

# **Marine Invaders in the Northeast**

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**Rapid Assessment Survey of non-native and native marine species of floating dock communities**

**Prepared by Chris MacIntyre, Massachusetts Coastal Zone Management Intern**

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**Adrienne Pappal, Massachusetts Coastal Zone Management**

**Judy Pederson, MIT Sea Grant**

**Jan P. Smith, Massachusetts Coastal Zone Management**

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The spread of non-native species is considered to be the second greatest threat to global biodiversity after habitat degradation. The impact of introduced species, including efforts to control bioinvasions, is estimated to cost the US more than \$138 billion annually [5]. Globalization and enhancements in commercial transportation have increased the rate of new introductions as well as the area affected by them [3]. Of nearly 100 known introductions of aquatic invertebrate species, it is estimated that more than 95% were accidental and associated with trade and shipping [5]. Surveillance of high-risk coastal habitats to detect new introductions and monitor established invaders is crucial to build scientific knowledge needed for the development of effective prevention practices and control methods. The rapid assessment survey is one method currently used to monitor and detect non-native marine species.

The primary objectives of the Northeast Rapid Assessment Survey (RAS) for marine species are to: identify native, non-native and cryptogenic species, expand upon data collected in past surveys, assess the invasion status and range extensions of documented non-native species, and to detect new introductions [2]. The 2010 RAS was the fourth study conducted in the Northeast region since 2000 (Table 1). Multiple surveys conducted over an extended period of time support the formation of a comprehensive dataset that will provide the public and policy makers with better information concerning the status of non-native species in the region.

**Table 1: Rapid assessment surveys conducted along the Northeast coast since 2000.**

<b>Year</b>	<b>Sites Sampled</b>	<b>Geographic Range of Survey</b>	<b>Non-Native Species</b>
<b>2000</b>	34	Narragansett Bay (RI) to Gloucester(MA)	32
<b>2003</b>	20	Staten Island(NY) to Portland(ME)	29
<b>2007</b>	17	Buzzards Bay(MA) to Rockland(ME)	26
<b>2010</b>	20	Narragansett Bay (RI) to Cape Elizabeth Maine	29

The 2010 RAS targeted sampling at commercial ports and marinas (areas most likely to serve as inoculation sites for non-native species) and rocky intertidal sites in each of the four states within the study region. The survey began in North Kingston, Rhode Island on July 25 and was completed in South Freeport, Maine on July 31. Twenty coastal sites within five National Estuary Program (NEP) study areas were surveyed in Rhode Island, Massachusetts, New Hampshire and Maine. The following NEPs were included in the study: Narragansett Bay Estuary Program, Rhode Island; Buzzards Bay Estuary Program, Massachusetts; Massachusetts Bays Program, Massachusetts; Piscataqua Region Estuaries Partnership, New Hampshire; and the Casco Bay Estuary Partnership, Maine. Sampling locations are described in the following pages and are listed in order they were sampled. Each listing includes the sampling date, time (usually one hour sampling per site), as well as a description of the site and listings of the non-native and cryptogenic (undefined origin) species found at each location [1]. In all, 314 different species were documented during the survey, 259 native, 26 cryptogenic and 29 non-native (Table 42).



**Figure 1: Sampling locations of the 2010 Rapid Assessment Survey.**

**1. Port Edgewood Marina, Cranston, Rhode Island**  
*July 25, 2010, 07:35 (<http://www.portedgewood.com/>)*

Located in the northern region of Providence Harbor adjacent to a large industrial park, Port Edgewood is one of many areas of the Providence River that has been filled over the last century to create shipyards, highways, wharves and naval bases. Providence is one of several North Atlantic cities whose harbors are contaminated with PCBs, pesticides, metals and aromatic hydrocarbons. The marina includes 3 large wooden floats and 160 seasonal and transient boat slips. The fouling community was dominated by a mussel base with an abundance of ascidians and bryozoans. The water at this site had the lowest average salinity (25.3 ppt.) of any site sampled during the 2010 RAS. Fifty-two species were collected including six non-native and six cryptogenic species.

**Table 2: Non-native species recorded at Port Edgewood Marina during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Arthropoda	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
Cnidaria	<i>Diadumene lineata</i>	Orange Striped Anemone
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate

**Table 3: Cryptogenic species recorded at Port Edgewood Marina during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Annelida	<i>Harmothoe imbricata</i>	Fifteen-scaled worm
Annelida	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
Cnidaria	<i>Obelia dichotoma</i>	Sea Thread Hydroid
Ectoprocta	<i>Bowerbankia sp.</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
Porifera	<i>Leucosolenia botryoides</i>	Orange Pipe Sponge

## 2. Allen Harbor Marina, North Kingston, Rhode Island

July 25, 2010, 09:30 ([http://www.northkingstown.org/recreationdept/allen\\_harbor\\_marina.asp](http://www.northkingstown.org/recreationdept/allen_harbor_marina.asp))

Allen Harbor Marina is located on the western side of Narragansett Bay on the corner of the former Quonset-Davisville Naval Base. The marina features a wooden dock system with 80 moorings and 66 slips and it is located within a semi-enclosed, 17.5 acre harbor surrounded by heavily industrialized lands including four EPA Hazmat sites and the Allen Harbor Landfill. Water quality in the harbor is characterized by the Rhode Island Department of Environmental Management as being impaired by pollutants. The fouling community was dominated by a barnacle base that supported anemones, sponges and ascidians. Fifty-nine species were found during the 2010 RAS including eight non-native and five cryptogenic species.

**Table 4: Non-native species recorded at Allen Harbor Marina during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Cnidaria	<i>Diadumene lineata</i>	Orange Striped Anemone
Rhodophyceae	<i>Grateloupia turuturu</i>	Asian Red Seaweed
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Porifera	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate
Urochordata	<i>Styela clava</i>	Club Tunicate

**Table 5: Cryptogenic species recorded at Allen Harbor Marina during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Cnidaria	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
Ectoprocta	<i>Bowerbankia imbricata</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Bugula simplex</i>	Fan Bugula
Ectoprocta	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
Ectoprocta	<i>Conopeum reticulum</i>	Encrusting Bryozoan

### 3. Point Judith Marina, South Kingston, Rhode Island

July 25, 2010 13:00 (<http://www.pjmarina.com/>)

The Point Judith Marina is located on the southern end of the Narragansett Bay within the sheltered enclosure of Point Judith Pond. The marina features a large system of floating docks and wooden pilings. In 2008 the Rhode Island Coastal Resources Management Council designated Point Judith Rhode Island's second Clean Marina, a distinction that reflects the use of Best Management Practices (BMPs) and innovative pollution control strategies. The fouling community was composed of a barnacle base with an abundance of anemones and bryozoans. Seventy-three species were recorded during the 2010 RAS including fifteen non-native and eleven cryptogenic species.

**Table 6: Non-native species recorded at Point Judith Marina during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Arthropoda	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
Cnidaria	<i>Diadumene lineata</i>	Orange Striped Anemone
Ectoprocta	<i>Bugula neritina</i>	Stoloniferous (Plant-like) Bryozoan
Chlorophyceae	<i>Codium fragile ssp. fragile</i>	Green Fleece
Rhodophyceae	<i>Grateloupia turuturu</i>	Asian Red Seaweed
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Porifera	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
Urochordata	<i>Ascidia aspersa</i>	European Sea-squirt
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate
Urochordata	<i>Didemnum vexillum</i>	Colonial Sea-squirt
Urochordata	<i>Diplosoma listerianum</i>	Compound Sea-squirt
Urochordata	<i>Styela clava</i>	Club Tunicate

**Table 7: Cryptogenic species recorded at Point Judith Marina during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Annelida	<i>Harmothoe imbricata</i>	Fifteen-scaled worm
Annelida	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
Cnidaria	<i>Clytia hemisphaerica</i>	Hydroid
Cnidaria	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
Ectoprocta	<i>Bowerbankia gracilis</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Bugula simplex</i>	Fan Bugula
Ectoprocta	<i>Bugula stolonifera</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
Mollusca	<i>Placida dendritica</i>	Sea Slug
Porifera	<i>Leucosolenia botryoides</i>	Orange Pipe Sponge
Urochordata	<i>Ciona intestinalis</i>	Sea Vase

### 4. F.L. Tripp & Sons, Inc., Westport, Massachusetts

July 26, 2010 08:15 (<http://www.fltripp.com/>)

Tripp's Marina is located on the Westport River between Rhode Island Sound and Buzzard Bay. The marina features 178 boat slips and is situated on the inland side of Horseneck Beach State Reservation. Horseneck Beach and the Westport River Estuary system are considered some of the Commonwealth's greatest coastal assets in both habitat

quality and scenic beauty. Changing land use patterns in surrounding areas have increased nutrient loading and pathogen contamination in the estuary. The fouling community was composed of a mussel base that supported a rich assortment of ascidians and hydroids. Eighty species were documented during the 2010 RAS including fifteen non-native and eight cryptogenic species.

**Table 8: Non-native species recorded at F.L. Tripps & Sons, Inc during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Arthropoda	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
Cnidaria	<i>Diadumene lineata</i>	Orange Striped Anemone
Ectoprocta	<i>Bugula neritina</i>	Stoloniferous (Plant-like) Bryozoan
Chlorophyceae	<i>Codium fragile ssp. fragile</i>	Green Fleece
Rhodophyceae	<i>Grateloupia turuturu</i>	Asian Red Seaweed
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Porifera	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate
Urochordata	<i>Didemnum vexillum</i>	Colonial Sea-squirt
Urochordata	<i>Diplosoma listerianum</i>	Compound Sea-squirt
Urochordata	<i>Styela canopus</i>	Rough Sea-squirt
Urochordata	<i>Styela clava</i>	Club Tunicate

**Table 9: Cryptogenic species recorded at F.L. Tripps & Sons, Inc during the 2010 RAS**

Phylum/Division	Species	Common Name/* Description
Annelida	<i>Harmothoe imbricata</i>	Fifteen-scaled worm
Annelida	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
Cnidaria	<i>Obelia dichotoma</i>	Sea Thread Hydroid
Cnidaria	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
Ectoprocta	<i>Amathia vidovici</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Bowerbankia imbricata</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Bugula stolonifera</i>	Stoloniferous (Plant-like) Bryozoan
Urochordata	<i>Ciona intestinalis</i>	Sea Vase

**5. Fort Adams State Park, Newport, Rhode Island**  
 July 26, 2010, 10:45 (<http://www.fortadams.org/>)

Fort Adams State Park is located at the mouth of Newport Harbor facing the East Passage of Narragansett Bay. Construction of the fort began in 1824 and was completed 30 years later. The fort was deeded to the state of Rhode Island in 1966 and has since become a major public access point into Narragansett Bay and recreational attraction. The 105 acre park includes a small semi-enclosed marina at the southern-most point. The fouling community on the wooded docks was composed of a mussel base with a covering of the non-native colonial tunicate *Didemnum vexillum*, and the cryptogenic tunicate *Ciona intestinalis*. Seventy-six species were recorded at this site including seventeen non-natives and thirteen cryptogenic species.

**Table 10: Non-native species recorded at Fort Adams State Park during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
Arthropoda	<i>Carcinus maenas</i>	European Green Crab

<b>Arthropoda</b>	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
<b>Arthropoda</b>	<i>Praunus flexuosus</i>	Opossum Shrimp
<b>Ectoprocta</b>	<i>Bugula neritina</i>	Stoloniferous (Plant-like) Bryozoan
<b>Ectoprocta</b>	<i>Membranipora membranacea</i>	Lacy Crust Bryozoan
<b>Chlorophyceae</b>	<i>Codium fragile ssp. fragile</i>	Green Fleece
<b>Rhodophyceae</b>	<i>Grateloupia turuturu</i>	Asian Red Seaweed
<b>Rhodophyceae</b>	<i>Heterosiphonia japonica</i>	Red Algae
<b>Rhodophyceae</b>	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
<b>Porifera</b>	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
<b>Urochordata</b>	<i>Asciidiella aspersa</i>	European Sea-squirt
<b>Urochordata</b>	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
<b>Urochordata</b>	<i>Botryllus schlosseri</i>	Star Tunicate
<b>Urochordata</b>	<i>Didemnum vexillum</i>	Colonial Sea-squirt
<b>Urochordata</b>	<i>Diplosoma listerianum</i>	Compound Sea-squirt
<b>Urochordata</b>	<i>Styela clava</i>	Club Tunicate

**Table 11: Cryptogenic species recorded at Fort Adams State Park during the 2010 RAS**

<b>Phylum/Division</b>	<b>Species</b>	<b>Common Name/Description</b>
<b>Annelida</b>	<i>Harmothoe imbricata</i>	Fifteen-scaled worm
<b>Annelida</b>	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
<b>Cnidaria</b>	<i>Laomedea calceolifera</i>	Hydroid
<b>Cnidaria</b>	<i>Obelia dichotoma</i>	Sea Thread Hydroid
<b>Cnidaria</b>	<i>Obelia geniculata</i>	Knotted Thread Hydroid
<b>Cnidaria</b>	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
<b>Ectoprocta</b>	<i>Bowerbankia gracilis</i>	Stoloniferous (Plant-like) Bryozoan
<b>Ectoprocta</b>	<i>Bugula simplex</i>	Fan Bugula
<b>Ectoprocta</b>	<i>Bugula stolonifera</i>	Stoloniferous (Plant-like) Bryozoan
<b>Ectoprocta</b>	<i>Electra pilosa</i>	Hairy Sea-mat
<b>Porifera</b>	<i>Leucosolenia botryoides</i>	Orange Pipe Sponge
<b>Porifera</b>	<i>Sycon ciliatum</i>	Sponge
<b>Urochordata</b>	<i>Ciona intestinalis</i>	Sea Vase

**6. King's Beach, Newport, Rhode Island**  
July 26, 2010, 13:30

This popular diving and fishing spot is located on the southern end of Newport. The rocky intertidal habitat in the western cove and sandy subtidal eastern cove support a rich diversity of fish species and a thriving eelgrass bed. The site is commonly used for harvesting eelgrass for restoration projects throughout Narragansett Bay. Sixty-five species were recorded here during the 2010 RAS including thirteen non-native and three cryptogenic species.

**Table 12: Non-native species recorded at King's Beach during the 2010 RAS**

<b>Phylum/Division</b>	<b>Species</b>	<b>Common Name/Description</b>
<b>Arthropoda</b>	<i>Chthamalus fragilis</i>	Barnacle
<b>Arthropoda</b>	<i>Carcinus maenas</i>	European Green Crab
<b>Arthropoda</b>	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
<b>Cnidaria</b>	<i>Diadumene lineata</i>	Orange Striped Anemone
<b>Mollusca</b>	<i>Littorina littorea</i>	European Periwinkle
<b>Chlorophyceae</b>	<i>Codium fragile ssp. fragile</i>	Green Fleece
<b>Rhodophyceae</b>	<i>Gracilaria vermiculophylla</i>	Red Algae
<b>Rhodophyceae</b>	<i>Grateloupia turuturu</i>	Asian Red Seaweed

<b>Rhodophyceae</b>	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
<b>Urochordata</b>	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
<b>Urochordata</b>	<i>Botryllus schlosseri</i>	Star Tunicate
<b>Urochordata</b>	<i>Didemnum vexillum</i>	Colonial Sea-squirt
<b>Urochordata</b>	<i>Diplosoma listerianum</i>	Compound Sea-squirt

**Table 13: Cryptogenic species recorded at King's Beach during the 2010 RAS**

<b>Phylum/Division</b>	<b>Species</b>	<b>Common Name/Description</b>
<b>Cnidaria</b>	<i>Dynamena pumila</i>	Sea Oak Hydroid
<b>Ectoprocta</b>	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
<b>Ectoprocta</b>	<i>Electra pilosa</i>	Hairy Sea-mat

### 7. Pope's Island Marina, New Bedford, Massachusetts

July 27, 2010, 08:00 ([www.newbedford-a.gov/PortofNewBedford/GettingAround/PopesIsland.html](http://www.newbedford-a.gov/PortofNewBedford/GettingAround/PopesIsland.html))

Pope's Island Marina is a public boat facility with 198 boat slips. The marina was opened in 1993 with assistance from the Massachusetts Department of Conservation and Recreation and is currently maintained and operated by the New Bedford Harbor Development Commission. The marina is located on the south side of Pope's Island in the upper region of New Bedford Harbor. New Bedford Harbor was named a Superfund site in 1982 and is contaminated with high levels of toxic metals and organic pollutants. The fouling community was composed of a *Schizoporella-Hydroides* base and a cover of ascidians and bryozoans. Sixty-seven species were recorded here during the 2010 RAS including ten non-native and eight cryptogenic species.

**Table 14: Non-native species recorded at Pope's Island Marina during the 2010 RAS**

<b>Phylum/Division</b>	<b>Species</b>	<b>Common Name/Description</b>
<b>Arthropoda</b>	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
<b>Arthropoda</b>	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
<b>Cnidaria</b>	<i>Diadumene lineata</i>	Orange Striped Anemone
<b>Chlorophyceae</b>	<i>Codium fragile ssp. fragile</i>	Green Fleece
<b>Rhodophyceae</b>	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
<b>Porifera</b>	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
<b>Urochordata</b>	<i>Asciella aspersa</i>	European Sea-squirt
<b>Urochordata</b>	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
<b>Urochordata</b>	<i>Botryllus schlosseri</i>	Star Tunicate
<b>Urochordata</b>	<i>Styela clava</i>	Club Tunicate

**Table 15: Cryptogenic species recorded at Pope's Island Marina during the 2010 RAS**

<b>Phylum/Division</b>	<b>Species</b>	<b>Common Name/Description</b>
<b>Cnidaria</b>	<i>Halecium halecinum</i>	Herringbone Hydroid
<b>Cnidaria</b>	<i>Obelia dichotoma</i>	Sea Thread Hydroid
<b>Cnidaria</b>	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
<b>Ectoprocta</b>	<i>Bowerbankia gracilis</i>	Stoloniferous (Plant-like) Bryozoan
<b>Ectoprocta</b>	<i>Bowerbankia imbricata</i>	Stoloniferous (Plant-like) Bryozoan
<b>Ectoprocta</b>	<i>Bugula simplex</i>	Fan Bugula
<b>Ectoprocta</b>	<i>Bugula stolonifera</i>	Stoloniferous (Plant-like) Bryozoan
<b>Ectoprocta</b>	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan

**8. Massachusetts Maritime Academy, Bourne, Massachusetts**

July, 27, 2010 10:00 (<http://www.maritime.edu/>)

The Massachusetts Maritime Academy is located at the southern end of the Cape Cod Canal. The academy's private docking area features one permanent floating dock of approximately 70 meters. Several vessels are docked there including the *USTS Kennedy* which frequently travels around the world for training exercises. There are also seasonal floating docks for smaller vessels used for teaching cadets. The fouling community on the docks was composed of a base of solitary tunicates, *Styela clava*, as well as mussels. Many different ascidian species were found here, including the native *Aplidium constellatum*, unique to this site. A total of eighty-one species were recorded here including fourteen non-native and eleven cryptogenic species.

**Table 16: Non-native species recorded at Mass. Maritime Academy during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
Arthropoda	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
Cnidaria	<i>Diadumene lineata</i>	Orange Striped Anemone
Chlorophyceae	<i>Codium fragile ssp. fragile</i>	Green Fleece
Rhodophyceae	<i>Grateloupia turuturu</i>	Asian Red Seaweed
Rhodophyceae	<i>Lomentaria clavellosa</i>	Red Algae
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Porifera	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
Urochordata	<i>Styela canopus</i>	Rough Sea-squirt
Urochordata	<i>Asciella aspersa</i>	European Sea-squirt
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate
Urochordata	<i>Didemnum vexillum</i>	Colonial Sea-squirt
Urochordata	<i>Styela clava</i>	Club Tunicate

**Table 17: Cryptogenic species recorded at Mass. Maritime Academy during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Annelida	<i>Harmothoe imbricata</i>	Fifteen-scaled worm
Annelida	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
Cnidaria	<i>Clytia hemisphaerica</i>	Hydroid
Cnidaria	<i>Laomedea calceolifera</i>	Hydroid
Cnidaria	<i>Obelia dichotoma</i>	Sea Thread Hydroid
Cnidaria	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
Ectoprocta	<i>Bugula simplex</i>	Fan Bugula
Ectoprocta	<i>Bugula stolonifera</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Electra pilosa</i>	Hairy Sea-mat
Porifera	<i>Leucosolenia botryoides</i>	Orange Pipe Sponge
Urochordata	<i>Ciona intestinalis</i>	Sea Vase

**9. Sandwich Marina, Sandwich, Massachusetts**

July 27, 2010 13:15 (<http://www.sandwichmarina.com/>)

Sandwich Marina, opened in 1989, is located within the north end of the Cape Cod Canal and is an important site for monitoring the northerly progression of non-native species into Massachusetts Bay via the canal. The marina features

a floating dock system which includes 140 seasonal slips, 42 commercial slips and 24 transient slips. The fouling community was composed primarily of solitary tunicates as well as a large population of the native anemone *Metridium senile*. Eighty-five species were recorded here, including thirteen non-native and twelve cryptogenic species.

**Table 18: Non-native species recorded at Sandwich Marina during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Arthropoda	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
Ectoprocta	<i>Membranipora membranacea</i>	Lacy Crust Bryozoan
Rhodophyceae	<i>Grateloupia turuturu</i>	Asian Red Seaweed
Rhodophyceae	<i>Lomentaria orcadensis</i>	Red Algae
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Porifera	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
Urochordata	<i>Ascidia aspersa</i>	European Sea-squirt
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate
Urochordata	<i>Didemnum vexillum</i>	Colonial Sea-squirt
Urochordata	<i>Styela clava</i>	Club Tunicate

**Table 19: Cryptogenic species recorded at Sandwich Marina during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Annelida	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
Annelida	<i>Harmothoe imbricata</i>	Fifteen-scaled worm
Cnidaria	<i>Gonothyrea loveni</i>	Hydroid
Cnidaria	<i>Obelia dichotoma</i>	Sea Thread Hydroid
Cnidaria	<i>Obelia geniculata</i>	Knotted Thread Hydroid
Ectoprocta	<i>Bugula simplex</i>	Fan Bugula
Ectoprocta	<i>Bugula stolonifera</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
Ectoprocta	<i>Electra pilosa</i>	Hairy Sea-mat
Porifera	<i>Leucosolenia sp.</i>	Sponge
Porifera	<i>Sycon ciliatum</i>	Sponge
Urochordata	<i>Ciona intestinalis</i>	Sea Vase

### **10. Brewer Plymouth Marine, Massachusetts**

July 28, 2010, 08:30 (<http://www.byy.com/plymouth>)

Brewer's Marina is located in the historic Plymouth Harbor behind a scenic narrow barrier beach and a stone breakwater. The marina features concrete floats, with 100 seasonal slips and can accommodate boats up to 150 feet. Fresh water discharged from Town Brook adjacent to the marina creates a lens of fresh water on the surface of the water near the marina (surface salinity was 17.68 ppt). The fouling community was composed of a mixed ascidian base. Sixty species were recorded including eleven non-native and seven cryptogenic species.

**Table 20: Non-native species recorded at Brewer Plymouth Marine during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Arthropoda	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
Cnidaria	<i>Diadumene lineata</i>	Orange Striped Anemone
Chlorophyceae	<i>Codium fragile ssp. fragile</i>	Green Fleece
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Porifera	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
Urochordata	<i>Didemnum vexillum</i>	Colonial Sea-squirt
Urochordata	<i>Styela clava</i>	Club Tunicate
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate

**Table 21: Cryptogenic species recorded at Brewer Plymouth Marine during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Cnidaria	<i>Obelia dichotoma</i>	Sea Thread Hydroid
Cnidaria	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
Ectoprocta	<i>Bowerbankia imbricata</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Bugula simplex</i>	Fan Bugula
Ectoprocta	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
Ectoprocta	<i>Electra pilosa</i>	Hairy Sea-mat
Porifera	<i>Leucosolenia sp.</i>	Sponge

### **11. The Marina at Rowes Wharf (ROW), Boston, Massachusetts**

July 28, 2010 11:30 (<http://themarinaatroweswharf.com>)

The Marina at Rowes Wharf is located along the highly developed waterfront of Boston's inner harbor and is part of the Rowes Wharf luxury hotel and condominium complex. The marina features many floating docks frequented by international boaters. Water quality in Boston Harbor is monitored by the Massachusetts Water Resource Authority (MWRA) and has improved drastically since the opening of the waste-water treatment plant on Deer Island. The fouling community is composed of a mussel base supporting various ascidians, bryozoans, sponges, and sea anemones. Seventy-nine different species were recorded on the docks including thirteen non-native and twelve cryptogenic species.

**Table 22: Non-native species recorded at Rowes Wharf during the 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Arthropoda	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate
Cnidaria	<i>Diadumene lineata</i>	Orange Striped Anemone
Ectoprocta	<i>Membranipora membranacea</i>	Lacy Crust Bryozoan
Porifera	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
Rhodophyceae	<i>Grateloupia turuturu</i>	Asian Red Seaweed
Rhodophyceae	<i>Lomentaria clavellosa</i>	Red Algae
Urochordata	<i>Styela clava</i>	Club Tunicate

<b>Urochordata</b>	<i>Didemnum vexillum</i>	Colonial Sea-squirt
<b>Urochordata</b>	<i>Ascidella aspersa</i>	European Sea-squirt
<b>Urochordata</b>	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate

**Table 23: Cryptogenic species recorded at *Rowes Wharf* during the 2010 RAS**

<b>Phylum/Division</b>	<b>Species</b>	<b>Common Name/Description</b>
<b>Annelida</b>	<i>Harmothoe imbricata</i>	Fifteen-scaled worm
<b>Annelida</b>	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
<b>Cnidaria</b>	<i>Laomedea calceolifera</i>	Hydroid
<b>Cnidaria</b>	<i>Obelia dichotoma</i>	Sea Thread Hydroid
<b>Cnidaria</b>	<i>Obelia geniculata</i>	Knotted Thread Hydroid
<b>Cnidaria</b>	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
<b>Ectoprocta</b>	<i>Bowerbankia imbricata</i>	Stoloniferous (Plant-like) Bryozoan
<b>Ectoprocta</b>	<i>Bugula simplex</i>	Fan Bugula
<b>Ectoprocta</b>	<i>Bugula stolonifera</i>	Stoloniferous (Plant-like) Bryozoan
<b>Ectoprocta</b>	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
<b>Ectoprocta</b>	<i>Electra pilosa</i>	Hairy Sea-mat
<b>Urochordata</b>	<i>Ciona intestinalis</i>	Sea Vase

## **12. South Odiorne Point, Rye, New Hampshire**

*July 29, 2010, 08:00*

This rocky shore site was located just south of Odiorne State Park on the longest stretch of undeveloped land on the New Hampshire coast. Large sheltered tide pools and adjacent salt marshes provide extensive habitat for a diverse array of marine species. Thirty-three species were found during the 2010 RAS including three cryptogenic and five non-native species.

**Table 24: Non-native species recorded at *South Odiorne Point* during the 2010 RAS**

<b>Phylum/Division</b>	<b>Species</b>	<b>Common Name/Description</b>
<b>Arthropoda</b>	<i>Carcinus maenas</i>	European Green Crab
<b>Arthropoda</b>	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
<b>Mollusca</b>	<i>Littorina littorea</i>	European Periwinkle
<b>Rhodophyceae</b>	<i>Bonnemaisonia hamifera</i>	Filamentous Red Algae
<b>Rhodophyceae</b>	<i>Neosiphonia harveyi</i>	Red Algae
<b>Urochordata</b>	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
<b>Urochordata</b>	<i>Botryllus schlosseri</i>	Star Tunicate
<b>Urochordata</b>	<i>Didemnum vexillum</i>	Colonial Sea-squirt

**Table 25: Cryptogenic species recorded at *South Odiorne Point* during the 2010 RAS**

<b>Phylum/Division</b>	<b>Species</b>	<b>Common Name/Description</b>
<b>Annelida</b>	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
<b>Cnidaria</b>	<i>Dynamena pumila</i>	Sea Oak Hydroid
<b>Cnidaria</b>	<i>Obelia geniculata</i>	Knotted Thread Hydroid

**13. Hampton River Marina: Hampton State Pier, Hampton, New Hampshire**

July 29, 2010 10:00 (<http://www.hamptonrivermarina.com/>)

Hampton River Marina is located within the Piscataqua River Estuary and is part of the Hampton Beach State Park. The Marina features 144 boat slips with floating docks and wooden pilings. The fouling community was composed of mussels, barnacles and ascidians. Eighty species were found here, eleven of which were non-native and twelve cryptogenic.

**Table 26: Non-native species recorded at Hampton River Marina during 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
Arthropoda	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Arthropoda	<i>Praunus flexuosus</i>	Opossum Shrimp
Mollusca	<i>Littorina littorea</i>	European Periwinkle
Phaeophyceae	<i>Melanosiphon intestinalis</i>	Brown algae
Porifera	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Rhodophyceae	<i>Lomentaria clavellosa</i>	Red Algae
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate

**Table 27: Cryptogenic species recorded at Hampton River Marina during 2010 RAS**

Phylum/Division	Species	Common Name/Description
Annelida	<i>Harmothoe imbricata</i>	Fifteen-scaled worm
Annelida	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
Cnidaria	<i>Obelia dichotoma</i>	Sea Thread Hydroid <i>Obelia dichotoma</i>
Cnidaria	<i>Obelia geniculata</i>	Knotted Thread Hydroid
Cnidaria	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
Ectoprocta	<i>Bowerbankia imbricata</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Bugula stolonifera</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
Ectoprocta	<i>Electra pilosa</i>	Hairy Sea-mat
Mollusca	<i>Cuthona gymnota</i>	Sea Slug
Mollusca	<i>Tenellia adpersa</i>	Miniature Aeolis
Porifera	<i>Leucosolenia botryoides</i>	Orange Pipe Sponge

**14. University of New Hampshire (UNH) Coastal Marine Lab, Newcastle, New Hampshire**

July 29, 2010, 13:15 (<http://marine.unh.edu/facilities/labs/cml.html>)

Located at historic Fort Constitution in New Castle, N.H., at the mouth of Portsmouth Harbor, the Coastal Marine Lab provides UNH faculty and students with access to the open waters of the Gulf of Maine and laboratory facilities with full strength seawater capabilities. The lab features a new 325' research pier and dock that provide essential berth space for the UNH fleet of research vessels and shelter for experimental enclosures located under the fixed pier. The fouling community was composed of a mussel base supporting ascidians, barnacles and sponges. Ninety species were recorded here including ten non-natives and eleven cryptogenic species.

**Table 28: Non-native species recorded at UNH Coastal Marine Lab during 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Arthropoda	<i>Praunus flexuosus</i>	Opossum Shrimp
Ectoprocta	<i>Membranipora membranacea</i>	Lacy Crust Bryozoan
Mollusca	<i>Littorina littorea</i>	European Periwinkle
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Urochordata	<i>Didemnum vexillum</i>	Colonial Sea-squirt
Urochordata	<i>Styela clava</i>	Club Tunicate
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate

**Table 29: Cryptogenic species recorded at UNH Coastal Marine Lab during 2010 RAS**

Phylum/Division	Species	Common Name/Description
Annelida	<i>Harmothoe imbricata</i>	Fifteen-scaled worm
Annelida	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
Cnidaria	<i>Obelia dichotoma</i>	Sea Thread Hydroid
Cnidaria	<i>Obelia geniculata</i>	Knotted Thread Hydroid
Cnidaria	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
Cnidaria	<i>Dynamena pumila</i>	Sea Oak Hydroid
Ectoprocta	<i>Bugula simplex</i>	Fan Bugula
Ectoprocta	<i>Electra pilosa</i>	Hairy Sea-mat
Mollusca	<i>Cuthona gymnota</i>	Sea Slug
Mollusca	<i>Tenellia adspersa</i>	Miniature Aeolis
Urochordata	<i>Ciona intestinalis</i>	Vase Tunicate

**15. Winter Island, Salem, Massachusetts**

July 30, 2010, 08:15 (<http://www.salemweb.com/winterisland/>)

Winter Island is a Marine Recreational Park located on Salem's eastern end at the mouth of Salem Harbor. The park features a public beach and a rocky intertidal shore that look out over the busy shipping lanes of Salem Sound. Sixty-eight species were found here, of which eleven were non-native and six were cryptogenic.

**Table 30: Non-native species recorded at Winter Island during 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Arthropoda	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
Ectoprocta	<i>Alcyonidium sp.</i>	Encrusting Bryozoan
Mollusca	<i>Littorina littorea</i>	European Periwinkle
Rhodophyceae	<i>Bonnemaisonia hamifera</i>	Red Algae
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Urochordata	<i>Ascidella aspersa</i>	European Sea-squirt
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate
Urochordata	<i>Didemnum vexillum</i>	Colonial Sea-squirt
Urochordata	<i>Styela clava</i>	Club Tunicate

**Table 31: Cryptogenic species recorded at *Winter Island* during 2010 RAS**

Phylum/Division	Species	Common Name/Description
Annelida	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
Cnidaria	<i>Dynamena pumila</i>	Sea Oak Hydroid
Cnidaria	<i>Obelia dichotoma</i>	Sea Thread Hydroid
Ectoprocta	<i>Bowerbankia imbricata</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Electra pilosa</i>	Hairy Sea-mat
Urochordata	<i>Ciona intestinalis</i>	Sea Vase

**16. Hawthorne Cove Marina (HCM), Salem, Massachusetts**

July 30, 2010, 10:00 (<http://www.hawthornecove.com/>)

Hawthorne Cove Marina, part of the historic Salem shipping port, features a floating dock system with 100 boat slips. The marina is located near a power plant and may be under the influence of a thermal plume. The fouling community includes a mussel base supporting ascidians and anemones, including *Sagartia elegans* which is unique to this site. The European prawn *Palaemon elegans* was discovered here during the 2010 RAS. This is the first record of this species in North America. In total, sixty-nine species were recorded including seventeen non-native and twelve cryptogenic species.

**Table 32: Non-native species recorded at *Hawthorne Cove Marina* during 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Palaemon elegans</i>	European Rock Pool Shrimp
Arthropoda	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Arthropoda	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
Arthropoda	<i>Praunus flexuosus</i>	Opossum Shrimp
Cnidaria	<i>Diadumene lineata</i>	Orange Striped Anemone
Cnidaria	<i>Sagartia elegans</i>	Purple Anemone
Ectoprocta	<i>Bugula neritina</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Membranipora membranacea</i>	Lacy Crust Bryozoan
Chlorophyceae	<i>Codium fragile ssp. fragile</i>	Green Fleece
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Urochordata	<i>Asciella aspersa</i>	European Sea-squirt
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate
Urochordata	<i>Didemnum vexillum</i>	Colonial Sea-squirt
Urochordata	<i>Diplosoma listerianum</i>	Compound Sea-squirt
Urochordata	<i>Styela clava</i>	Club Tunicate

**Table 33: Cryptogenic species recorded at *Hawthorne Cove Marina* during 2010 RAS**

Phylum/Division	Species	Common Name/Description
Annelida	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
Annelida	<i>Harmothoe imbricata</i>	Fifteen-scale Worm
Cnidaria	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
Cnidaria	<i>Obelia dichotoma</i>	Sea Thread Hydroid
Ectoprocta	<i>Electra pilosa</i>	Hairy Sea-mat
Ectoprocta	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
Ectoprocta	<i>Bugula stolonifera</i>	Stoloniferous (Plant-like) Bryozoan

<b>Ectoprocta</b>	<i>Bugula simplex</i>	Fan Bugula
<b>Ectoprocta</b>	<i>Bowerbankia gracilis</i>	Stoloniferous (Plant-like) Bryozoan
<b>Mollusca</b>	<i>Placida dendritica</i>	Sea Slug
<b>Porifera</b>	<i>Leucosolenia botryoides</i>	Orange Pipe Sponge
<b>Urochordata</b>	<i>Ciona intestinalis</i>	Sea Vase

### 17. Jodrey State Pier, Gloucester, Massachusetts

July 30, 2010, 13:15 (www.massdevelopment.com/jodrey-state-pier/)

In 1993, Jodrey State Pier, was renovated to accommodate modern fishing vessels and a new fish processing plant. Facilities at the pier include a 54 slip marina for boats up to 100 feet in length, three berths for ships up to 145 feet in length, a 5,000-square-foot office building, a 50,000-square-foot fish processing facility, and a 40,000-square-foot freezer facility. The fouling community is composed of a mussel base with rich ascidian cover. Seventy-two species were recorded in 2010, including twelve non-natives and thirteen cryptogenic species.

**Table 34: Non-native species recorded at Gloucester State Pier during 2010 RAS**

Phylum/Division	Species	Common Name/Description
<b>Arthropoda</b>	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
<b>Arthropoda</b>	<i>Carcinus maenas</i>	European Green Crab
<b>Arthropoda</b>	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
<b>Ectoprocta</b>	<i>Membranipora membranacea</i>	Lacy Crust Bryozoan
<b>Mollusca</b>	<i>Littorina littorea</i>	European Periwinkle
<b>Rhodophyceae</b>	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
<b>Porifera</b>	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
<b>Urochordata</b>	<i>Asciella aspersa</i>	European Sea-squirt
<b>Urochordata</b>	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
<b>Urochordata</b>	<i>Botryllus schlosseri</i>	Star Tunicate
<b>Urochordata</b>	<i>Diplosoma listerianum</i>	Compound Sea-squirt
<b>Urochordata</b>	<i>Styela clava</i>	Club Tunicate

**Table 35: Cryptogenic species recorded at Gloucester State Pier during 2010 RAS**

Phylum/Division	Species	Common Name/Description
<b>Annelida</b>	<i>Harmothoe imbricata</i>	Fifteen-scaled worm
<b>Annelida</b>	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
<b>Cnidaria</b>	<i>Laomedea calceolifera</i>	Hydroid
<b>Cnidaria</b>	<i>Obelia dichotoma</i>	Sea Thread Hydroid
<b>Cnidaria</b>	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
<b>Ectoprocta</b>	<i>Bowerbankia gracilis</i>	Stoloniferous (Plant-like) Bryozoan
<b>Ectoprocta</b>	<i>Bugula simplex</i>	Fan Bugula
<b>Ectoprocta</b>	<i>Bugula stolonifera</i>	Stoloniferous (Plant-like) Bryozoan
<b>Ectoprocta</b>	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
<b>Ectoprocta</b>	<i>Electra pilosa</i>	Hairy Sea-mat
<b>Porifera</b>	<i>Leucosolenia botryoides</i>	Orange Pipe Sponge
<b>Porifera</b>	<i>Sycon ciliatum</i>	Sponge
<b>Urochordata</b>	<i>Ciona intestinalis</i>	Sea Vase

### 18. Dyer Cove, Cape Elizabeth, Maine

July 31, 2010, 08:30 (<http://www.gsmmaine.org/>)

Dyer Cove is a rocky intertidal inlet located along the shore of Maine's, Casco Bay. One hundred species were found here including eleven non-native and six cryptogenic species.

**Table 36: Non-native species recorded at Dyer Cove during 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Arthropoda	<i>Hemigrapsus sanguineus</i>	Asian Shore Crab
Mollusca	<i>Littorina littorea</i>	European Periwinkle
Chlorophyceae	<i>Codium fragile ssp. fragile</i>	Green Fleece
Rhodophyceae	<i>Bonnemaisonia hamifera</i>	Red Algae
Rhodophyceae	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
Porifera	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
Urochordata	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
Urochordata	<i>Botryllus schlosseri</i>	Star Tunicate
Urochordata	<i>Didemnum vexillum</i>	Colonial Sea-squirt
Urochordata	<i>Diplosoma listerianum</i>	Compound Sea-squirt

**Table 37: Cryptogenic species recorded at Dyer Cove during 2010 RAS**

Phylum/Division	Species	Common Name/Description
Cnidaria	<i>Dynamena pumila</i>	Sea Oak Hydroid
Cnidaria	<i>Obelia dichotoma</i>	Sea Thread Hydroid
Ectoprocta	<i>Bowerbankia imbricata</i>	Stoloniferous (Plant-like) Bryozoan
Ectoprocta	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
Ectoprocta	<i>Electra pilosa</i>	Hairy Sea-mat
Porifera	<i>Leucosolenia sp.</i>	Orange Pipe Sponge

### 19. Spring Point Marina, South Portland, Maine

July 31, 2010, 10:15 (<http://www.portharbormarine.com>)

Located at the entrance of Portland Harbor and the mouth of the Fore River, Spring Point Marina is Maine's largest full-service marina. Portland Harbor, like many urban areas, suffers from the impacts of past activities including papermaking, gasworks, tanning and metal working. Toxic pollutants including heavy metals have persisted in the harbor sediment and nutrient loading from storm water outfalls impact water quality. Seventy-eight species were found here during the 2010 RAS including nine non-native and twelve cryptogenic species.

**Table 38: Non-native species recorded at Spring Point Marina during 2010 RAS**

Phylum/Division	Species	Common Name/Description
Arthropoda	<i>Praunus flexuosus</i>	Opossum Shrimp
Arthropoda	<i>Caprella mutica</i>	Japanese Skeleton Shrimp
Arthropoda	<i>Carcinus maenas</i>	European Green Crab
Cnidaria	<i>Diadumene lineata</i>	Orange Striped Anemone
Ectoprocta	<i>Membranipora membranacea</i>	Lacy Crust Bryozoan
Porifera	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
Urochordata	<i>Ascidella aspersa</i>	European Sea-squirt

<b>Urochordata</b>	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
<b>Urochordata</b>	<i>Botryllus schlosseri</i>	Star Tunicate

**Table 39: Cryptogenic species recorded at *Spring Point Marina* during 2010 RAS**

<b>Phylum/Division</b>	<b>Species</b>	<b>Common Name/Description</b>
<b>Ectoprocta</b>	<i>Bowerbankia imbricata</i>	Stoloniferous (Plant-like) Bryozoan
<b>Urochordata</b>	<i>Ciona intestinalis</i>	Sea Vase
<b>Ectoprocta</b>	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
<b>Cnidaria</b>	<i>Dynamena pumila</i>	Sea Oak Hydroid
<b>Ectoprocta</b>	<i>Electra pilosa</i>	Hairy Sea-mat
<b>Annelida</b>	<i>Harmothoe imbricata</i>	Fifteen-scale Worm
<b>Annelida</b>	<i>Lepidonotus squamatus</i>	Rusty Scaleworm
<b>Porifera</b>	<i>Leucosolenia botryoides</i>	Orange Pipe Sponge
<b>Cnidaria</b>	<i>Obelia dichotoma</i>	Sea Thread Hydroid
<b>Cnidaria</b>	<i>Obelia geniculata</i>	Knotted Thread Hydroid
<b>Cnidaria</b>	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
<b>Porifera</b>	<i>Sycon sp.</i>	Sponge

## **20. Brewers Marina, South Freeport, Maine**

July 31, 2010, 13:30

A relatively large marina, located on the banks of the Harraseeket River on the edge of Casco Bay, Brewer South Freeport Marine served historically as a ship building port. The marina provides 15 moorings and 100 boat slips with dockside depths of 14 feet, while serving as a premier yacht yard, focusing on maintenance, repair, and restoration of commercial, recreational, and competitive yachts. Sixty-seven species including six non-native and ten cryptogenic species were found here during the 2010 RAS.

**Table 40: Non-native species recorded at *Brewers Marina* during 2010 RAS**

<b>Phylum/Division</b>	<b>Species</b>	<b>Common Name/Description</b>
<b>Arthropoda</b>	<i>Carcinus maenas</i>	European Green Crab
<b>Ectoprocta</b>	<i>Membranipora membranacea</i>	Lacy Crust Bryozoan
<b>Rhodophyceae</b>	<i>Neosiphonia harveyi</i>	Filamentous Red Algae
<b>Porifera</b>	<i>Halichondria bowerbanki</i>	Bread Crumb Sponge
<b>Urochordata</b>	<i>Botrylloides violaceus</i>	Orange Sheath Tunicate
<b>Urochordata</b>	<i>Botryllus schlosseri</i>	Star Tunicate

**Table 41: Cryptogenic species recorded at *Brewers Marina* during 2010 RAS**

<b>Phylum/Division</b>	<b>Species</b>	<b>Common Name/Description</b>
<b>Annelida</b>	<i>Harmothoe imbricata</i>	Fifteen-scale Worm
<b>Cnidaria</b>	<i>Obelia dichotoma</i>	Sea Thread Hydroid
<b>Cnidaria</b>	<i>Obelia geniculata</i>	Knotted Thread Hydroid
<b>Cnidaria</b>	<i>Obelia longissima</i>	Bushy Wine-glass Hydroid
<b>Ectoprocta</b>	<i>Bugula simplex</i>	Fan Bugula
<b>Ectoprocta</b>	<i>Cryptosula pallasiana</i>	Encrusting Bryozoan
<b>Ectoprocta</b>	<i>Electra pilosa</i>	Hairy Sea-mat
<b>Mollusca</b>	<i>Cuthona gymnota</i>	Sea Slug
<b>Mollusca</b>	<i>Tenellia adpersa</i>	Miniature Aeolis
<b>Urochordata</b>	<i>Ciona intestinalis</i>	Sea Vase

**Table 42: List of the 29 non-native marine species identified during the 2010 Rapid Assessment Survey. National Estuary Program abbreviations: Narragansett Bay Estuary Program =NBEP; Buzzards Bay Program =BBP; Mass. Bays Program = MBP; Piscataqua Region Estuaries = PREP; Casco Bay Estuary Partnership = CBEP. Prevalence = number of sites where species was recorded/total number of sites.**

<b>Taxonomic Species</b>	<b>NBEP</b>	<b>BBP</b>	<b>MBP</b>	<b>PREP</b>	<b>CBEP</b>	<b>Number of Sites Present</b>	<b>Percent Prevalence</b>
<b>Chlorophyceae:</b>							
<i>Codium fragile ssp. fragile</i>	x	x	x		x	9	45%
<b>Rhodophyceae:</b>							
<i>Bonnemaisonia hamifera</i>			x	x	x	3	15%
<i>Gracilaria vermiculophylla</i>	x					2	10%
<i>Grateloupia turuturu</i>	x	x	x			6	30%
<i>Heterosiphonia japonica</i>	x					2	10%
<i>Lomentaria clavellosa</i>		x	x			3	15%
<i>Lomentaria orcadensis</i>			x			1	5%
<i>Neosiphonia harveyi</i>	x	x	x	x	x		95%
<b>Phaeophyceae:</b>							
<i>Melanosiphon intestinalis</i>				x		1	5%
<b>Porifera:</b>							
<i>Halichondria bowerbanki</i>	x	x	x	x	x	14	70%
<b>Cnidaria:</b>							
<i>Diadumene lineata</i>	x	x	x		x	11	55%
<i>Sagartia elegans</i>			x			1	5%
<b>Mollusca:</b>							
<i>Littorina littorea</i>	x		x	x	x	6	30%
<b>Arthropoda: Amphipoda</b>							
<i>Caprella mutica</i>	x	x	x	x	x	13	65%
<b>Arthropoda: Sessilia</b>							
<i>Chthamalus fragilis</i>	x					1	5%
<b>Arthropoda: Mysidacea</b>							
<i>Praunus flexuosus</i>	x		x	x	x	5	25%
<b>Arthropoda: Decapoda</b>							
<i>Carcinus maenas</i>	x	x	x	x	x	16	80%
<i>Hemigrapsus sanguineus</i>	x	x	x		x	14	70%
<i>Palaemon elegans</i>			x			1	5%
<b>Ectoprocta:</b>							
<i>Alcyonidium sp.</i>			x			1	5%
<i>Bugula neritina</i>	x	x	x			4	20%
<i>Membranipora membranacea</i>	x		x	x		8	40%
<b>Urochordata:</b>							
<i>Didemnum vexillum</i>	x	x	x	x	x	13	65%
<i>Diplosoma listerianum</i>	x	x	x			7	35%
<i>Asciidiella aspersa</i>		x	x		x	10	50%
<i>Botrylloides violaceus</i>	x	x	x	x	x	20	100%
<i>Botryllus schlosseri</i>	x	x	x	x	x	20	100%
<i>Styela canopus</i>		x			x	2	10%
<i>Styela clava</i>	x	x	x	x	x	13	65%
<b>Total Species/Region</b>	<b>21</b>	<b>17</b>	<b>24</b>	<b>13</b>	<b>16</b>	<b>-</b>	<b>-</b>

**Table 43: List of the 26 cryptogenic [1] marine species identified during the 2010 Rapid Assessment Survey. Narragansett Bay Estuary Program =NBEP; Buzzards Bay Program = BBP; Massachusetts Bays Program = MBP; Piscataqua Region Estuaries Partnership = PREP; Casco Bay Estuary Partnership = CBEP [1]**

Taxonomic Species	NBEP	BBP	MBP	PREP	CBEP	Number of Sites Present	Percent Prevalence
<b>Polychaeta:</b>							
<i>Lepidonotus squamatus</i>	x	x	x	x	x	14	70%
<i>Harmothoe imbricate</i>	x	x	x	x	x	15	75%
<b>Ectoprocta:</b>							
<i>Amathia vidovici</i>		x				2	10%
<i>Bowerbankia gracilis</i>	x	x	x		x	6	30%
<i>Bowerbankia imbricata</i>	x	x		x	x	9	45%
<i>Bugula stolonifera</i>	x	x	x	x		10	50%
<i>Bugula simplex</i>	x	x	x	x	x	12	60%
<i>Conopeum reticulum</i>	x					1	5%
<i>Electra pilosa</i>	x	x	x	x	x	14	70%
<i>Cryptosula pallasiana</i>	x	x	x	x	x	15	75%
<b>Cnidaria:</b>							
<i>Ectopleura larynx</i>				x		1	5%
<i>Halecium halecinum</i>		x				1	5%
<i>Pennaria disticha</i>	x					1	5%
<i>Gonothyrea loveni</i>		x	x			2	10%
<i>Clytia hemisphaerica</i>	x	x				3	15%
<i>Laomedea calceolifera</i>	x	x	x			4	20%
<i>Dynamena pumila</i>			x	x	x	6	30%
<i>Obelia geniculata</i>	x	x	x	x	x	8	40%
<i>Obelia longissima</i>	x	x	x	x	x	13	65%
<i>Obelia dichotoma</i>	x	x	x	x	x	15	75%
<b>Mollusca:</b>							
<i>Placida dendritica</i>	x		x			2	10%
<i>Tenellia adspersa</i>				x	x	3	15%
<i>Cuthona gymnota</i>				x	x	4	20%
<b>Porifera:</b>							
<i>Sycon sp.</i>	x				x	4	20%
<i>Leucosolenia sp.</i>	x	x	x	x	x	11	55%
<b>Urochordata:</b>							
<i>Ciona intestinalis</i>	x	x	x	x	x	12	60%
<b>Total Species/Region</b>	20	18	18	16	16	-	-

Table 44: Water Quality Data was collected using compact sondes (YSI 600XLM and YSI 55) as well as a secchi disk. Measurements were collected at the surface only at rocky shore sites (RS).

SITE	Max Depth (m)	Surface Temp (°C)	Surface Dissolved O <sub>2</sub> [mg/L]	Surface Salinity (ppt.)	Max Depth Temp (°C)	Max Depth Dissolved O <sub>2</sub> [mg/L]	Max Depth Salinity (ppt.)	Secchi Depth (m)
Port Edgewood	3	25.56	8.29	25.13	25.36	6.44	25.42	0.75
Allen Harbor Marina	3.75	25.78	8.78	27.83	23.8	1.89	29.81	1.25
Point Judith Marina	1.5	25.51	8.64	30.25	25.1	7.92	30.37	1.5 (max)
F.L. Tripp & Son	3.1	21.6	6.90	31.33	21.62	6.59	31.4	2
Fort Adams	3	22.35	6.88	30.56	21.71	5.40	30.6	3 (max)
Kings Beach (RS)	n/a	21.44	12.77	31.18	n/a	n/a	n/a	n/a
Popes Island Marina	3.5	24.22	2.78	30.2	24.21	4.53	30.64	1.75
Mass. Maritime	4	22.51	7.16	30.62	22.54	7.24	30.58	3
Sandwich Marina	5	22.05	6.98	30.26	19.29	95.4	30.64	5 (max)
Brewers Plymouth	2.75	20.85	6.87	17.68	19.95	7.45	30.92	2
Rowes Wharf	6	19.26	7.41	30.63	17.4	7.04	30.76	2
South Odiorne (RS)	n/a	19.42	7.42	30.99	n/a	n/a	n/a	n/a
Hampton State Pier	1.75	19.89	6.64	31.05	18.58	6.16	31.01	4.40 (max)
UNH CML	5.75	17.03	8.02	30.48	15.24	8.20	30.76	3.5
Winter Island (RS)	n/a	18.33	7.95	30.84	n/a	n/a	n/a	n/a
Hawthorne Cove	2	19.67	7.66	31.31	18.59	6.64	31.31	2 (max)
Gloucester Fish Pier	5.25	19.25	6.64	31.17	12.34	7.72	31.23	2.75
Dyer Cove (RS)	n/a	15.32	10.08	30.24	n/a	n/a	n/a	n/a
Spring Point Marina	3	17.6	8.38	28.96	15.72	7.17	30.36	2.5
Brewers S. Freeport	3.25	17.69	7.76	30.73	17.19	7.70	30.85	1

**Table 45: The field team for the 2010 RAS included marine scientists with varying specialties.**

Participant Name	Specialty/ Role	Affiliation
<b>Field Team</b>		
Charles Lambert	Ascidians/ Species Identification	California State University, Fullerton
Gretchen Lambert	Ascidians/ Species Identification	California State University, Fullerton
James Carlton	General Taxonomy	Williams College-Mystic Seaport
Arthur Mathieson	Algae / Species Identification	University of New Hampshire
Niels Hobbs	Amphipods/ Species Identification	Salem Sound Coastwatch
Antonion Carlos Marques	Cnidarians / Species Identification	Universidade de Sao Paulo
Adriaan Gittenberger	Underwater Photographer/Species Identification	Leiden Bio Science Park
Walter Lambert	General Taxonomy / Species Identification	Framingham State University
Jenn Dijkstra	General Taxonomy/ Biomass Collection	Wells National Estuarine Research Reserve
Judy Pederson	Co-organizer/General taxonomy/logistics	MIT Sea Grant
Larry Harris	General taxonomy/Species Identification	University of New Hampshire
Lauren Stefaniak	Ascidians/ Species Identification	University of Connecticut
Cascade Sorte	Biomass/ Lab and Field Assistant	University of Massachusetts Boston
Adrienne Pappal	Co-organizer, Dockmaster / Logistics	MA Office of Coastal Zone Management
Sara Grady	Water Quality, Annelid Identification	Mass Bays Program
Jan Smith	Co-organizer/ Logistics	MA Office of Coastal Zone Management
Linsey Haram	Shrimp/ Lab and Field Assistant	Williams College-Mystic Seaport
Miranda Mickiewicz	Shrimp / Lab and Field Assistant	Williams College-Mystic Seaport
Rachel Rock-Blake	Barnacles/ Lab and Field Assistant	Williams College-Mystic Seaport
Christopher McIntyre	Lab, Field Assistant/ Data Analysis, Reporting	University of Massachusetts Boston
Martine Wagstaff	Biomass/ Lab and Field Assistant	University of Massachusetts Boston
Jessica Bryant	Biomass/ Lab and Field Assistant	University of New Hampshire
Yvette Garner	Biomass/ Lab and Field Assistant	
Renée Eriksen	Algae/ Lab and Field Assistant	University of New Hampshire
Megan McCuller	Biomass/ Lab and Field Assistant	University of New Hampshire
<b>Support Team</b>		
Greg Booma	Data Management	MIT Sea Grant
Kevin Cute	Logistics/ RI	RI Coastal Resources Management Council
Curtis Bohlen	Logistics/ NH	Casco Bay Estuary Program
Beverly Bayley-Smith	Logistics/ ME	Casco Bay Estuary Program
Tracy Warnke	Logistics/ Buzzards Bay, MA	Buzzards Bay Estuary Program
Barbara Warren	Logistics/ Salem Sound, MA	Salem Sound Coastwatch
Jay Baker	Logistics/ MA	Mass Bays Program
Michel Trembly	Logistics/ finance	Northeast Aquatic Nuisance Species Panel

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