES
- 2A) EXPOSED WAVE-CUT PLATFORMS IN BEDROCK
- 3A) FINE- TO MEDIUM-GRAINED SAND BEACHES
- 3B) SCARPS AND STEEP SLOPES IN SAND
- 4) COARSE-GRAINED SAND BEACHES
- 5) MIXED SAND AND GRAVEL BEACHES
- 6A) GRAVEL BEACHES
- 6B) RIPRAP
- 7) EXPOSED TIDAL FLATS
- 8A) SHELTERED ROCKY SHORES
- 8B) SHELTERED, SOLID MAN-MADE STRUCTURES
- 8C) SHELTERED RIPRAP
- 9A) SHELTERED TIDAL FLATS
- 9B) VEGETATED LOW BANKS
- 10A) SALT- AND BRACKISH-WATER MARSHES
- 10B) FRESHWATER MARSHES
- 10C) SWAMPS

## HUMAN-USE FEATURES

- ACCESS
- AIRPORT
- AQUACULTURE
- AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)
- BOAT RAMP
- COAST GUARD
- COMMERCIAL FISHING
- FERRY
- LOCK OR DAM
- MARINA / ANCHORAGE
- MARINE SANCTUARY / RESERVE
- NATIONAL PARK
- RECREATIONAL BEACH
- RECREATIONAL FISHING
- STATE PARK / FOREST
- WASHOVER SITE
- WATER INTAKE
- WILDLIFE REFUGE / MGT AREA
- HISTORICAL SITE
- HUMAN-USE NUMBER

- STATE BOUNDARY
- MANAGEMENT AREA
- BRIDGE

## SENSITIVE BIOLOGICAL RESOURCES

- |              |                   |                            |
|--------------|-------------------|----------------------------|
| BIRD         | FISH              | REPTILE                    |
| DIVING BIRD  | ANADROMOUS STREAM | TURTLE                     |
| GULL / TERN  | BEGINNING OF RUN  | SUBMERSED HABITAT          |
| PELAGIC BIRD | INVERTEBRATE      | EELGRASS                   |
| RAPTOR       | BIVALVE           | ELMR (FISH & INVERTEBRATE) |
| SHOREBIRD    | INSECT            | FISH                       |
| WADING BIRD  | MARINE MAMMAL     | CRUSTACEAN                 |
| WATERFOWL    | DOLPHIN           | ECHINODERM                 |
| NESTING SITE | PINNIPED          | THREATENED / ENDANGERED    |
|              | WHALE             | RAR NUMBER                 |

## SALINITY INFORMATION (ALL ESTUARIES)

DECREASING SALINITY PERIOD

October - February

LOW SALINITY PERIOD

March - May

INCREASING SALINITY PERIOD

June

HIGH SALINITY PERIOD

July - September

HIGH SALINITY

HIGHER

LOWER

LOW SALINITY

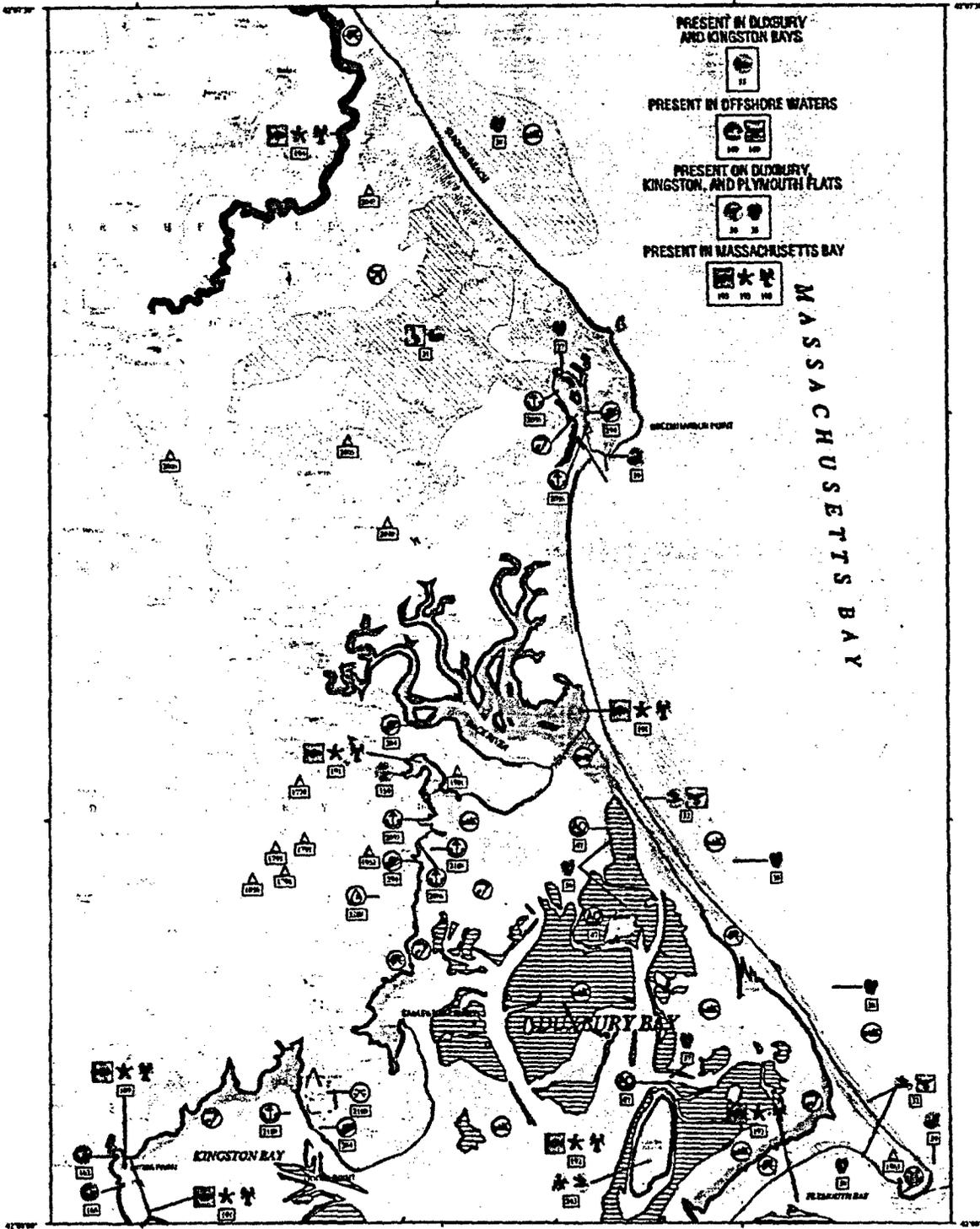
HIGHER

LOWER

FISH AND INVERTEBRATES  
RELATIVE ABUNDANCE

- 1 No Information
- 2 Rare
- 3 Common
- 4 Abundant
- 5 Highly Abundant

# ENVIRONMENTAL SENSITIVITY INDEX MAP



**SHORELINE HABITATS**

- 14 EXPOSED ROCKY SHORES
- 15 IMPROVED, STRUCTURE-MADE STRUCTURES
- 21 DAMP/WAVE-EXPOSED PLATFORM BEACHES
- 23 FINE-TO-MEDIUM-GRAINED SAND BEACHES
- 28 SCARP AND STEEP SLOPES IN SAND
- 1 COARSE-GRAINED SAND BEACHES
- 5 MIXED SAND AND GRAVEL BEACHES
- 6A GRAVEL BEACHES
- 6B RIPRAP
- 7 EXPOSED TIDAL FLATS
- 6A SHELTERED ROCKY SHORES
- 6B SHELTERED, STRUCTURE-MADE STRUCTURES
- 6C SHELTERED RIPRAP
- 6A SHELTERED TIDAL FLATS
- 6B VEGETATED LOW BANKS
- 6A SALT - HYDRACKRIS - WATER WARDES
- 100 FRESHWATER MARSHES
- 80 SCAMPS

SCALE 1:45000

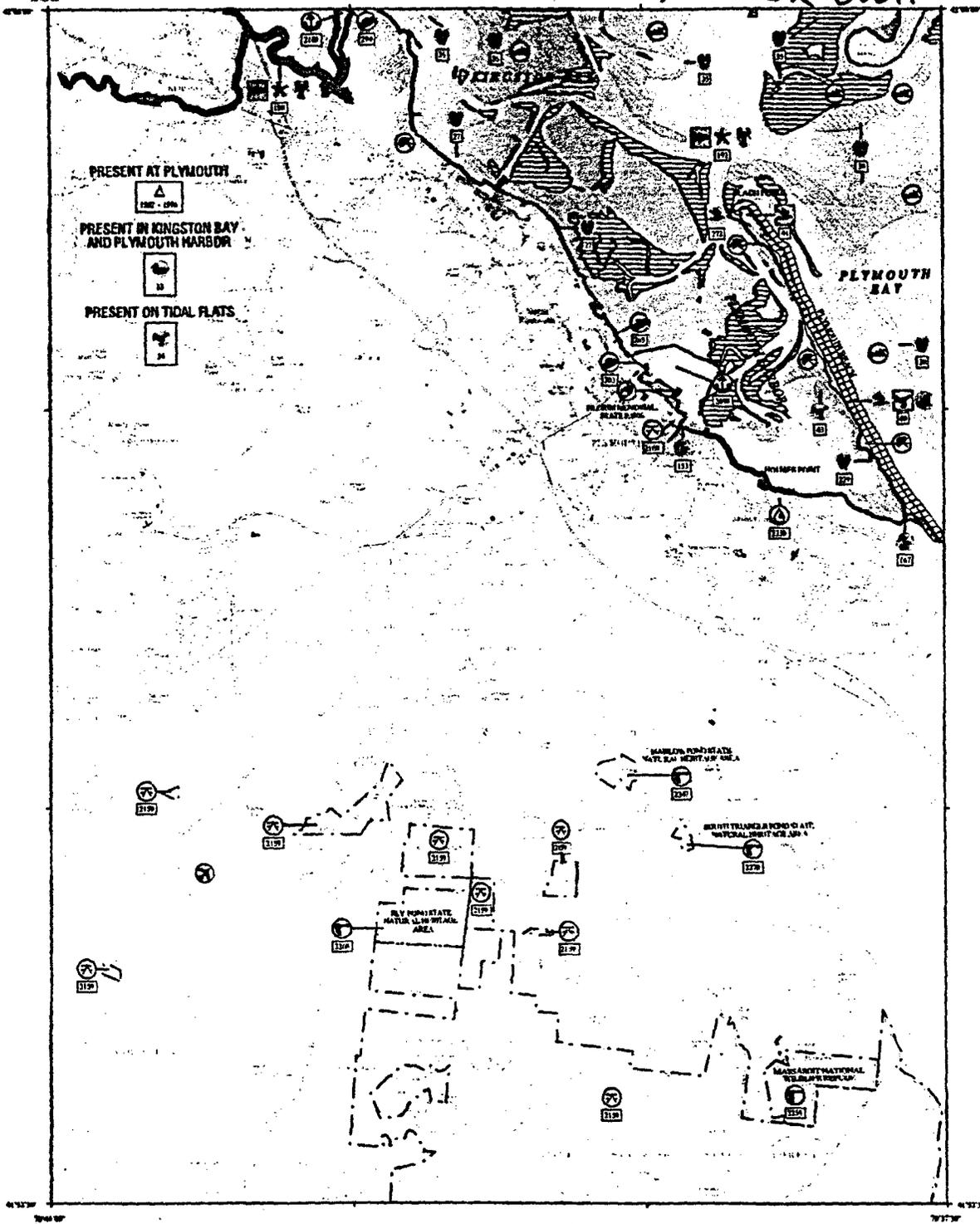
1 KILOMETER

1 MILE

**Not For Navigation**  
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 National Oceanic and Atmospheric Administration  
 National Ocean Service  
 Office of Response and Restoration  
 Hazardous Materials Response Division

# ENVIRONMENTAL SENSITIVITY INDEX MAP



- PRESENT AT PLYMOUTH  
[Symbol]
- PRESENT IN KINGSTON BAY AND PLYMOUTH HARBOR  
[Symbol]
- PRESENT ON TIDAL FLATS  
[Symbol]

**SHORELINE HABITATS**

- 1A EXPOSED ROCKY SHORES
- 1B PROTECTED ROCKY SHORES
- 2A LAYERS WAVE-CUT PLATFORMS IN BEDROCK
- 2B FINE- TO MEDIUM-GRAINED SAND BEACHES
- 2C SCALPS AND STEEP SLOPE SAND BEACHES
- 3 CLAY-SAND-GRAINED SAND BEACHES
- 4 MIXED SAND AND GRAVEL BEACHES
- 5 GRAVEL BEACHES
- 6 RIPRAP
- 7 EXPOSED TIDAL FLATS
- 8A SHELTERED ROCKY SHORES
- 8B SHELTERED SAND/MAN-MADE STRUCTURES
- 8C SHELTERED RIPRAP
- 8D SHELTERED TIDAL FLATS
- 9 VEGETATED LOW BANKS
- 10A SALT- AND BRACKISH-WATER MARSHES
- 10B FRESHWATER MARSHES
- 11 SWAMPS

SCALE 1:65000

0 1 KILOMETER

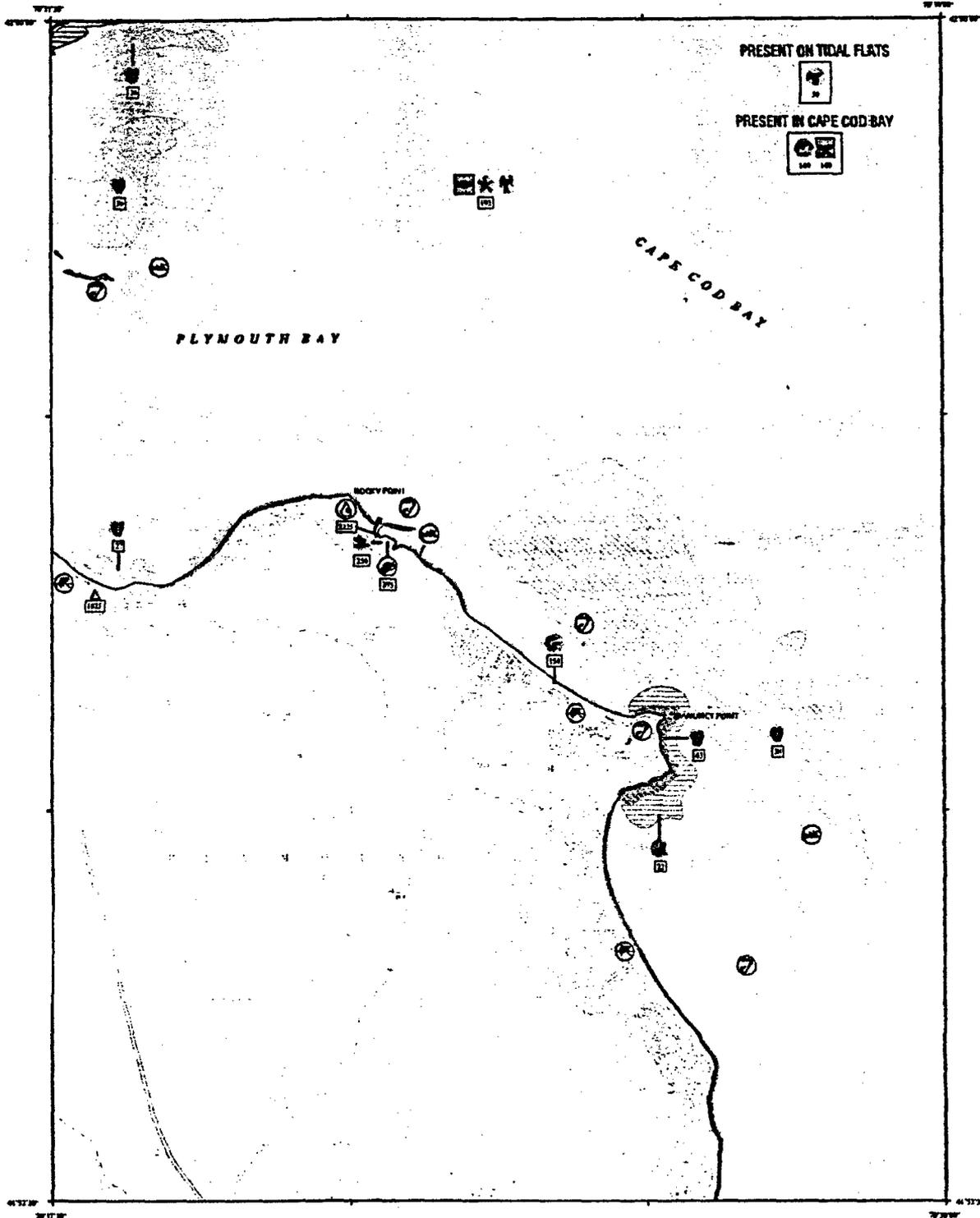
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PLYMOUTH, MA (1977) MASS-18

# ENVIRONMENTAL SENSITIVITY INDEX MAP



PRESENT ON TIDAL FLATS



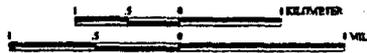
PRESENT IN CAPE COD BAY



- SHORELINE HABITATS**
- 1A CULTURED ROCKY SHORES
  - 1B FISHES, SHELLS, MAN-MADE STRUCTURES
  - 2A BARRIERS, WAVES - CLT PLATFORMS IN BEDROCK
  - 2B FIRE - FORMERLY - GRANDED SAND BEACHES
  - 3 RAMP AND STEEP SLOPES IN SAND
  - 4 CLUMBS - GRANDED SAND BEACHES
  - 5 MIXED SAND AND GRAVEL BEACHES
  - 6A GRAVEL BEACHES
  - 6B RUPRAP
  - 7 EXPOSED TIDAL FLATS
  - 8A SHELTERED ROCKY SHORES
  - 8B SHELTERED ROCKY MAN-MADE STRUCTURES
  - 9A SHELTERED RUPRAP
  - 9B SHELTERED TIDAL FLATS
  - 10 VEGETATED LOW BAYS
  - 11A SALT - AND BRACKISH - WATER MARSHES
  - 11B FRESHWATER MARSHES
  - 12 SWAMPS

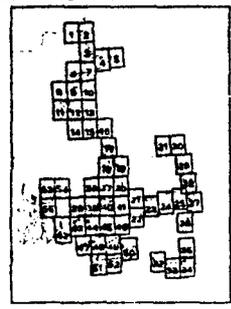


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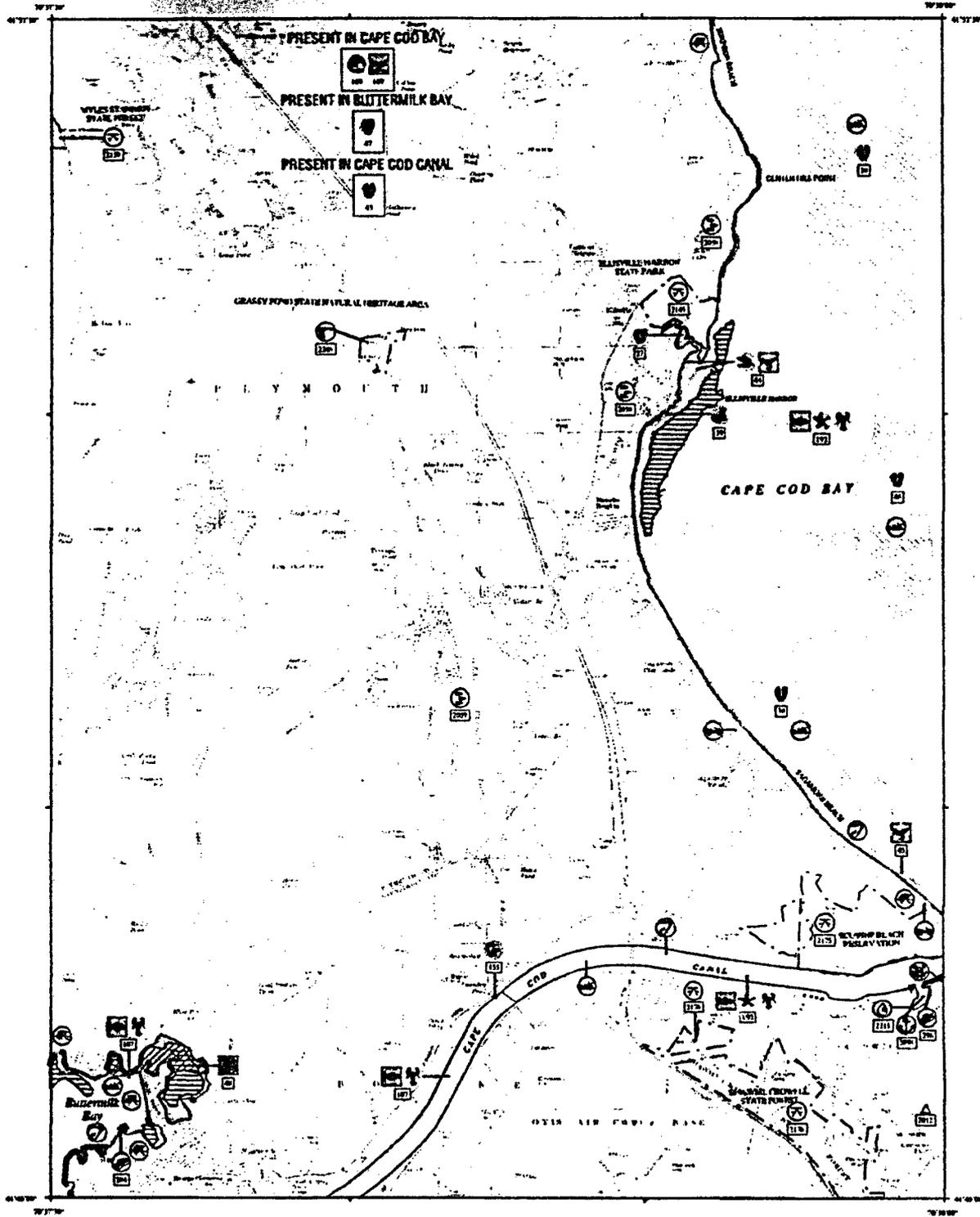
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MANOMET, MA (1977) **MASS-19**

# ENVIRONMENTAL SENSITIVITY INDEX MAP

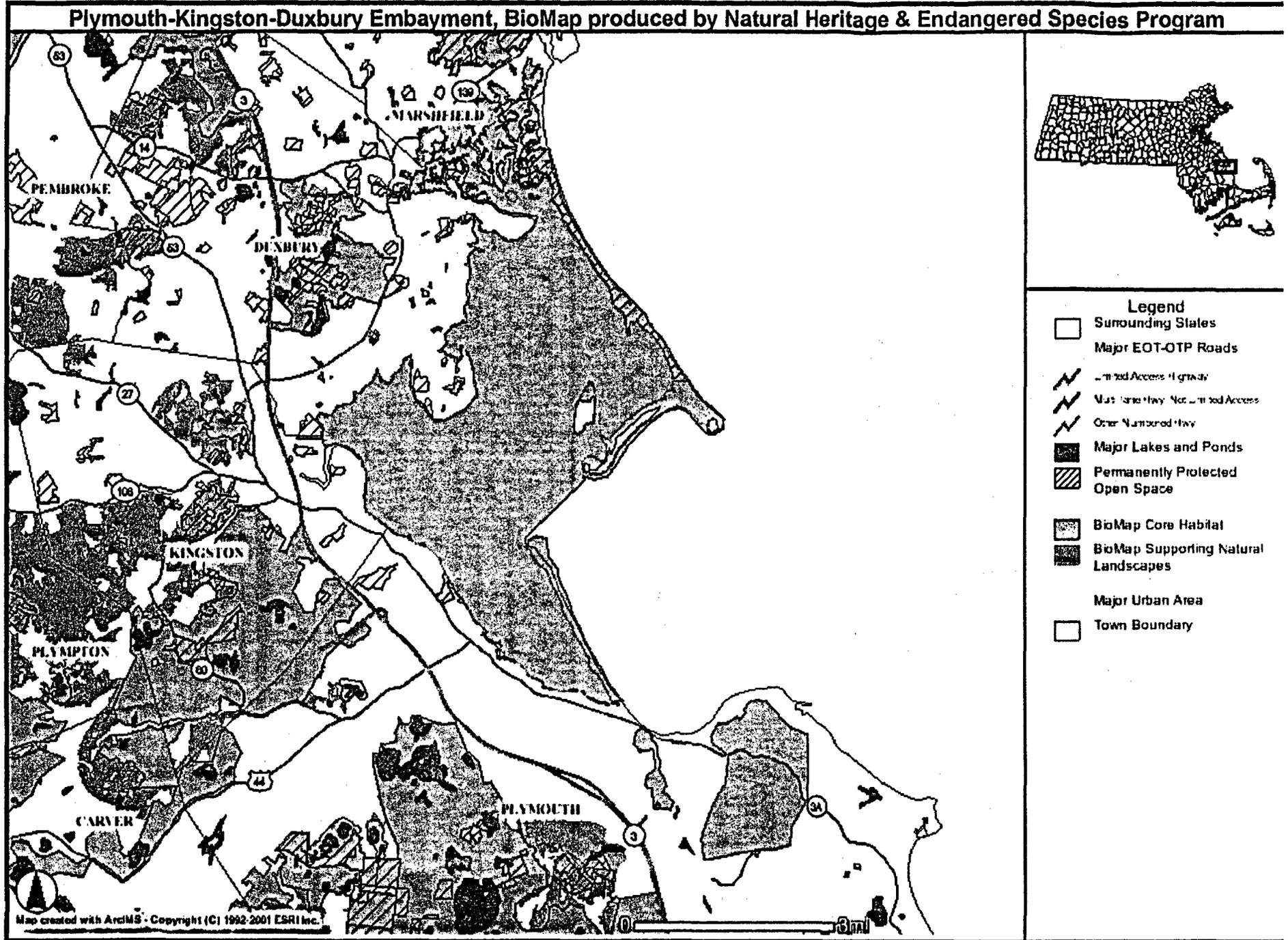


| SHORELINE HABITATS |  |
|--------------------|--|
|                    | 14 EXPOSED ROCKY SHORES                  |
|                    | 15 EXPOSED, STRIP MAN-MADE STR. CYLES    |
|                    | 21 SANDY WAVE-CUT ATTIHUBEN BEACHES      |
|                    | 22 FINE-TO MEDIUM-GRAINED SAND BEACHES   |
|                    | 23 COARSE-TO MEDIUM-GRAINED SAND BEACHES |
|                    | 4 COARSE-GRAINED SAND BEACHES            |
|                    | 5 MEDIUM-GRAINED SAND BEACHES            |
|                    | 6A GRAVEL BEACHES                        |
|                    | 6B SPRAY                                 |
|                    | 7 EXPOSED TIDAL FLATS                    |
|                    | 8A BELTERED ROCKY SHORES                 |
|                    | 8B BELTERED MUD/MAN-MADE STR. CYLES      |
|                    | 9 BELTERED SPRAY                         |
|                    | 10A BELTERED TIDAL FLATS                 |
|                    | 10B VEGETATED LOW BANKS                  |
|                    | 10C SALT-SPRAY WACKEN-WATER WARREN       |
|                    | 10D FRESHWATER WARREN                    |
|                    | 10E SWAMP                                |

SCALE 1:45000  
  
 1 KILOMETER  
  
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**Plymouth-Kingston-Duxbury Embayment, BioMap produced by Natural Heritage & Endangered Species Program**



- Legend**
- Surrounding States
  - Major EOT-OTP Roads
  - Limited Access Highway
  - Multi Lane Hwy. Not Limited Access
  - Other Numbered Hwy
  - Major Lakes and Ponds
  - Permanently Protected Open Space
  - BioMap Core Habitat
  - BioMap Supporting Natural Landscapes
  - Major Urban Area
  - Town Boundary

Map created with ArcIMS - Copyright (C) 1992-2001 ESRI Inc.

