

*Boston
Harbor
Islands Vital
Signs Scoping
Workshop*

Agenda

AGENDA

Boston Harbor Islands Vital Signs Scoping Workshop

6 October 2003

Boston Museum of Science

9 am – 4 pm.

Objectives:

- 1) introduce the process of developing long-term ecological monitoring in the NPS and Northeast Temperate Network, provide background to the unique partnerships and natural resource issues of Boston Harbor Islands, and review ongoing water quality monitoring around Boston Harbor Islands
- 2) identify priority monitoring topics for the Boston Harbor Islands Partnership to be conducted by the NPS Inventory and Monitoring program
- 3) establish topical work groups to identify monitoring questions, environmental stressors, and potential indicators

- | | |
|-------------|--|
| 8:30-9:00 | Assemble (coffee/snacks) |
| 9:00-9:15 | Introduction (Greg Shriver) |
| 9:15-9:45 | Developing ecological monitoring in the Northeast Temperate Network
(Greg Shriver) |
| 9:45-10:00 | Overview of Boston Harbor Islands; natural resource mgt. objectives and partnerships.
(Bruce Jacobson) |
| 10:00-10:30 | Overview of water quality monitoring in Boston Harbor Islands
(Mark Flora) |
| 10:30-10:45 | BREAK |
| 10:45-12:00 | -review draft lists and conceptual models of BOHA ecological systems
-review draft lists of priority natural resources in each ecological system
-review draft lists of potential threats/stressors impacting/driving those resources/systems
-revise lists and establish work groups based on ecological systems |
| 12:00-1:00 | LUNCH (meet with work groups for lunch to initiate discussion) |
| 1:00-3:00 | Work groups:
-confirm priority systems and resources
-list monitoring questions, stressors, and indicators for each system
-develop natural resource monitoring objectives for each system |

- identify islands where monitoring should be conducted
- rank indicators and stressors for each system in priority order
- complete provided tables to document work

3:00-4:00 Synthesis of work group results, additional discussion

4:00 Thank you and ADJOURN

Workshop Goals

30 September 2003

RE: Boston Harbor Islands Scoping Workshop

Dear Participants:

Thank you for agreeing to participate in the Boston Harbor islands Vital Signs Scoping Workshop. During this workshop, we plan to identify priority monitoring questions, natural resource management issues, and ways to enhance, establish, and capitalize on partnership opportunities.

The Boston Harbor Islands (BOHA) are unique in their partnerships for both management and natural resource monitoring. Officially listed in the Northeast Temperate Network (NETN), the Northern Coastal and Barrier Network (NCBN) has already worked to identify priority monitoring issues for coastal parks, including Boston Harbor Islands. These I&M networks are presently at different stages of planning for development ecological monitoring programs. The NCBN has recently identified Vital Signs for 8 NCBN parks and coastal Vital Signs for two NETN parks (Acadia and Boston Harbor Islands) whereas the NETN will not identify Vital Signs until October 2004.

For this workshop, we intend to establish the following three workgroups and will entertain suggestions for others. Because of the different Network planning stages, each workgroup will be asked to complete slightly different tasks.

The preliminary workgroups and responsibilities will be as follows:

- 1) **estuarine/inter-tidal group**: using the NCBN selected vital signs for estuaries, review how these indicators are being monitored in the BOHA area by other agencies and determine if the present extent of monitoring is adequate to make inferences about estuarine systems in BOHA. For inter-tidal systems, review and revise draft conceptual models, tables of indicators and stressors, and prioritize indicators and stressors.
- 2) **coastal uplands/freshwater wetlands group**: using draft conceptual models and draft lists of indicators and stressors, identify the priority upland natural resources and monitoring questions, review and revise the draft list of indicators and stressors, prioritize upland indicators, and identify islands where monitoring could be conducted.
- 3) **baseline long-term monitoring group**: identify the most important information needed to support long-term ecological monitoring at BOHA.

Workgroup Synthesis

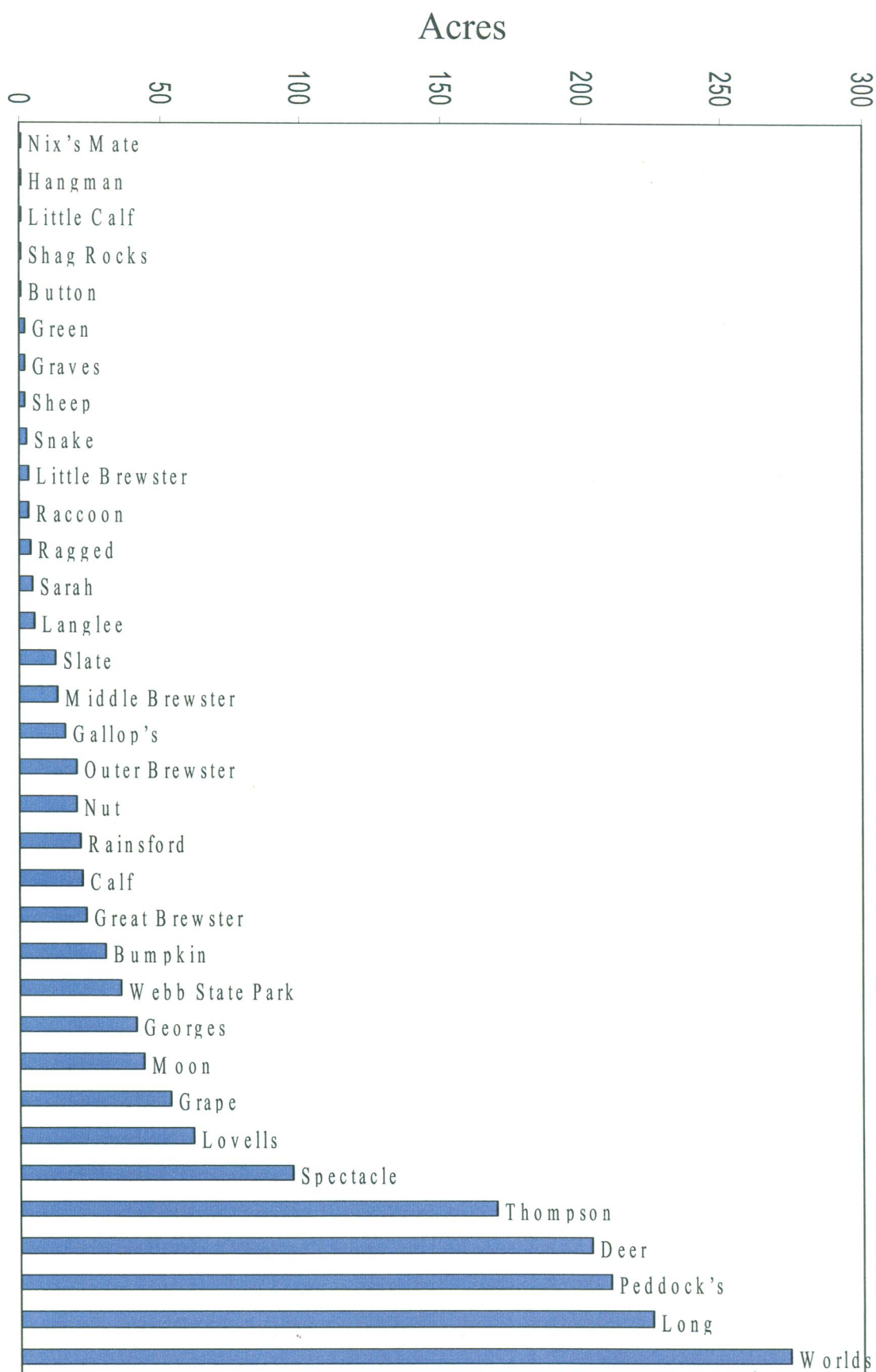
A final objective of this workshop is to synthesize recommendations from workgroups and determine the priority Vital Signs that could be considered for implementation by the NETN and/or NCBN at BOHA.

Thank you again for your time and we look forward to seeing you Monday 6 October 2003.

Sincerely,

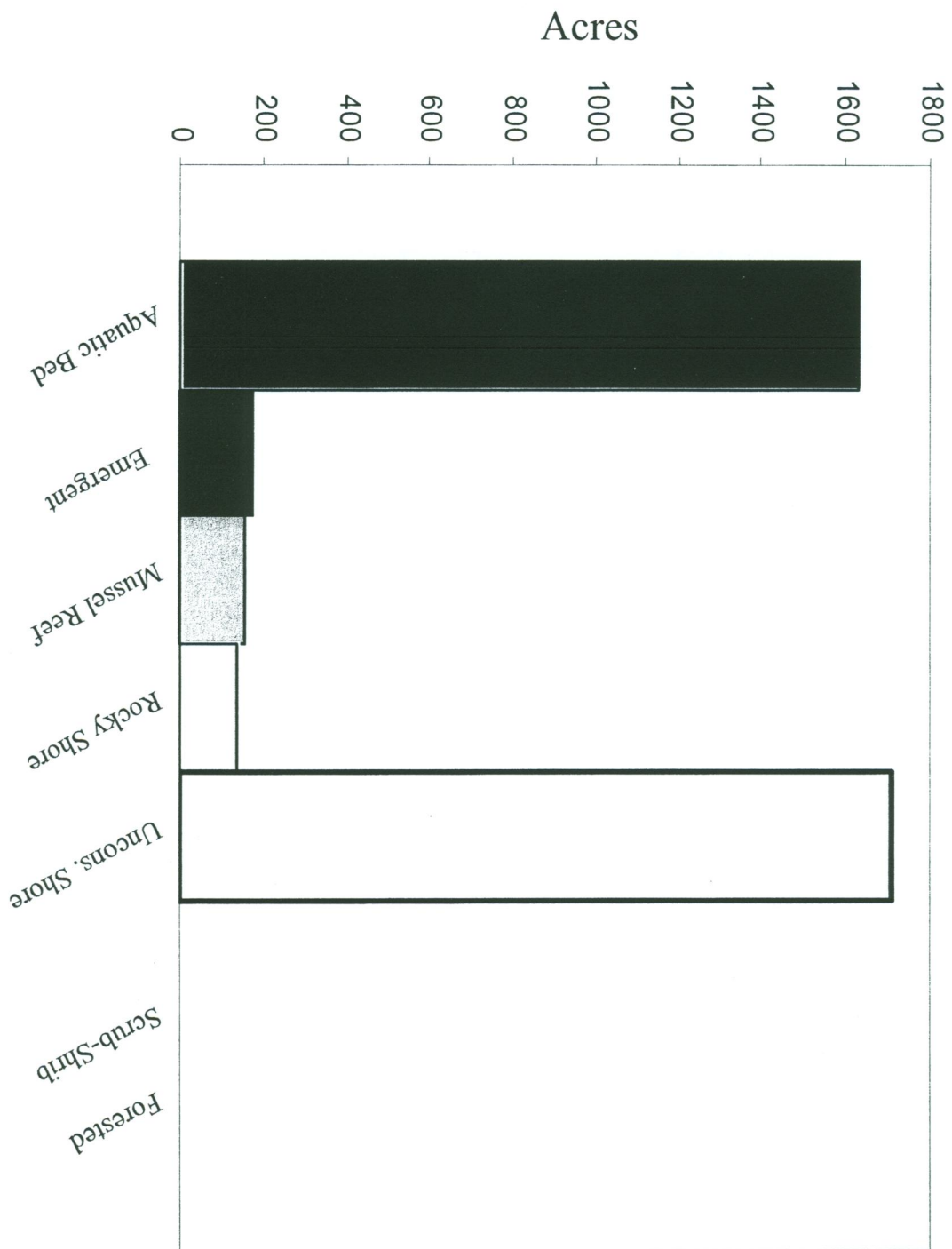
Greg Shriver and Fred Dieffenbach

Background

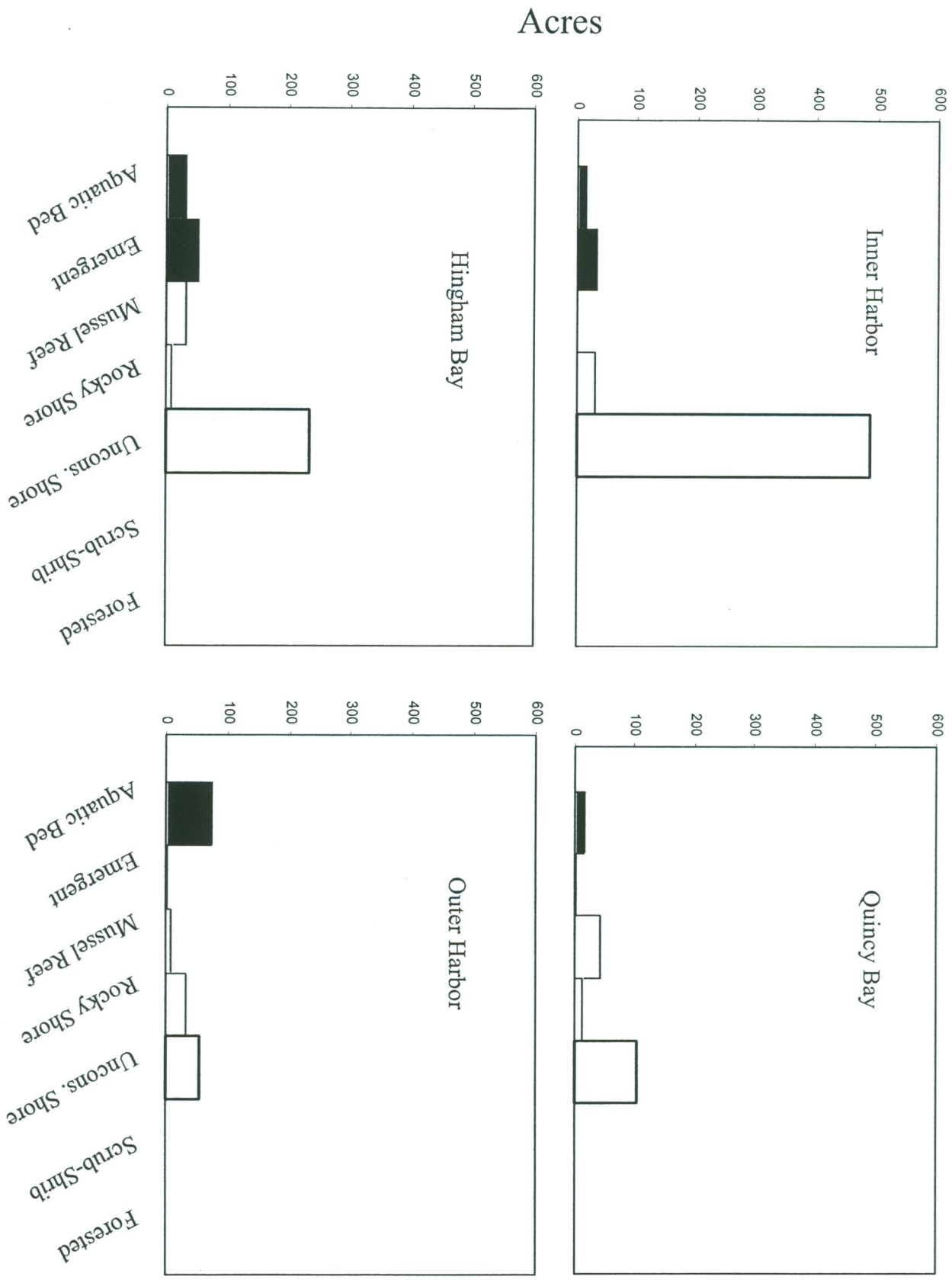


Size distribution of Boston Harbor Islands (acres)

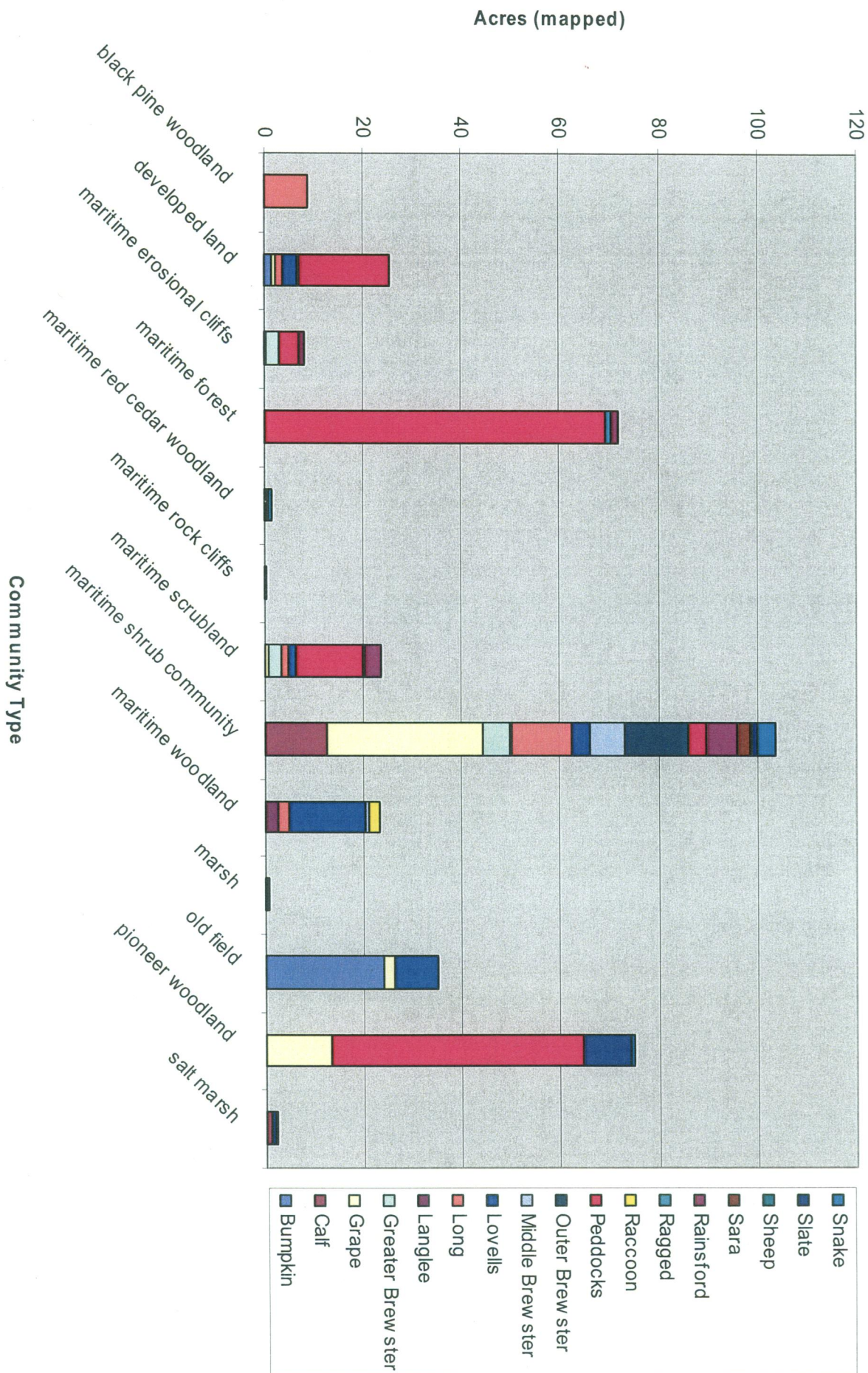
Distribution of wetland habitat types at Boston Harbor Islands (from Tiner et al. 2003)



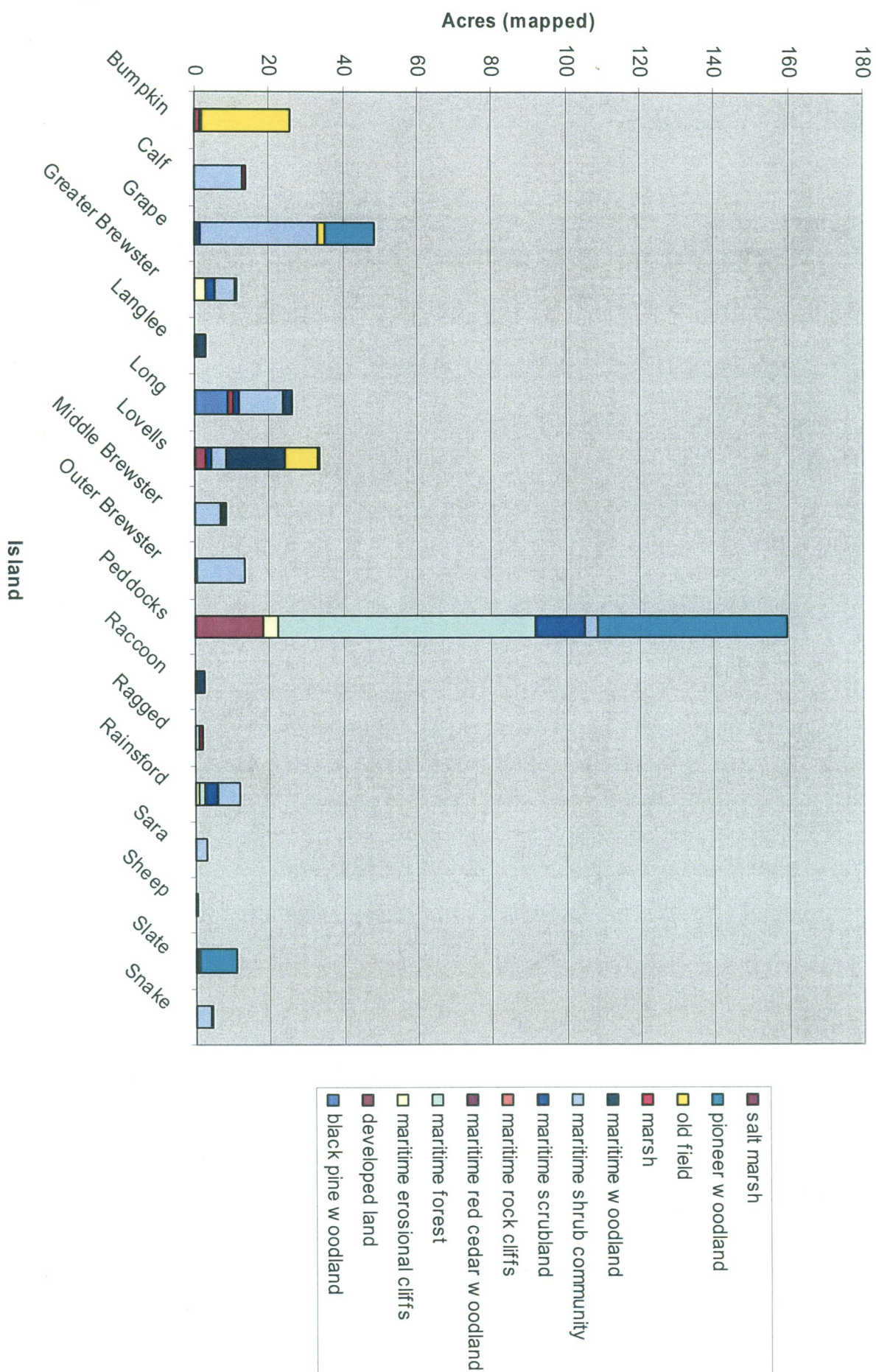
Wetland habitats within island groups at Boston Harbor Islands (from Tiner et al. 2003)



Vegetation Communities



Vegetation Communities on Mapped BOHA Islands



General Model of System groups for NETN

Processes/Functions

Structure/Composition

Biodiversity Response

Natural Drivers

Focal Species

Natural Disturbances:

Ecosystem Processes:

Physical Processes:

Climate:

Terrestrial Plantations
& Pastures

Terrestrial Grasslands
& Shrublands

Terrestrial Forests

Riparian and Wetlands
peatland vs minerotrophic

Freshwater Aquatic

Coastal Marine

Terrestrial
and Aquatic
Populations

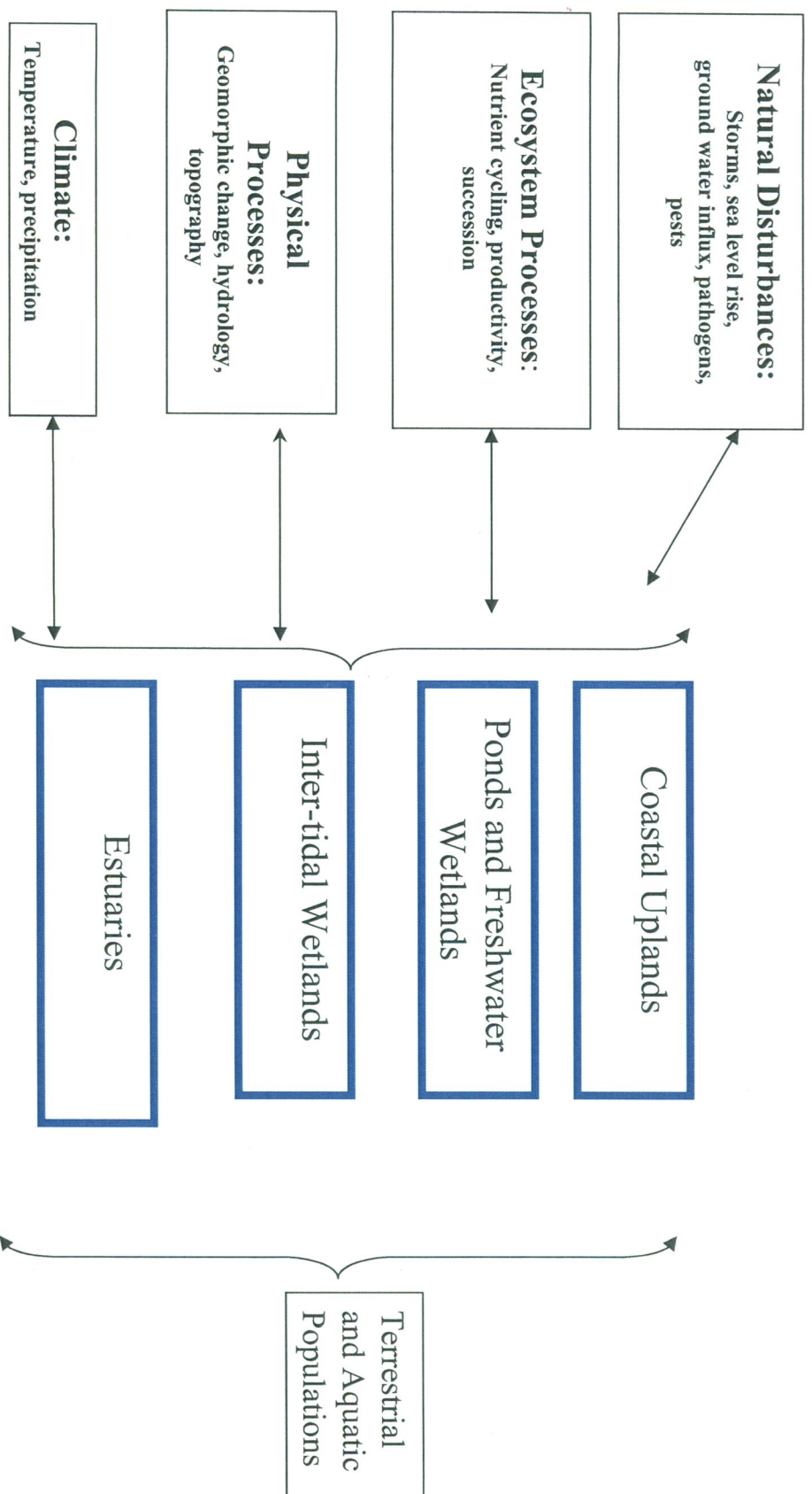
Stressors: (to be developed)

General Model of System groups for BOHA

Processes/Functions → Structure/Composition → Biodiversity Response

Natural Drivers

Focal Species



Coastal Uplands Model and Attributes

Processes/Functions ↔ Structure/Composition ↔ Biodiversity Response

Natural Drivers

Natural Disturbances:

Storms, sea level rise,
ground water influx, pathogens,
pests

Ecosystem Processes:

Nutrient cycling, primary productivity,
site productivity, succession,
energy flow

Physical Processes:

Geomorphic change, hydrology,
topography

Climate:

Precipitation, temperature

Focal Species

Terrestrial
Populations

Wetland and Aquatic
Populations

Species groups/guilds

Listed Species

Landscape Context

- patch size distribution
- edge density
- patch shape
- juxtaposition
- patch diversity

Biotic Condition

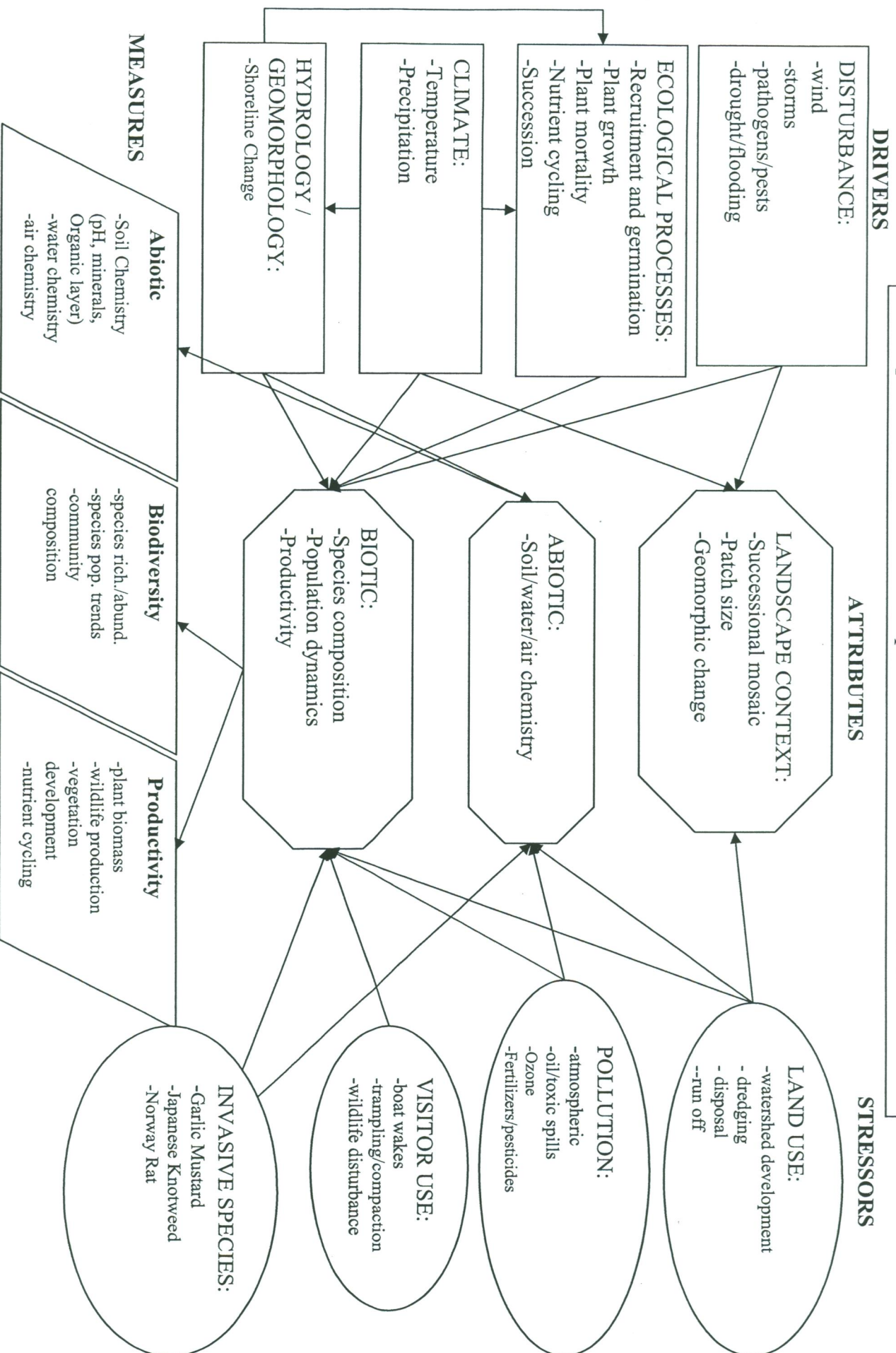
- species composition
- patch size
- herb/shrub layer
- tree size density dist.
- tree age distribution
- focal species

Abiotic Condition

- nutrient concentration
- soil chemistry
- water chemistry
- air chemistry

Stressors: (to be developed)

Conceptual Model of Coastal Uplands at Boston Harbor Islands



Conceptual Model of Intertidal Wetlands at Boston Harbor Islands

DRIVERS

DISTURBANCE:

- storms
- pathogens/pests
- sea level rise

ECOLOGICAL PROCESSES:

- nutrient cycling
- grazing

CLIMATE:

- Temperature
- Precipitation

HYDROLOGY / GEOMORPHOLOGY:

- Shoreline Change
- waterlogging/drainage

ATTRIBUTES

LANDSCAPE CONTEXT:

- Patch size
- Geomorphic change

ABIOTIC:

- Soil/water/air chemistry

BIOTIC:

- Species composition
- Population dynamics
- Productivity

STRESSORS

LAND USE:

- watershed development
- dredging
- disposal
- run off

POLLUTION:

- atmospheric deposition
- oil/toxic spills
- Ozone
- Fertilizers/pesticides

VISITOR USE:

- boat wakes
- trampling/compaction
- wildlife disturbance

INVASIVE SPECIES:

- Phragmites*
- Asian Crab
- Norway Rat

MEASURES

Abiotic

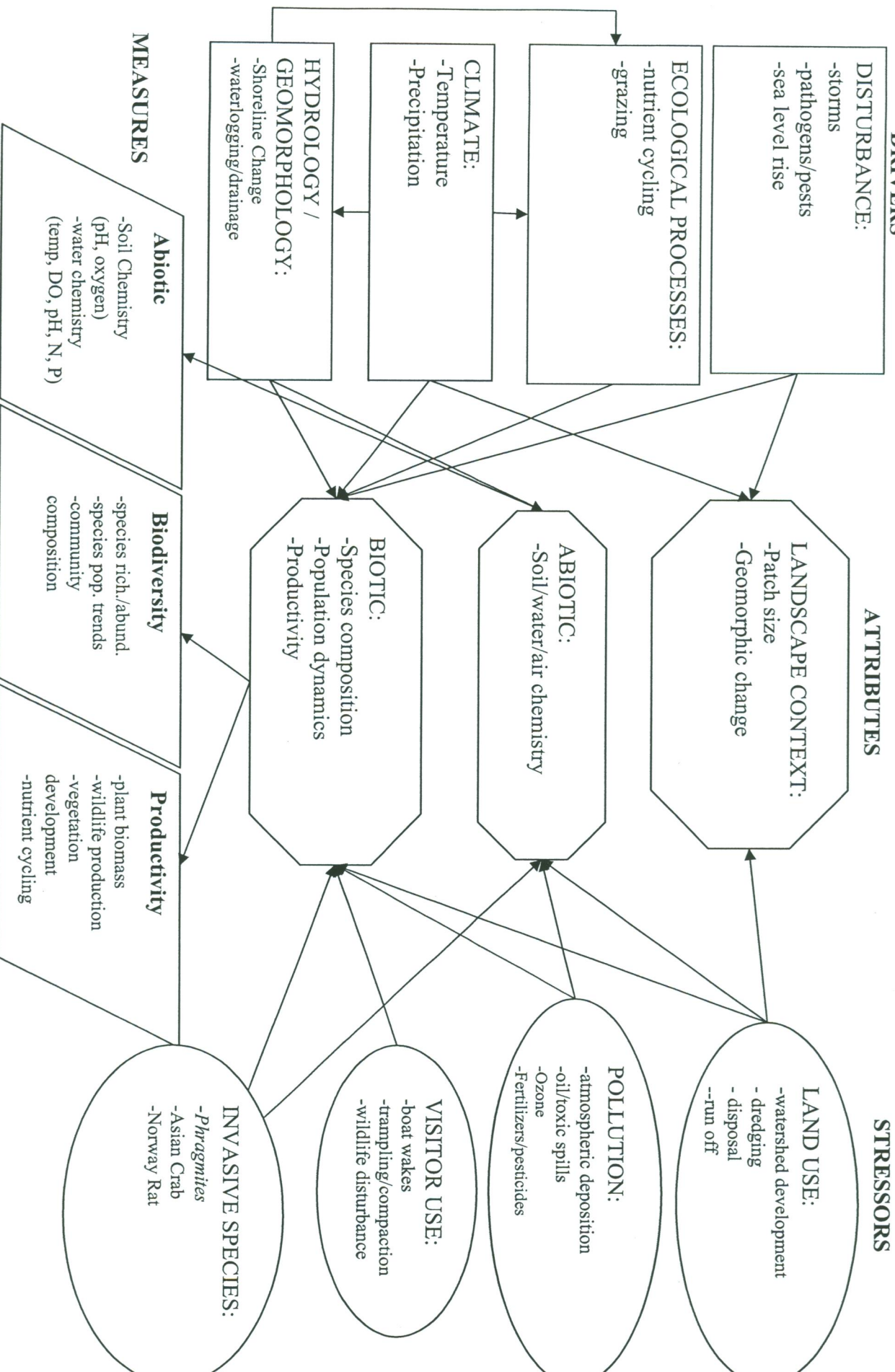
- Soil Chemistry (pH, oxygen)
- water chemistry (temp, DO, pH, N, P)

Biodiversity

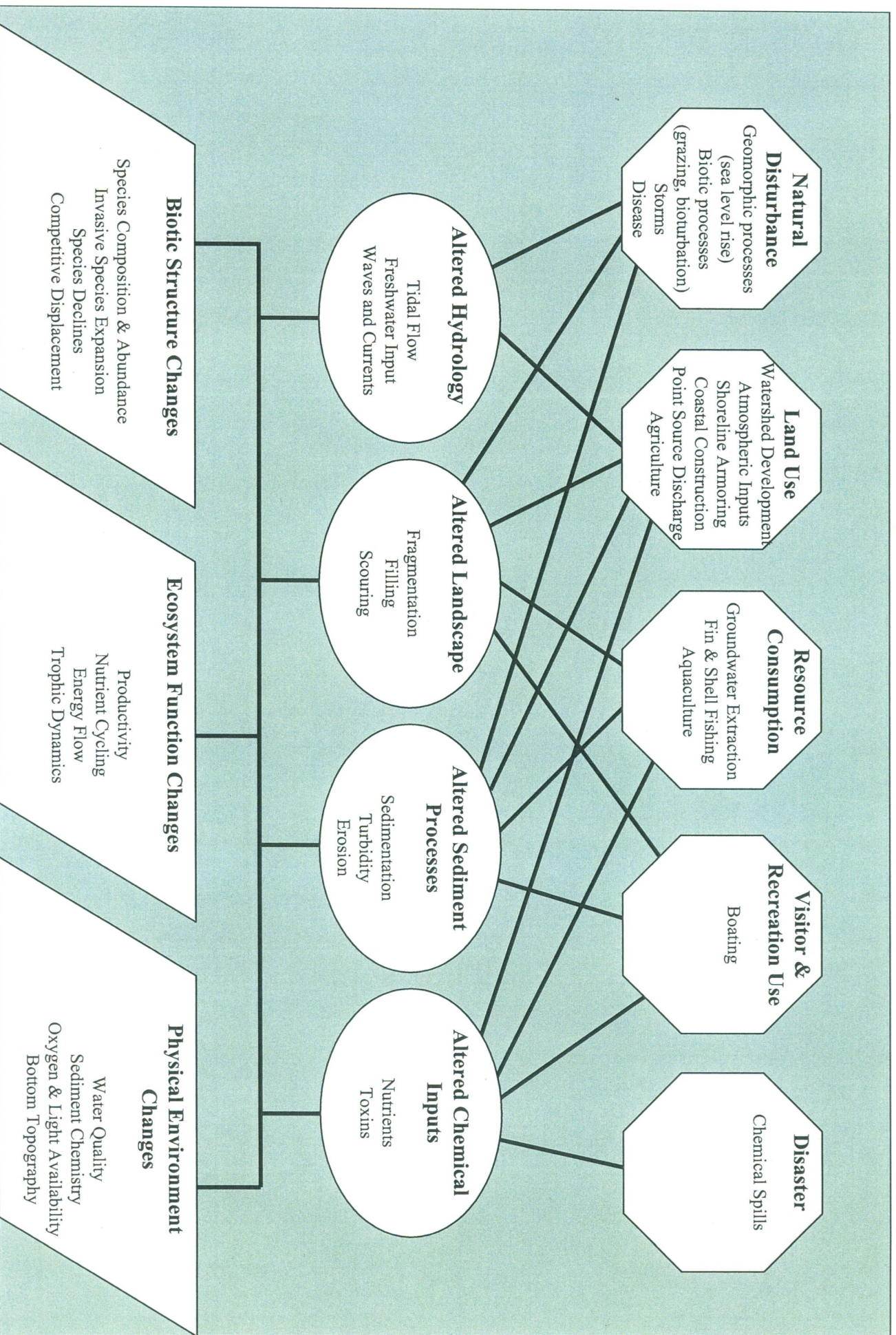
- species rich./abund.
- species pop. trends
- community composition

Productivity

- plant biomass
- wildlife production
- vegetation development
- nutrient cycling



Estuary Habitat Model



Maps and Tables

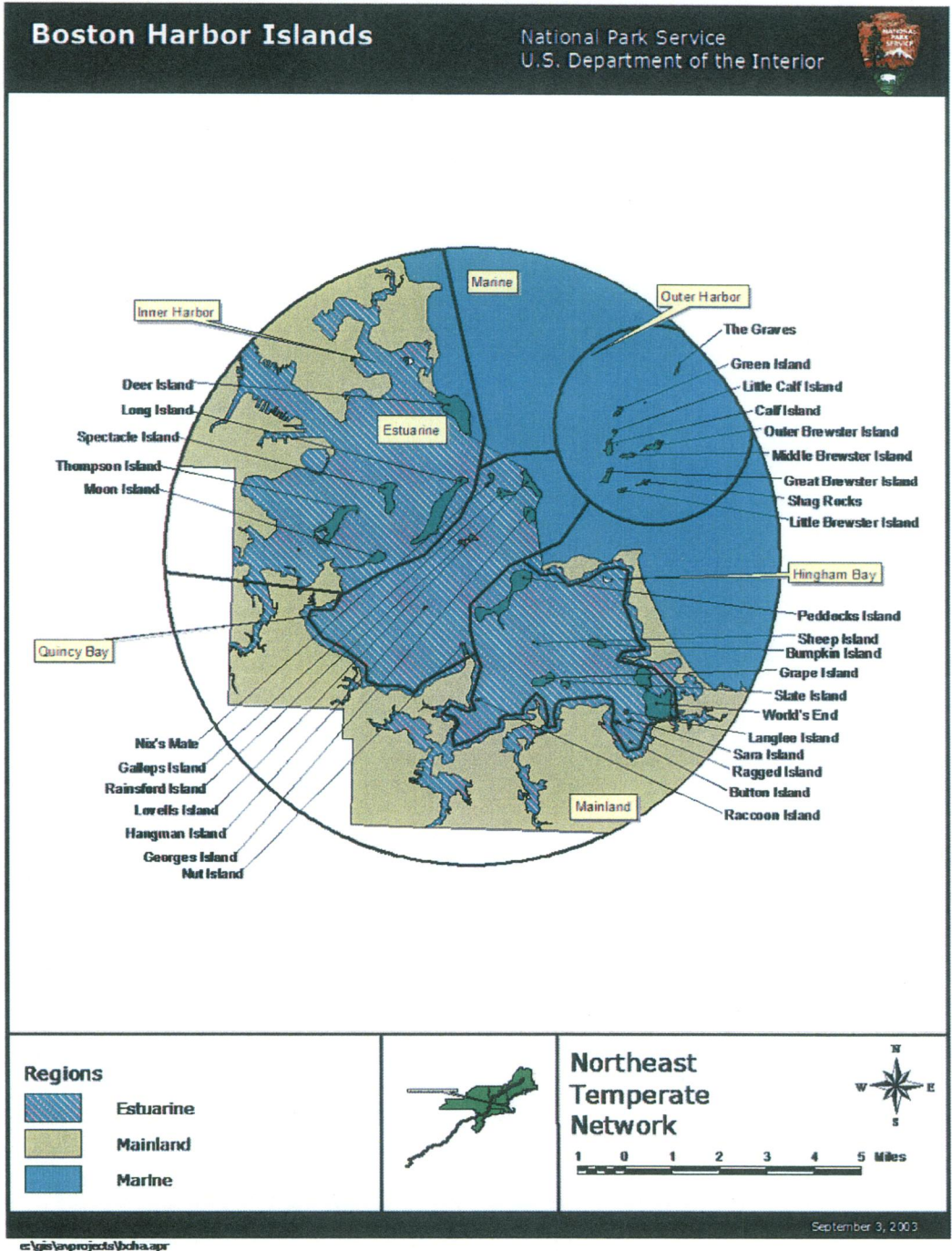


Figure 1: Boston Harbor Islands orientation and aquatic regime.

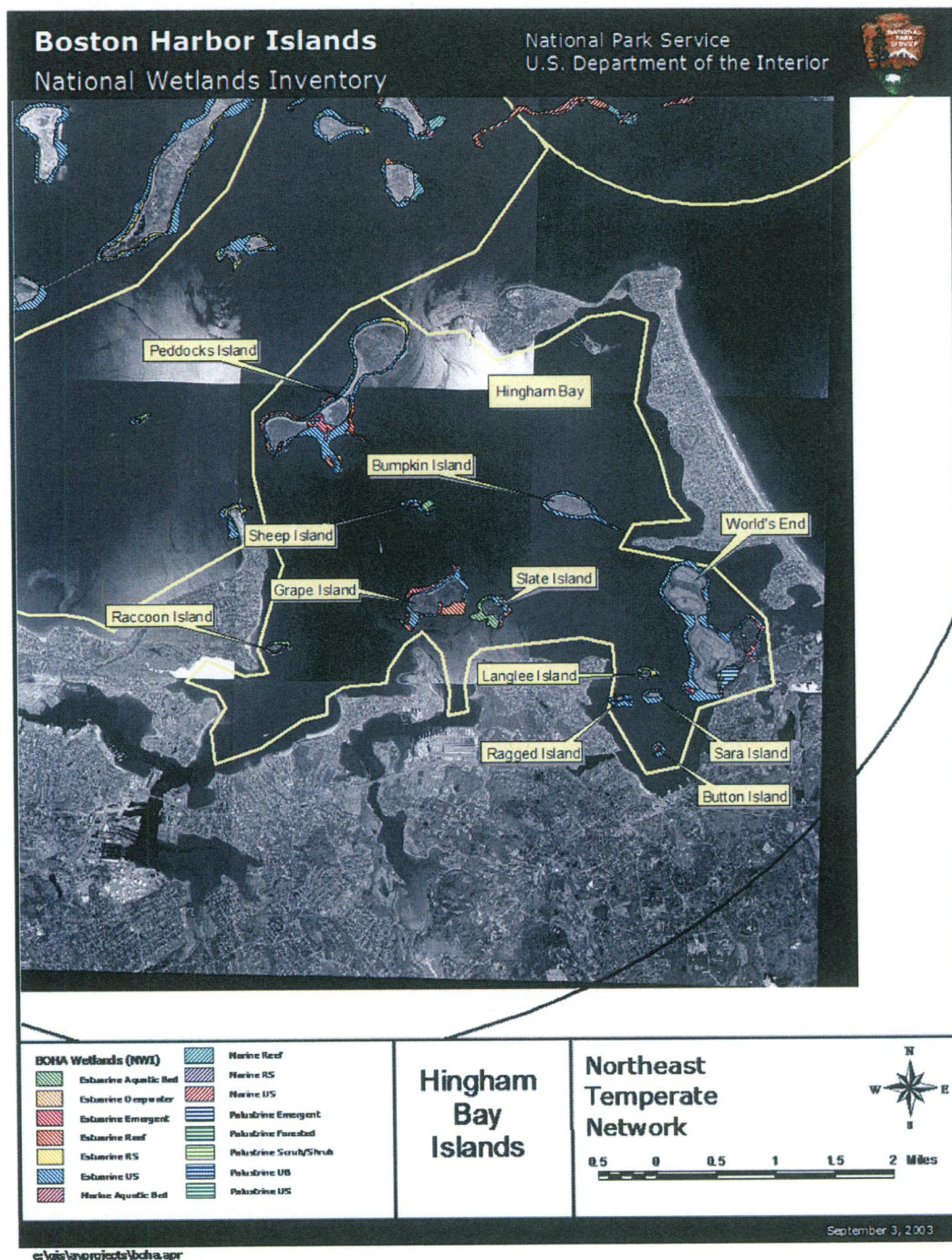


Figure 2: National Wetland Inventory (NWI) for Hingham Bay Island grouping.

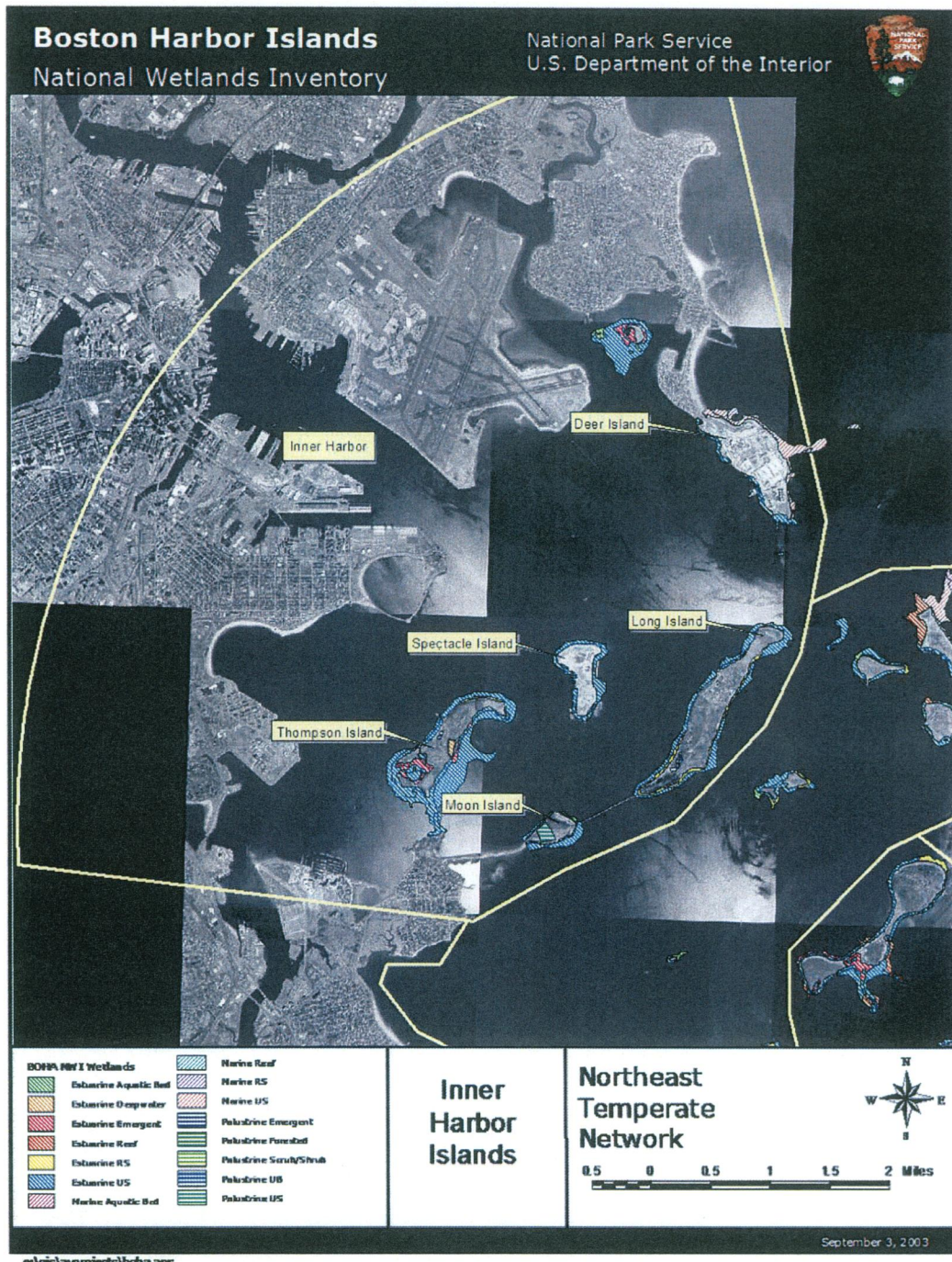


Figure 3: National Wetland Inventory (NWI) for Inner Harbor Island grouping.

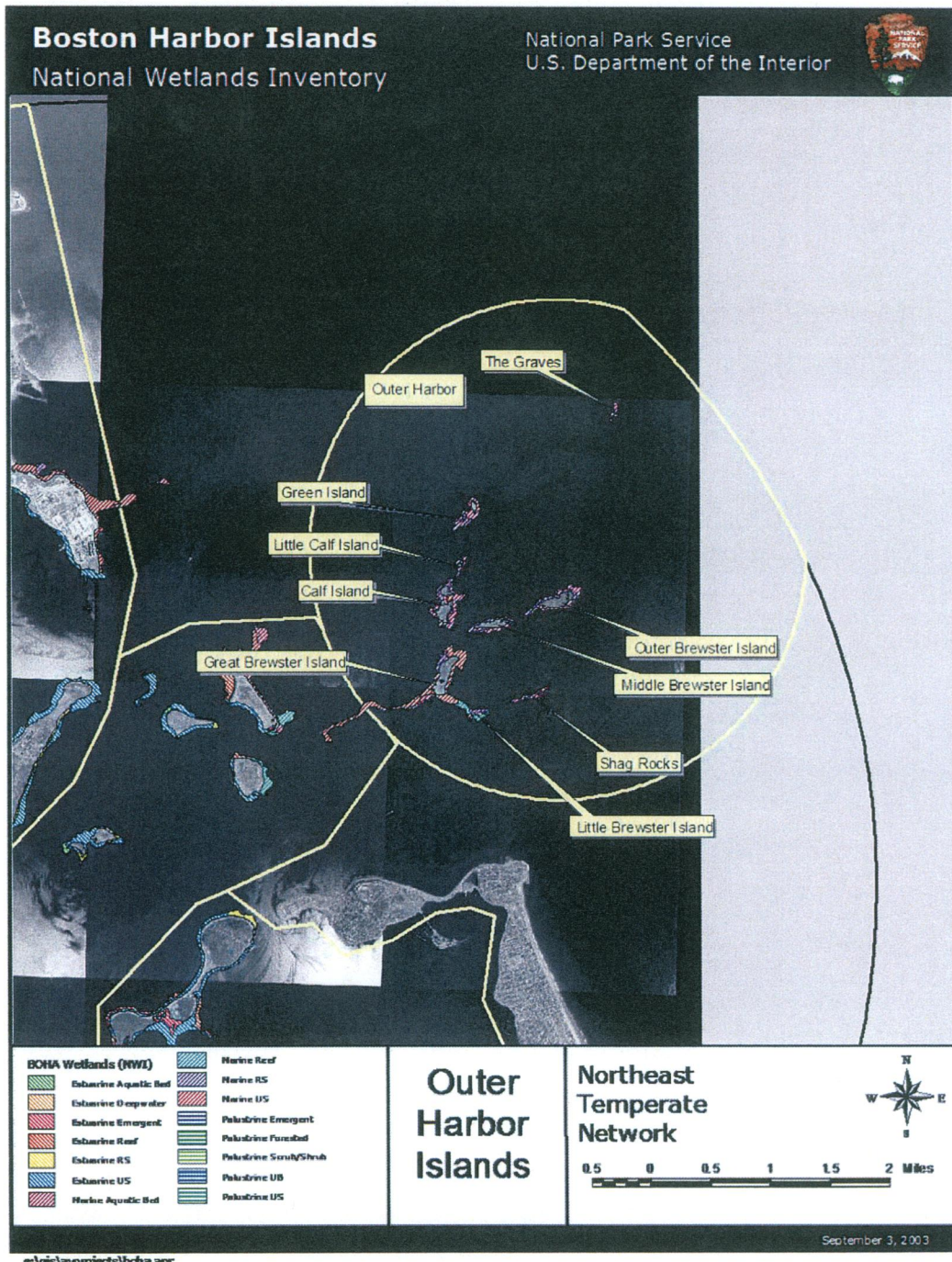


Figure 4: National Wetland Inventory (NWI) for Outer Harbor Island grouping.

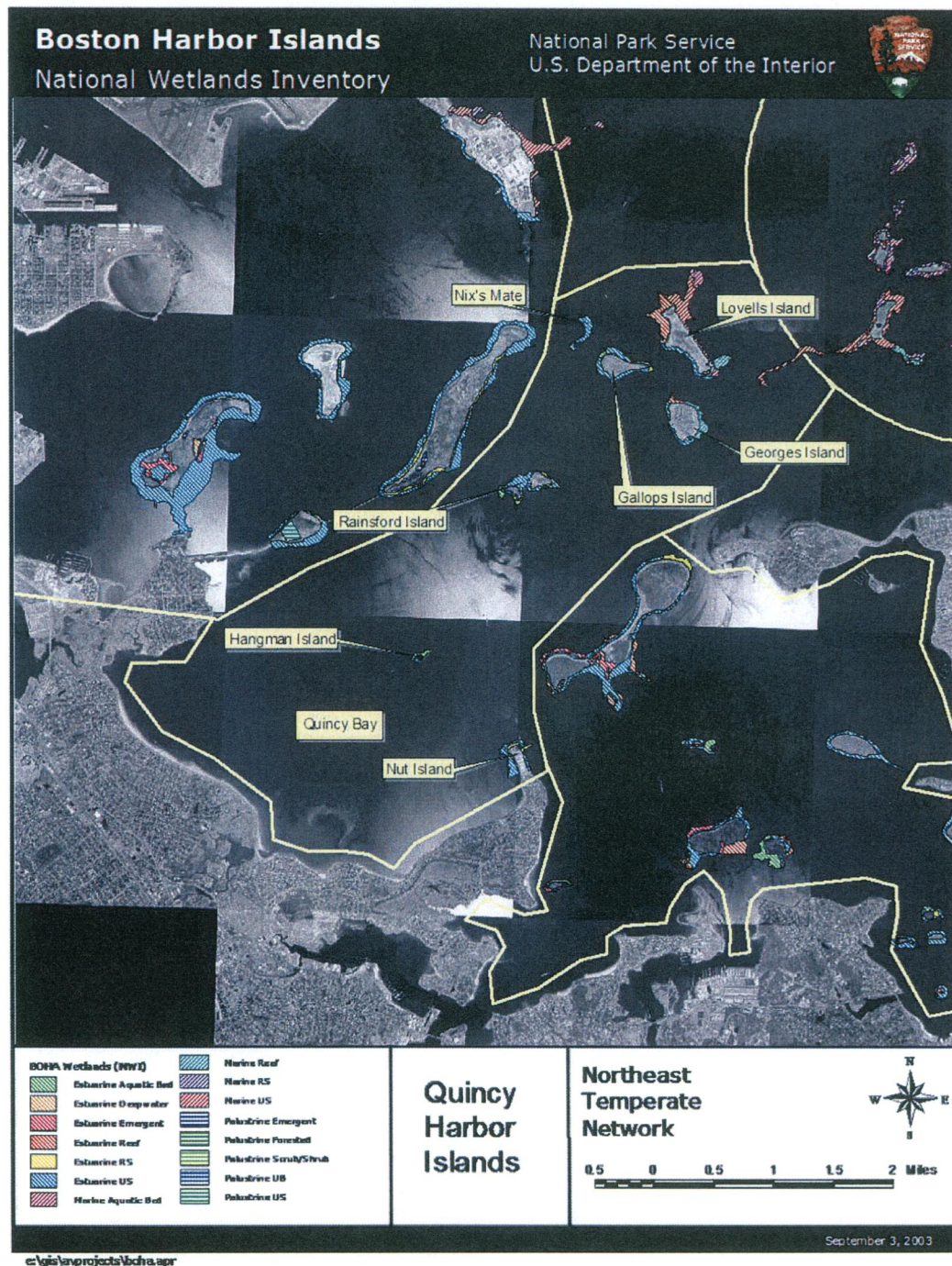


Figure 5: National Wetland Inventory (NWI) for Quincy Bay Island grouping.

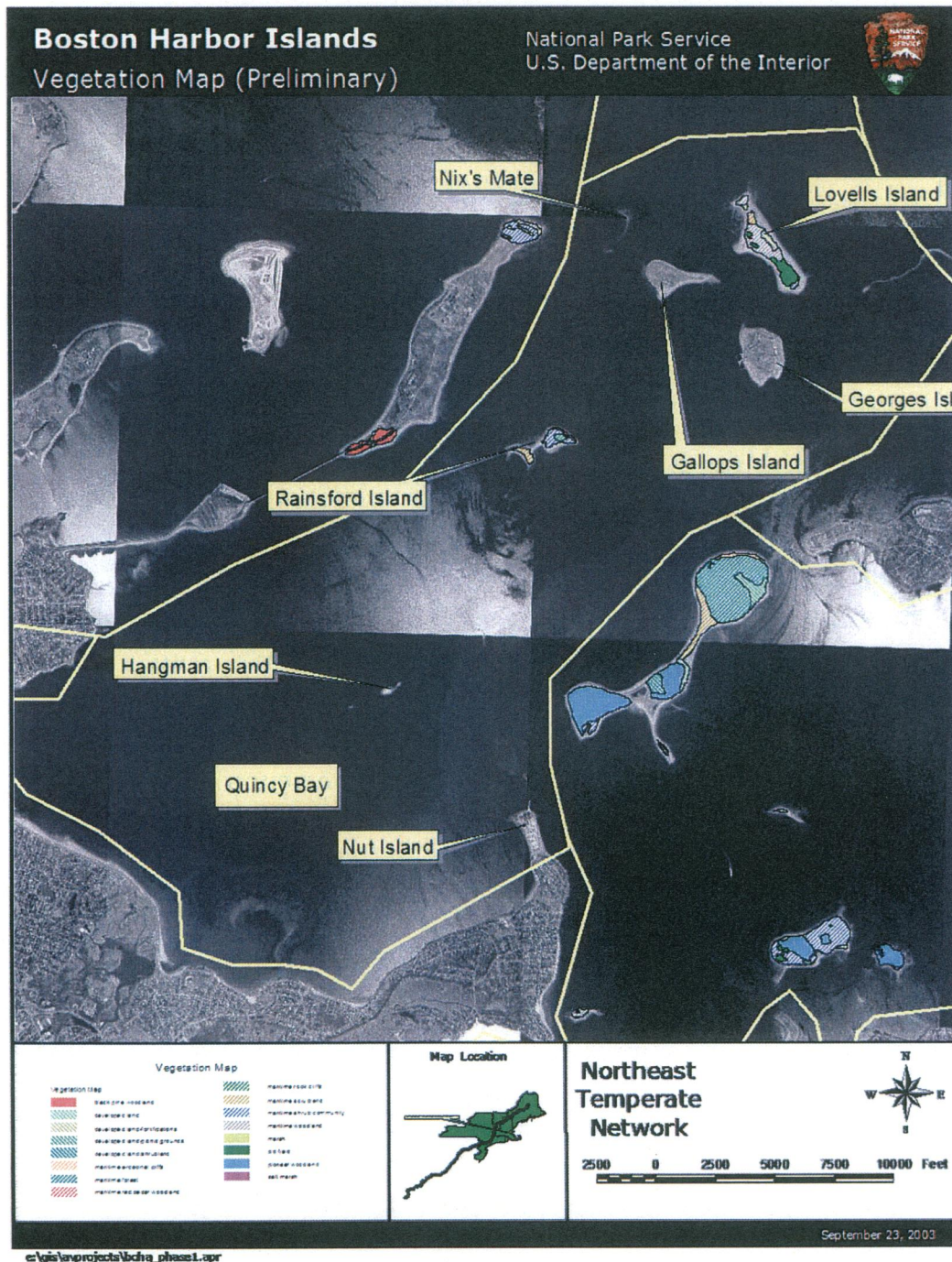


Figure 9: Vegetation map for Quincy Harbor Island grouping.

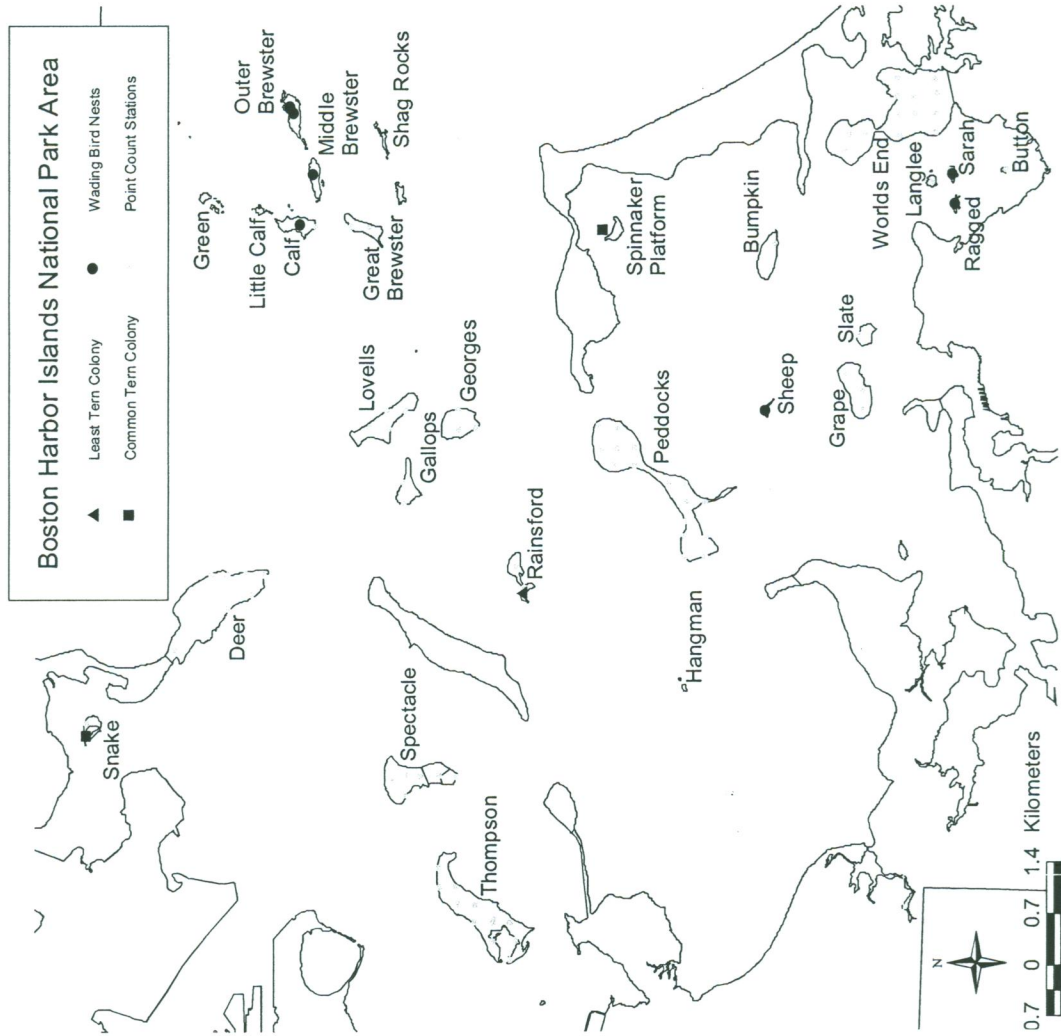


Figure 1. Location of avian point count stations (gray circles), Common Tern colonies (solid squares), Least Tern colonies (solid triangles), and colonial wading bird colonies (solid circles) in Boston Harbor during 2002 and 2003. From Paton et al. 2003.

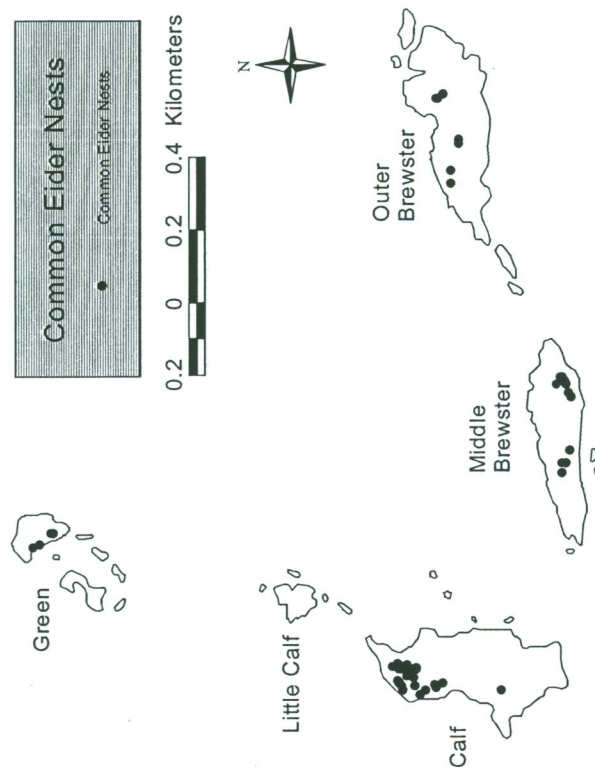


Figure 2. Location of Common Eider nests (solid squares) in outer islands of Boston Harbor in 2003. From Paton et al. 2003.

Island Group	Island Name	Mgt.	Wetland Types (acres)								% exotic plants	Important Natural Resources
			Island Size	Aquatic Bed	Emergent	Mussel Reef	Rocky Shore	Unconsolidated Shore	Scrub-Shrub	Forested		
Outer Harbor	Outer Brewster	N	20.1	11.0	--	--	8.8	--	--	--	56%	Eider & wading bird nests
	Great Brewster	M	23.9	5.9	0.4 (P)	--	4.6	49.6	--	--	62%	American Oystercatchers
	Middle Brewster	N	13.6	6.3	0.1	--	7.0	--	--	--	63%	Eider & wading bird nests
	Little Brewster Green	H N	3.1 1.7	-- 13.7	--	7.5	3.0 2.9	0.9	--	--	67%	Harbor Seals
	Calf	N	22.4	18.3	1.6	--	5.1	2.1	--	--	87%	Harbor Seals, Eider nests
	Little Calf	N	<1.0	4.7	--	--	--	--	--	--	59%	Harbor Seals, Eider & wading bird nests
	Graves	H	1.8	3.7	--	--	--	--	--	--	67%	
	Shag Rocks	N	<1.0	8.2	--	--	--	--	--	--	100%	

Table 2. Summary of mapped plant communities on 17 Boston Harbor Islands. Blank cells = no data available, -- = plant community not detected on island. Plant community names and acreage based on draft vegetation maps prepared by T. Elliman.

Island Group	Island Name	Plant Community (acres/mapped island)													pioneer woods	salt marsh
		black pine	developed	maritime erosional cliff	maritime forest	maritime red cedar	maritime rock cliff	maritime shrubland	maritime shrub comm	maritime woodland	marsh	old field				
Inner Harbor	Deer															
	Long Spectacle Thompson Moon Snake	8.8	1.6	--	--	--	--	1.4	12.1	2.2	--	--	--	--	--	--
															0.6	--
Quincy Bay	Nix's Mate Lovells Gallop's Georges Rainsford Nut Hangman	--			--	--	--	1.8	3.8	15.8	--	9.1	--	--	--	0.6
			2.9	--	--	--	--									
		--	--	1.1	1.5	--	--	3.3	6.1	--	--	--	--	--	--	--
Hingham Bay	Peddock's Sheep Bumpkin Raccoon Grape Slate World's End Ragged Sarah Langlee Button Webb State Park	--	18.3	3.8	69.5	--	--	13.6	3.4	--	--	--	--	51.1	--	--
		--	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--
		--	1.5	--	--	0.4	--	--	--	--	--	23.9	--	--	--	--
		--	--	--	--	--	--	0.1	0.2	2.0	--	--	--	--	--	--
		--	0.6	--	--	--	--	0.7	31.8	--	--	2.1	--	13.4	--	--
		--	--	--	--	--	0.4	--	0.8	--	--	--	--	9.9	--	--
		--	--	--	0.9	1.0	--	--	--	--	--	--	--	--	--	--
		--	--	--	--	--	--	--	2.8	--	--	--	--	--	--	--
		--	--	--	--	0.3	--	--	0.3	2.5	--	--	--	--	--	--

Plant Community (acres/mapped island)

[illegible]

Glossary

Glossary

Attributes are any living or nonliving feature or process of the environment that can be measured or estimated and that provide insights into the state of the ecosystem. The term **Indicator** is reserved for a subset of attributes that is particularly information-rich in the sense that their values are somehow indicative of the quality, health, or integrity of the larger ecological system to which they belong (Noon 2002). See Indicator.

Ecological integrity is a concept that expresses the degree to which the physical, chemical, and biological components (including composition, structure, and process) of an ecosystem and their relationships are present, functioning, and capable of self-renewal. Ecological integrity implies the presence of appropriate species, populations and communities and the occurrence of ecological processes at appropriate rates and scales as well as the environmental conditions that support these taxa and processes.

Ecosystem is defined as, "a spatially explicit unit of the Earth that includes all of the organisms, along with all components of the abiotic environment within its boundaries" (Likens 1992).

Ecosystem Drivers are major, naturally occurring forces of change such as climate, fire cycles, biological invasions, hydrologic cycles, and natural disturbance events (e.g., droughts, floods, lightning-caused fires) that have large scale influences on the attributes of natural systems" (Leibfreid 2003). We have divided ecosystem drivers into the following categories:

- ◆ Natural disturbance regimes (fires, floods, insect infestations, wind);
- ◆ Ecological processes (energy and material flows);
- ◆ Physical Processes (Hydrology and geomorphology surface and groundwater flows, channel characteristics, sediment and material transport);
- ◆ Climate (Temperature, precipitation).

Ecosystem management is the process of land-use decision making and land-management practice that takes into account the full suite of organisms and processes that characterize and comprise the ecosystem and is based on the best understanding currently available as to how the ecosystem works. Ecosystem management includes a primary goal of sustainability of ecosystem structure and function, recognition that ecosystems are spatially and temporally dynamic, and acceptance of the dictum that ecosystem function depends on ecosystem structure and diversity. Coordination of land-use decisions is implied by the whole-system focus of ecosystem management.

Focal resources are park resources that, by virtue of their special protection, public appeal, or other management significance, have paramount importance for monitoring regardless of current threats or whether they would be monitored as an indication of ecosystem integrity. Focal resources might include ecological processes such as deposition rates of nitrates and sulfates in certain parks, or they may be a species that is harvested, endemic, alien, or has protected status.

Indicators are a subset of monitoring attributes that are particularly information-rich in the sense that their values are somehow indicative of the quality, health, or integrity of the larger ecological system to which they belong (Noon 2002). Indicators are a selected subset of the physical, chemical, and biological elements and processes of natural

systems that are selected to represent the overall health or condition of the system, known or hypothesized effects of stressors, or elements that have important human values.

Measures are the specific feature(s) used to quantify an indicator, as specified in a sampling protocol.

Stressors are physical, chemical, or biological disturbance events that result in significant ecological effects and are considered proximate causes of adverse effects on the groups of organisms within the system (Noon et al. 2002). Stressors cause significant changes in the ecological components, patterns and processes in natural systems. Examples include air pollution, exotic pest invasions, water pollution, water withdrawal, pesticide use, timber harvesting, traffic emissions, stream acidification, trampling, poaching, and land-use change.

Vital Signs, as used by the National Park Service, are synonymous with Indicator, and are defined as any measurable feature of the environment that provides insights into changes in the state of the ecosystem. Vital signs are intended to track changes in a subset of park resources and processes that are determined to be the most significant indicators of ecological condition of those specific resources that are of the greatest concern to each park. This subset of resources and processes is part of the total suite of natural resources that park managers are directed to preserve “unimpaired for future generations,” including water, air, geological resources, plants and animals, and the various ecological, biological, and physical processes that act on these resources. Vital signs may occur at any level of organization including landscape, community, population, or genetic levels, and may be compositional (referring to the variety of elements in the system), structural (referring to the organization or pattern of the system), or functional (referring to ecological processes).