APPENDIX 2: SUMMARY OF SEAWEEDS RECORDED IN BOSTON HARBOR DURING THE NOMES STUDY (1971 AND 1972) AND COMPARISON WITH THE 2001AND 2002 INTERTIDAL SURVEY

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See Harris (1974) for more details.

STUDY SITES WITHIN MASSACHUSETTS BAY

1. A sunken barge located between Great Brewster and Calf Islands within Massachusetts Bay (°'" & °'"); collections made during July 1971-June 1972 (11 months) @ 1.5-6.1m

2. Pope Rock located east of Calf Island within Massachusetts Bay (°'" & °'"); collections made during July 1971-June 1972 (11 months) @ 1.5-10.6m

3. Flip Rock located offshore and south of Nahant, Massachusetts (70°55'33" & 42°24'08"); collections made during August 1971-September, 1973 (20 months) @ 3.0-21.2m

4. Located east of the Graves within Massachusetts Bay (70°51'22" & 42°22'02"); collections made during June 1972-May 1993 (11 months) @ 15.2-19.7m

5. Three and One Half Fathom Ledge (70°50'45" & 42°21'14"); collections made during July 1972-September 1972 (2 months) @ 9.1-18.2m

6. Thieves Ledge (70°50'03" & 42°19'20"); collections made during July 1972-April 1973 (9 months) @ 10.6-18.2m

7. Located SSE of the Graves within Massachusetts Bay (70°48'31" & 42°17'30"); collections made during September 1972-September 1973 (8 months) @ 10.6-15.2m

8. Located ESE of the Graves within Massachusetts Bay (70°47'37" & 42°19'27"); collections made during November 1972-August 1973 (10 months) @ 13.6-19.7m

9. Located east of the Graves within Massachusetts Bay (70°47'26" & 42°22'17"); collections made during November 1972-June 1973 (7 months) @ 19.7-25.8m

10. Located offshore from Massachusetts Bay (70°46’36” & 42°18’29”); collections made during July 1972-August 1973(6 months) @ 13.6-22.7m

11. Located offshore from Massachusetts Bay (70°43’04” & 42°16’34”); collections made during 1972-September, 1973 (4 months) @ between 19.7-24.2m

12. Located offshore from Massachusetts Bay (70°46’19” & 42°21’01”); collections made during March 1973-September 1973 (6 months) @ 22.7-27.3m

13. Harding Ledge within Massachusetts Bay (70°50’56” & 42°18’17”); collections made during July 1972 (1 collection) @ 6.1-18.2m

14. Located ~0.24 km S of station #4 (70°51’25” & 42°21’56”); collections made during September 1972 (1 collection) @ 24.2m

15. Located ~1.5 km ESE of station #7 (70°48’13” & 42°17’35”); collections made during July 1972 (1 collection) @ 18.2-19.7m

16. Located ~1.1 km ESE of station #8 (70°46’40” & 42°19’25”); collections made during July 1972 (1 collection) @ 27.3m

17. Located ~1.5 km WSW of station #8 (70°48’38” & 42°18’58”); collections made during July 1972 (1 collection) @ 19.7m

18. Located 1.3 km WNW of station #12 (70°47’21” & 42°21’12”); collections made during July 1972 (1 collection) @ 25.8m

19. Located ~1.3 WNW of H10 (70°46’35” & 42°20’25”); collections made during July 1972 (1 collection) @ 27.3m

20. Located ~1.6 km NNW of Light Ship (70°46’15” & 42°21’14”); collections made during June 1972, (1 collection) @ 25.8m

Taxa	Study Site																				% Occurrence by Site
CHRYSOPHYTA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	%
Berkeleya rutilans (Trent.) Grun.	x	x																			10
TOTAL CHRYSOPHYTA/SITE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
CHLOROPHYTA																					
Chaetomorpha linum (O. F. Mueller) Kützing	x	x																			10
Chaetomorpha melagonium (Weber et Mohr) Kützing	x	x	x																		15
Chaetomorpha picquotiana Montagne ex Kützing	x	x																			10
Cladophora sericea (Hudson) Kützing	x	x																			10
Enteromorpha linza (L.) J. Agardh	x	x																			10
Monostroma grevillei (Thuret) Wittrock	x																				5
Spongomorpha arcta (Dillwyn) Kützing	x	x				x															15
Spongomorpha spinescens Kützing	x																				5
Ulva lactuca L.	x	x																			10
Ulvaria obscura (Kützing) Gayral	x																				5
TOTAL CHLOROPHYTA TAXA/SITE	10	7	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PHAEOPHYTA																					
Agarum clathratum Dumort.	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	95
Alaria esculenta (L.) Greville			x	x																	10
Chorda filum (L.) Stackhouse	x																				5
Chordaria flagelliformis (O. F. Müller) C. Agardh		x																			5
Desmarestia aculeata (L.) Lamouroux		x	x																		10
Desmarestia viridis (O. F. Müller) Lamouroux		x																			5
Ectocarpus siliculosus (Dillwyn) Lyngbye	x	x	x																	15	
Fucus distichus L.																					

ssp. evanescens (C. Agardh) Powell		x																			5
Giffordia sandriana (Zanardini) Hamel	x																				5
Laminaria digitata (Hudson) Lamouroux	x	x	x		x								x								25
Laminaria longicruris de la Pylaie	x	x	x																		15
Laminaria saccharina (L.) Lamouroux	x	x	x	x		x							x				x				35
Pseudolithoderma extensum (P. Crouan et H. Crouan) Lund	x																				5
Ralfsia verrucosa (Areschoug) J. Agardh	x																				5
Sphacelaria arctica Harvey	x		x																		10
Spongonema tomentosum (Hudson) Kützing		x	x																		10
TOTAL PHAEOPHYTA TAXA/MONTH	10	10	9	3	2	2	1	1	1	1	1	1	2	1	1	1	2	11	1		
RHODOPHYTA																					%
Ahnfeltia plicata (Hudson) Fries	x	x	x																		15
Antithamnionella floccosa (O. F. Müller) Whittick	x	x	x	x		x	x	x	x	xx	x				x				x	65	
Audouinella purpurea (Lightfoot) Woelkerling			x																		5
Callithamnion tetragonum (Withering) S. F. Gray		x																			5
Callocolax neglectus Schmitz ex Batters		x	x	x		x	x	x	x	x					x		x				45
Euthora cristata C. Agardh	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	90
Ceramium rubrum (Hudson) C. Agardh	x	x	x				x														20
Ceratocolax hartzii Rosenvinge		x	x			x	x			x		x									30
Chondria baileyana (Montagne) Harvey	x		x																		10
Chondrus crispus Stackhouse	x	x	x				x						x								25
Choreocolax polysiphoniae Reinsch										x											5
Clathromorphum circumscriptum (Strömfelt) Foslie	x	x	x	x					x												25
Corallina officinalis L.	x	x	x																		15
"*Cruoriopsis gracilis* (Kuckuck) Batters"	x																				5
Cystoclonium purpureum (Hudson) Batters	x	x	x			x				x			x		x						35
Fimbrifolium dichotomum (Lepeschkin) Hansen			x	x		x	x	x	x	x	x	x				x				x	55
Gymnogongrus crenulatus (Turner) J. Agardh													x								5
Hildenbrandia rubra (Sommerfelt) Meneghini	x	x	x																		15

Leptophytum foecundum (Kjellman) Adey		x																						5
Leptophytum laevae (Strömfelt) Adey		x	x	x			x		x	x														30
Lithothamniom glaciale Kjellman	x	x	x	x			x	x	x	x	x											x		50
Lomentaria baileyana (Harvey) Farlow	x																							5
Lomentaria clavellosa (Turner) Gaillon	x																							5
Lomentaria orcadensis (Harvey) Collins ex Taylor	x																							5
Mastocarpus stellatus (Stackhouse in Withering) Guiry		x																						5
Membranoptera alata (Hudson) Stackhouse		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x					85
Palmaria palmata (L.) Kuntze	x	x	x																					15
"*Petrocelis cruenta* J. Agardh"		x																						5
Peyssonnelia rosenvingii Schmitz in Rosenvinge	x	x																						10
Phycodrys rubens (L.) Batters	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							85
Phyllophora pseudoceranoides (Gmelin) Newroth et A. Taylor		x	x	x	x	x	x	x	x	x	x	x		x	x		x							70
Coccotylus truncatus (Pallas) Wynne et Heine	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	95			
Phymatolithon laevigatum (Foslie) Foslie		x	x	x				x	x	x														30
Phymatolithon rugulosum Adey		x	x				x	x														x		25
Polyides rotundus (Hudson) Greville	x	x	x																					15
Polysiphonia denudata (C. Agardh) Zanardini	x																							5
Polysiphonia flexicalis (Harvey) Collins	x	x																						10
Polysiphonia lanosa (L.) Tandy	x	x																						10
Polysiphonia nigra (Hudson) Batters	x																							5
Polysiphonia fucoides (Hudson) Greville	x	x																						10
Polysiphonia stricta (Dillwyn) Greville	x	x	x	x		x	x	x	x	x	x	x		x										60
Porphyra miniata (C. Agardh) C. Agardh			x																					5
Pterothamnion plumula (Ellis) Nägeli			x			x	x																	15
Ptilota serrata Kützing		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			95
Rhodomela confervoides (Hudson) Silva	x					x	x				x				x									25
Rhodophysema georgii Batters	x	x	x																					15
Scagelia pylaisaei			x			x		x		x	x													25
Spermothamnion repens (Dillwyn) Rosenvinge			x																					5
Titanoderma pustulatum (Lamouroux) Foslie				x					x															10

TOTAL RHODOPHYTA TAXA/SITE	28	32	31	15	5	15	16	13	14	17	13	11	8	7	9	7	72	3	7	
GRAND TOTAL SEAWEED TAXA/SITE	49	50	41	18	7	18	17	21	15	18	14	12	9	9	10	8	8	4	4	8

TABULATION OF SPECIES: NOMES (1971-1972) AND THE 2001 INTERTIDAL SURVEY

(Abbreviations: CI= Calf Island, intertidal-shallow subtidal; LI= Lovel's Island, collected by R. Buchsbaum; RI= Rainsford Island, intertidal-shallow subtidal; NOMES= collected subtidally during the New England Offshore Mining and Exploring Study

CHRYSOPHYTA

Berkeleya rutilans (Trent.) Grun.: CI & RI

CYANOPHYTA

Calothrix crustacea: CI & RI
Lyngbya majuscula: CI
Oscillatoria sp.: CI & RI

TOTAL CYANOPHYTA TAXA: 2

CHLOROPHYTA

Blidingia minima (Naegeli ex Kuetzing) Kylin: CI, LI & RI
Chaetomorpha linum (O. F. Mueller) Kützing: CI, LI & NOMES
Chaetomorpha melagonium (Weber et Mohr) Kützing: NOMES
Chaetomorpha picquotiana Montagne ex Kützing: CI, RI & NOMES
Cladophora sericea (Hudson) Kützing: CI, NOMES
Enteromorpha intestinalis (L.) Ness ssp. intestinalis: CI, LI & RI
Enteromorpha linza (L.) J. Agardh: RI & NOMES
Enteromorpha prolifera (Mueller) Kuntze: RI
Gomontia polyrhiza (Lagerh.) Born. et Flah.: RI
Monostroma grevillei (Thuret) Wittrock : NOMES
Monostroma oxyspermum (Thuret)Wittrock: RI
Prasiola stipitata Suhr: CI & RI
Rhizoclonium riparium (Roth) Harvey: CI & RI
Rhizoclonium tortuosum Kuetzing: CI & LI
Spongomorpha arcta (Dillwyn) Kützing: NOMES
Spongomorpha spinescens Kützing: NOMES
Ulva lactuca L.: CI, RI & NOMES
Ulvaria obscura (Kützing) Gayral: NOMES

TOTAL CHLOROPHYTA TAXA: 10

PHAEOPHYTA

Agarum clathratum Dumort.: CI, NOMES

Alaria esculenta (L.) Greville: NOMES
Ascophyllum nodosum: CI & RI
Chorda filum (L.) Stackhouse: NOMES
Chordaria flagelliformis (O. F. Müller) C. Agardh: CI, NOMES
Desmarestia aculeata (L.) Lamouroux : CI, NOMES
Desmarestia viridis (O. F. Müller) Lamouroux: NOMES
Ectocarpus siliculosus (Dillwyn) Lyngbye: CI, NOMES
Elachista fucicola (Velley) Areschoug: CI, LI & RI
Fucus distichus L. ssp. *edentatus*: CI
Fucus distichus L.ssp. evanescens (C. Agardh) Powell: NOMES
Fucus spiralis L.: LI & RI
Fucus vesiculosus L.: CI & RI
Fucus vesiculosus L. forma *mytili*i: RI
Giffordia sandriana (Zanardini) Hamel: NOMES
Laminaria digitata (Hudson) Lamouroux: NOMES
Laminaria longicruris de la Pylaie: NOMES
Laminaria saccharina (L.) Lamouroux: CI, NOMES
Petalonia fascia (Mueller) Kuntze: CI
Pilayella littoralis (L.) Kjellman: CI
Pseudolithoderma extensum (P. Crouan et H. Crouan) Lund: NOMES
"*Ralfsia bornetii*": CI & RI
Ralfsia verrucosa (Areschoug) J. Agardh: RI & NOMES
Scytosiphon lomentaria (Lyngbye) Link: CI, LI & RI
Sphacelaria arctica Harvey: NOMES
Spongonema tomentosum (Hudson) Kützing: NOMES

TOTAL PHAEOPHYTA TAXA: 16

RHODOPHYTA

Ahnfeltia plicata (Hudson) Fries: CI, NOMES
Antithamnionella floccosa (O. F. Müller) Whittick: NOMES
Audouinella purpurea (Lightfoot) Woelkerling: NOMES
Bonnemaisonia hamifera (Hariot) Okamura: CI & LI
Callithamnion tetragonum (Withering) S. F. Gray: NOMES
Callocolax neglectus Schmitz ex Batters: CI, NOMES
Ceramium rubrum (Hudson) C. Agardh: LI & NOMES
Ceratocolax hartzii Rosenvinge: NOMES
Chondria baileyana (Montagne) Harvey: NOMES
Chondrus crispus Stackhouse: CI, LI, RI & NOMES
Choreocolax polysiphoniae Reinsch: NOMES
Clathromorphum circumscriptum (Strömfelt) Foslie: CI, RI & NOMES
Coccotylus truncatus (Pallas) Wynne et Heine: NOMES
Corallina officinalis L. : CI, NOMES
"*Cruoriopsis gracilis* (Kuckuck) Batters": NOMES
Cystoclonium purpureum (Hudson) Batters: CI, NOMES

Dumontia contorta (Gmelin) Ruprecht: CI
Erythrotrichia carnea (Dillwyn) J. Agardh: RI
Euthora cristata (L.) J. Agardh: CI, NOMES
Fimbrifolium dichotomum (Lepeschkin) Hansen: NOMES
Gymnogongrus crenulatus (Turner) J. Agardh: NOMES
Hildenbrandia rubra (Sommerfelt) Meneghini: CI, RI & NOMES
Leptophytum foecundum (Kjellman) Adey: NOMES
Leptophytum laevae (Strömfelt) Adey: NOMES
Lithothamniom glaciale Kjellman: CI, NOMES
Lomentaria baileyana (Harvey) Farlow: NOMES
Lomentaria clavellosa (Turner) Gaillon: CI, NOMES
Lomentaria orcadensis (Harvey) Collins ex Taylor: NOMES
Mastocarpus stellatus (Stackhouse in Withering) Guiry: CI, LI, RI & NOMES
Membranoptera alata (Hudson) Stackhouse: NOMES
Palmaria palmata (L.) Kuntze: CI, NOMES
"Petrocelis cruenta J. Agardh": CI, NOMES
Peyssonnelia rosenvingii Schmitz in Rosenvinge: NOMES
Phycodrys rubens (L.) Batters: CI, NOMES
Phyllophora pseudoceranoides (Gmelin) Newroth et A. Taylor: CI, NOMES
Phymatolithon laevigatum (Foslie) Foslie: NOMES
Phymatolithon lenormandii (Areschoug in J. Agardh) Adey: RI
Phymatolithon rugulosum Adey: NOMES
Polyides rotundus (Hudson) Greville: NOMES
Polysiphonia denudata (C. Agardh) Zanardini: NOMES
Polysiphonia flexicalis (Harvey) Collins: NOMES
Polysiphonia fucoides (Hudson) Greville: NOMES
Polysiphonia harveyi Bailey: CI, LI & RI
Polysiphonia lanosa (L.) Tandy: CI, NOMES
Polysiphonia nigra (Hudson) Batters: NOMES
Polysiphonia stricta (Dillwyn) Greville: NOMES
Porphyra ?leucosticta Thuret in Le Jolis: CI
Porphyra miniata (C. Agardh) C. Agardh: NOMES
Porphyra purpurea (Roth) J. Agardh: CI, LI & RI
Porphyra ?umbilicalis (L.) J. Agardh: RI
Pterothamnion plumula (Ellis) Nägeli: NOMES
Ptilota serrata Kützing: NOMES
Rhodomela confervoides (Hudson) Silva: CI, NOMES
Rhodophysema georgii Batters: NOMES
Scagelia pylaisaei (Mont.) Wynne: NOMES
Spermothamnion repens (Dillwyn) Rosenvinge: NOMES
Titanoderma pustulatum (Lamouroux) Foslie: NOMES

TOTAL RHODOPHYTA TAXA: 50

XANTHOPHYTA

Vaucheria sp.: RI

TOTAL XANTHOPHYTA TAXA: 1

LICHENS:

Lichinia sp. : CI
Verrucaria maura: CI & RI
Verrucaria mucosa: CI

TOTAL LICHEN TAXA: 3

FLOWERING PLANTS

Limonium nashii: CI
Salicornia europaea: CI
Solidago sempervirens: CI
Spartina alterniflora: CI & RI
Spartina patens: CI & RI
Suaeda maritima: CI

APPENDIX 3: TRIMBLE GeoExplorer III GPS UNIT SETTINGS

GeoExplorer III Settings

Data	
Log between features	Off
Log PPrt data	NO
Log Velocities	NO
Antenna height	Set to personal height (1.5-2m)
Allow GPS update	Yes
Warning distance	Always
GPS	
The High Low bar should be three boxes to the left of High	
PDOP mask	5
SNR mask	5
Elevation mask	15
Minimum Satellites	4
2D altitude (HAE)	N/A
Real Time	
Mode	Best Available
Velocity filter	Off
RTCM age limit	50s
Station ID	any
Coordinates	
System	UTM
Zone	19 North
Datum	NAD 1983 (Conus)
Altitude reference	MSL
Geoid	DMA 10x10 (global)
Coordinate Units	Meters
Altitude Units	Meters
Units	
Distance	Meters
Area	Square Meters
Velocity	Meters/Seconds
Angle	degrees
North reference	true
Declination	Auto

Formats	
Language	English
Offset	Horz/Vert
Degrees	DD MM SS.ss
Date	MM/DD/YY
Time	24 hour
Time zone	.-4:00 during day light savings
Coordinate order	North/East
Comm	
Data transfer	Support Mod
RTCM input	Cable Free BoB
NMEA output	off
Port settings	
Input baud rate	2400
Output baud rate	2400
Data bits	8
Stop bits	1
Parity	None
Other	
Beep Volume	on
NMEA output interval	5s
NMEA message	
GGA	yes
VTG	yes

APPENDIX 4

NOTE: The information presented in this Appendix was collected subsequent to completion of the Boston Harbor Islands final report on intertidal resources. This information is directly related to the intertidal resource inventory and is included here as an appendix for completeness.

Boston Harbor Islands national park area Intertidal and Terrestrial Area Assessment

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May 2003

Introduction

A team of researchers from the New England Aquarium, National Park Service and Massachusetts Audubon Society completed an assessment of the intertidal resources of the Boston Harbor Islands national park area in December of 2002 (Bell *et al* 2002). They developed an intertidal classification system, the Boston Harbor Intertidal Classification System, (BHICS) and used it to map the intertidal zone of twenty of thirty-four islands in the Park. Each island was delineated by habitat and substrate type and converted into GIS coverage.

One of the recommendations of the report was to map one additional property, Snake Island using the BHICS. Snake Island has a large salt marsh assemblage and is a valuable habitat for birds and other organisms. This project was undertaken to complete this task and in addition determine an overall intertidal and terrestrial area for all thirty-four islands in the Park.

Methods

Snake Island was delineated using the Boston Harbor Intertidal Classification System following the methods set forth in the Inventory of Intertidal Habitats: *Boston Harbor Islands, a national park area* (Bell *et al* 2002).

The datum was combined with the GIS data from the Inventory of Intertidal Habitats to calculate the total intertidal and terrestrial area of twenty-one islands in the Park.

The remaining thirteen islands had no GIS or GPS coverage and were surveyed between January and April 2003 using a Trimble GeoExplorer III dGPS unit. On each island the high tide mark was recorded by walking the upper most wrack line not in upland vegetation or the upper edge of the black zone with a dGPS unit creating a polygon. The low tide mark was walked beginning one hour before low tide and continued as long as was needed up to one hour after low tide. On a few rare occasions due to difficult terrain and weather conditions the low tide mark was continued until two hours after low tide. In rocky areas the low tide mark was the lowest point safely attainable during this time most often above the kelp zone below the *Chondrus/Mastocarpus* zone. On mixed coarse and boulder areas the same delineation was made. In mudflat areas with no macroalgae indicators an individual walked waist to chest deep in the water beginning one hour before low tide and ending no later then one hour after low tide. Maximum tidal height at low tide was never more then 0.8 ft as recorded by NOAA tide stations. The thirteen island surveyed in 2003 were also examined for species of management concern.

On four islands due to extremely difficult terrain and wave exposure other techniques were used. The east side of Little Calf Island was delineated by recording dGPS positions from a small rowboat. Positions were taken one to two hours after low tide therefore affording the ability to make an accurate recording of the low tide mark without running aground. The south end of Green Island and the northern most and southern most points on The Graves were visually measured on site and drawn in using GIS. We were not able to land on Shag Rocks and this island was drawn in using aerial

photos and surveys from a boat. The polygons for Shag Rocks are not as accurate as those on the other islands.

A number of areas in the Park are peninsulas and share property lines with the neighboring cities and towns. A combination of deeds, plans, and assessors maps were used to determine the boundaries and these were walked with a dGPS unit. These boundaries are close approximations of the true property lines, but are not intended for legal use. Moon Island was the only peninsula where serious difficulties arose. The peninsula is owned by the City of Boston (Suffolk County), but is assessed in Quincy (Norfolk County). After consulting the Boston and Quincy Engineering departments, deeds, plans and assessors maps the property line could be estimated, but the full length of the legal boundary between Quincy and Boston could not be precisely determined.

The low tide mark/property line around Raccoon in Quincy and Button, Sarah and Ragged in Hingham Harbor was difficult to determine because the areas were islands at high tide, but were attached to the mainland at low tide. On Raccoon, we used a change in substrate and assemblage type as the boundary between the Quincy shore and the island, but in Hingham this was not possible. The Harbor is primarily exposed mudflat at low tide and lacks any measurable change in substrate or assemblage at the $25m^2$ MMU. The decision was made to include all the intertidal area connected to the three islands up to the approximate high tide mark on the Hingham shore. The low tide mark starting at the mooring field in Hingham Harbor follows the true low tide mark out the dredged channel and around the creeks and islands to the northwest corner. The northwest corner of the polygon follows the contours of a small creek and then continues along the high tide mark on the Hingham mainland.

The intertidal and terrestrial areas of the thirteen islands completed in 2003 were combined with the areas from the Inventory of Intertidal Habitats: *Boston Harbor Islands, a national park area* (Bell *et al* 2002). A single intertidal polygon for each island was created from the Inventory of Intertidal Habitats and a terrestrial polygon was added.

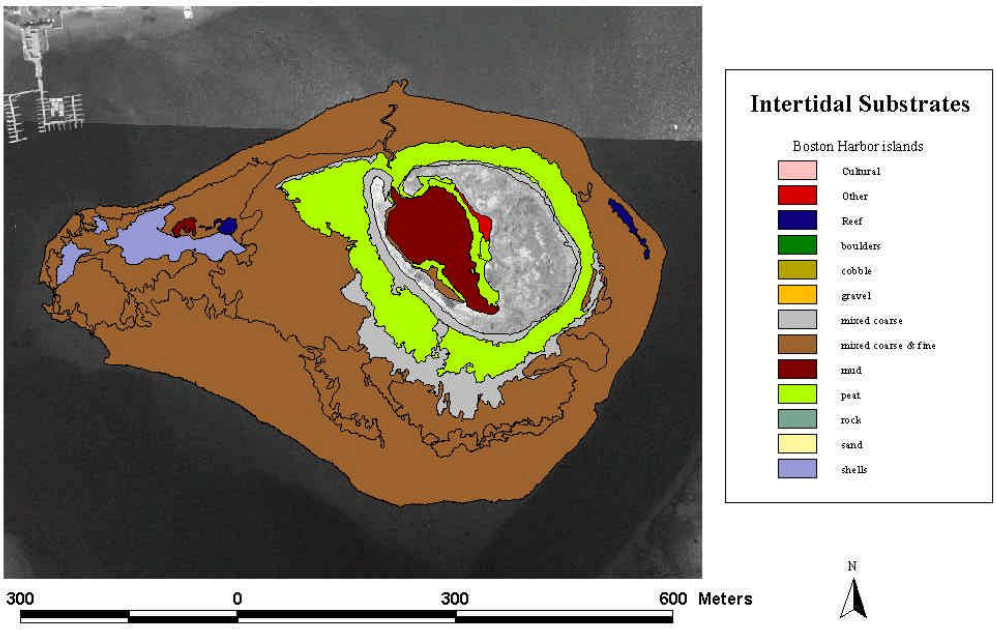
The settings for the GeoExplorer III can be found in Appendix 3 (Bell *et al* 2002). The rover files from the GeoExplorer III were uploaded to a computer via Pathfinder Office 2.51. Rover files were corrected with base files from base stations in Woburn, MA and the University of Rhode Island (Kingston, RI) and the corrected files were edited in Pathfinder Office 2.51 to remove loops. The corrected edited files were exported to ArcView 3.2 where the final editing was done. The final product was projected to adhere to National Park Service guidelines: UTM, Zone: 19N, NAD 83, Meters.

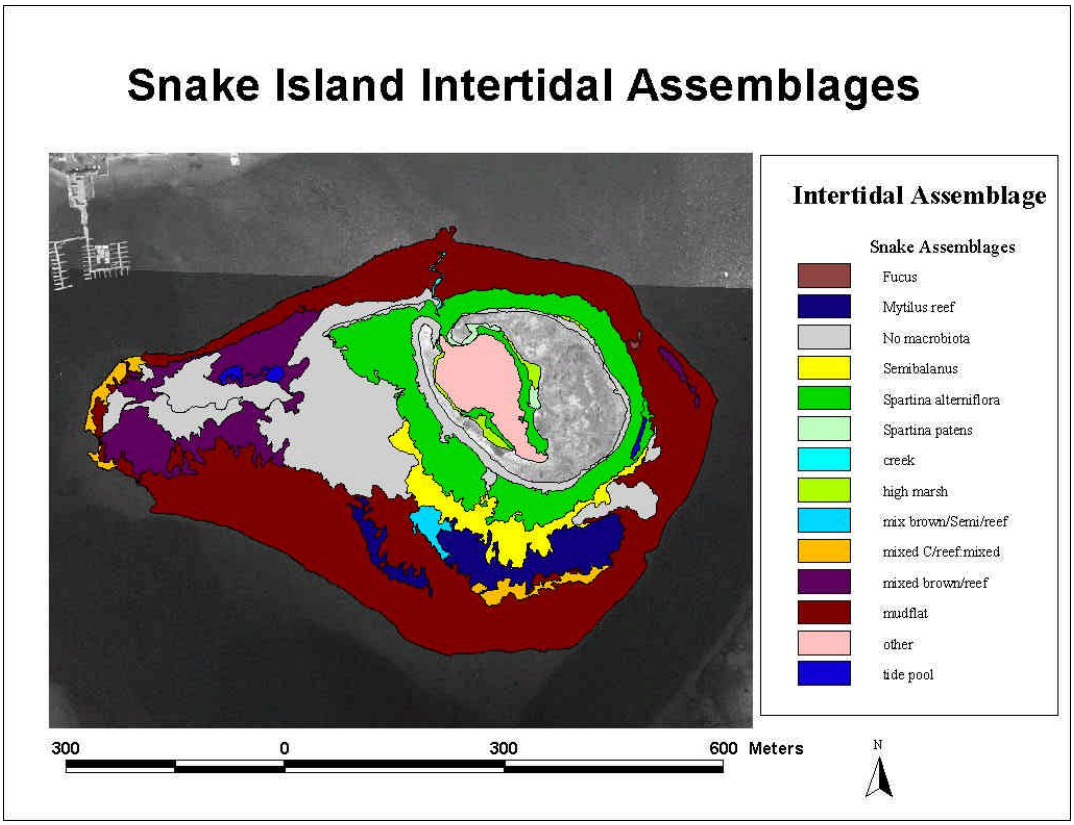
Results

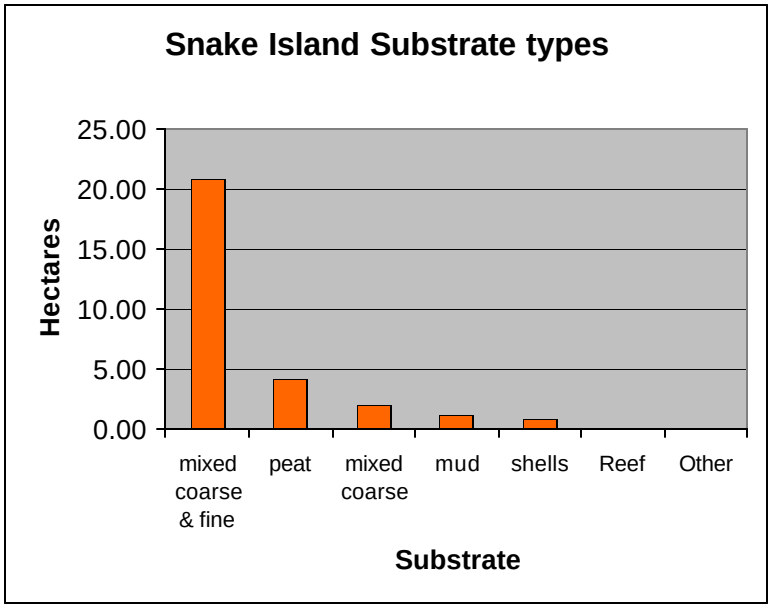
Species of Management Concern

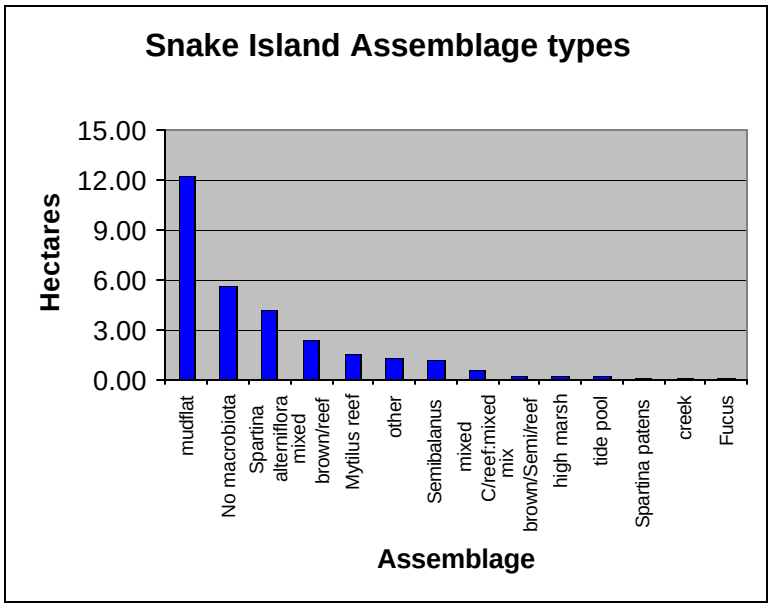
No new organisms were found in 2003.

Snake Island Intertidal Substrate




Snake Island Intertidal Assemblages
Intertidal Assemblage
Snake Assemblages
Fucus
Mytilus reef
No macrobiota
Semibalanus
Spartina alterniflora
Spartina patens
creek
high marsh
mix brown/Semi/reef
mixed C/reef:mixed
mixed brown/reef
mudflat
other
tide pool
300
0
300
600 Meters
N


Snake Island Substrate types
25.00
20.00
15.00
10.00
5.00
0.00
Hectares
mixed coarse & fine
peat
mixed coarse
mud
shells
Reef
Other
Substrate


Snake Island Assemblage types
Hectares
15.00
12.00
9.00
6.00
3.00
0.00
mudflat
No macrobiota
Spartina alterniflora mixed
brown/reef
Mytilus reef
other
Semibalanus mixed
C/reef:mixed mix
brown/Semi/reef
high marsh
tide pool
Spartina patens
creek
Fucus
Assemblage

Island	Intertidal	Terrestrial	Total Area
Bumpkin	12.7030	12.2030	24.9060
Button*	46.8980	0.2450	47.1430
Calf	6.5180	7.4880	14.0060
Deer	32.4500	74.8500	107.3000
Gallops	11.2440	9.1530	20.3970
Georges	5.5690	15.8400	21.4090
Grape	18.8310	21.8650	40.6960
Great Brewster^	19.8110	7.5320	27.3430
Green	5.9510	1.0440	6.9950
Hangman	2.2160	0.1840	2.4000
Langlee	1.3990	1.7770	3.1760
Little Brewster^	1.6870	1.2800	2.9670
Little Calf	1.6450	0.3850	2.0300
Long	34.8570	85.0710	119.9280
Lovell	28.8320	19.6120	48.4440
Middle Brewster	3.8320	4.9970	8.8290
Moon	87.0710	21.8580	108.9290
Nixes Mate	8.1200	0.0210	8.1410
Nut	16.4650	6.8240	23.2890
Outer Brewster	4.0580	7.6820	11.7400
Peddocks	42.1330	74.6060	116.7390
Raccoon	3.2320	1.2600	4.4920
Ragged*	27.2830	1.0540	28.3370
Rainsford	9.3160	6.6100	15.9260
Sarah*	18.4080	1.3720	19.7800
Shag Rocks	2.4490	0.2470	2.6960
Sheep	8.4050	0.4160	8.8210
Slate	15.1610	4.7760	19.9370
Snake	29.4450	2.8680	32.3130
Spectacle	11.4750	34.6180	46.0930
The Graves	1.8120	0.0600	1.8720
Thompson	53.0320	54.1800	107.2120
Webb State Park	22.2580	13.9220	36.1800
World's End	46.5940	104.4660	151.0600
Total Hectares	641.1600	600.3660	1241.5260
Total Acres	1584.0030	1483.0840	3067.0870

*Button, Ragged and Sarah were connected at low tide and were artificially separated for the purposes of this chart
^Great Brewster and Little Brewster were connected at low tide and were artificially separated for the purposes of this chart

Discussion

Snake Island

Snake Island is a small island just off Logan airport and the town of Winthrop with a relatively large intertidal zone. The majority of the island is mudflat that transitions into a moderately well developed salt marsh on a peat layer encircling the island in the high intertidal zone. The well developed peat layer on the outside of the island differs from the majority of other islands in the harbor. Most areas of *Spartina alterniflora* along the shore on the Boston Harbor Islands are on gravel and cobble shores with little to no peat while salt marshes in enclosed areas such as on Thompson and Peddocks have a well developed peat layer and surround standing water. More unusual is that the inside of the island where there is standing water and a full marsh might be expected had very little marsh grass.

The mudflats and salt marsh support a variety of migrating and nesting birds (Susannah Corona, NEAq per com). For the past several years a tern colony has nested on the west side of the Island and last year a pair of oystercatchers raised three young. Our first sighting of an oystercatcher this year was on Snake Island on March 26th.

Species of Management Concern

While no new species were found, certain organisms were seen more frequently or found in greater number (i.e., harbor seals, harbor porpoises, white-sided dolphins, eider ducks, scoters, northern gannets). The increased sightings of these organisms can mostly likely be attributed to the season during which the surveys were conducted. The intertidal team had sampled from mid April to late October in previous years, but had never sampled in the dead of winter. Harbor seals, harbor porpoises, eider ducks and scoters are known winter inhabitants of Boston Harbor. Harbor seals were frequently hauled out on Ram's Head off of Lovell Island and most of the outer Islands and porpoise harbor use has increased in recent years (Jim Rice, NEAq per com). White sided dolphins and northern gannets are unusual visitors as they tend to inhabit deeper water. They were only sighted on one day in mid April, but have been seen in the Harbor in previous years and have been found stranded in the Mystic River. As the water quality of the Harbor increases greater numbers can most likely be expected. No action is currently needed with Park visitation low in the winter months when these species are present, but as usage increases steps may be necessary to insure safe and undisturbed haul out areas.

Park Area

The numbers clearly show that the intertidal zone of the Boston Harbor Islands national park area is a major component of the Park. Encompassing just over half the total area, it serves a duel role as a valuable resource for both natural and cultural use. The intertidal zone is an important habitat for migrating and nesting birds, juvenile fish and marine mammals as well as an indicator of the health of the harbor. At the same time it is used as the access points for the islands, a place for camping, swimming, picnicking and many other recreational activities. By tying the natural and cultural uses together the intertidal

zone has the tremendous potential with which to educate visitors about the natural systems that function around them materialized in the organisms they see, hear and touch. For many people tidepools are their first realization that nature is not something one travels to see, but fully surrounding us at all times. As the Harbor becomes cleaner both the organisms and the number of visitors to the islands will increase. This report was developed to record baseline data to prepare for this increase. It is our hope that this information will be used to develop an effective management plan that conserves and promotes the natural ecosystem while enriching the visitor's experience.

Works Cited

Bell, R., M. Chandler, R. Buchsbaum, and C. Roman. 2002. Inventory of Intertidal Habitats*: Boston Harbor Islands, a national park area.* Technical report, National Park Service, Boston Support Office, 15 State Street, Boston, MA.

As the nation's primary conservation agency, the Department of the Interior has responsibility for most of our nationally owned public land and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS D-10 December 2003

[redacted]

National Park Service
U.S. Department of the Interior

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