**Marine Invaders in the Northeast: Rapid Assessment Survey of non-native and native marine species of floating dock communities, July 2007.**

The 2007 Rapid Assessment Survey (RAS) began in Buzzards Bay, Massachusetts on July 24 and was completed in Rockland, Maine on July 30. Seventeen coastal sites in Massachusetts, New Hampshire and Maine were surveyed, twelve of which were located within four National Estuary Program (NEP) study areas. The following NEPs were included in the study: Buzzards Bay Estuary Program, Massachusetts; Massachusetts Bays Program, Massachusetts; Piscataqua Region Estuaries Partnership, New Hampshire; Casco Bay Estuary Partnership, Maine. In all, twenty-five non-native marine species were recorded. Sampling locations are listed below, from south to north. Each listing includes sampling date, time (usually one hour sampling per site), a brief site description and the non-native species found at each location.

1. ***Marine Biological Laboratory (MBL), Falmouth, Massachusetts***

*July 24, 2007 14:00 (http://www.mbl.edu/)*

The Woods Hole Marine Biological Laboratory, located in the study area of the Buzzards Bay Estuary Program (BBP), features a small dock on Eel Pond. The pond is relatively small, with an estimated area of 486 square meters and a maximum depth of 5 meters. Eel Pond serves as a protected harbor for numerous boats and can be accessed only via a narrow waterway under the Water St. drawbridge. The 2007 RAS recorded thirty-five total species, seven of which were non-native. (Note: this site was sampled without the entire field team).

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| **Ascidians**  *Ascidiella aspersa*  *Botrylloides violaceus*  *Botryllus schlosseri*  *Didemnum vexillum*  *Styela clava* | **Crustaceans**  *Carcinus maenas*  *Hemigrapsus sanguineus* |

1. ***Woods Hole Coast Guard (WHC). Falmouth, Massachusetts***

*July 24, 2007 14:30 (http://www.uscg.mil/d1)*

This Coast Guard Station, opened in 1857, operates as a year-round marina maintaining aids to navigation and supporting marine safety, national defense and pollution control. Thirty-seven total species and eleven non-natives were found here during the 2007 RAS. (Note: this site was sampled without the entire field team).

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| **Ascidians**  *Ascidiella aspersa Botrylloides violaceus Botryllus schlosseri Didemnum vexillum Styela clava* | **Crustaceans**  *Caprella mutica*  *Carcinus maenas*  *Hemigrapsus sanguineus*  *Ianiropsis sp* | **Worms**  *Janua (Dexiospira) pagenstecheri* | **Algae**  *Codium fragile fragile* |

1. ***Sandwich Marina, Sandwich, Massachusetts***

*July 25, 2007 10:00 (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. Thirteen non-native species were found here during the 2007 RAS. The total number of species found was ninety.

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| **Ascidians**  *Ascidiella aspersa*  *Botrylloides violaceus*  *Botryllus schlosseri* *Didemnum vexillum Styela clava* | **Crustaceans**  *Carcinus maenas* | **Algae**  *Bonnemaisonia hamifera*  *Codium fragile fragile*  *Grateloupia turuturu*  *Neosiphonia harveyi* |
| **Bryozoans**  *Membranipora membranacea* | **Sponges**  *Halichondria bowerbanki* | **Anenome**  *Diadumene lineata* |

1. ***Massachusetts Maritime Academy (MMA), Buzzards Bay, Massachusetts***

*July 25, 2007 12:30 (http://www.maritime.edu/)*

The Massachusetts Maritime Academy is located within the Buzzards Bay NEP study area 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 2007 RAS recorded ninety-five species including sixteen non-natives.

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| **Ascidians**  *Ascidiella aspersa*  *Botrylloides violaceus*  *Botryllus schlosseri*  *Didemnum vexillum*  *Styela clava* | **Crustaceans**  *Caprella mutica*  *Carcinus maenas*  Hemigrapsus sanguineus  *Ianiropsis sp.* | **Worms**  *Janua (Dexiospira) pagenstecheri* |
| **Algae**  *Bonnemaisonia hamifera*  *Codium fragile fragile*  *Grateloupia turuturu*  *Neosiphonia harveyi* | **Bryozoans**  *Membranipora membranacea* | **Sponges**  Halichondria bowerbanki |

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

*July 26, 2007 09:30 (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. Of the seventy-eight species recorded here in 2007, ten were non-native.

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| **Ascidians**  *Ascidiella aspersa*  *Botrylloides violaceus*  *Botryllus schlosseri*  *Styela clava* | **Crustaceans**  *Caprella mutica*  *Carcinus maenas* | **Algae**  *Grateloupia turuturu*  *Neosiphonia harveyi* |
| **Bryozoans**  *Membranipora membranacea* | **Sponges**  *Halichondria bowerbanki* |  |

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

*July 26, 2007 12:30 (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. Previous records for the marina demonstrated a highly diverse floating dock community. The 2007 RAS reported eighty-eight total species. Sixteen non-native species were found including the purple anemone, *Sagartia elegans,* which was unique to this site.

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| **Ascidians**  *Ascidiella aspersa*  *Botrylloides violaceus*  *Botryllus schlosseri*  *Diplosoma listerianum*  *Styela clava* | **Crustaceans**  *Caprella mutica*  *Carcinus maenas*  *Ianiropsis sp.*  *Praunus flexuosus* | **Algae**  *Codium fragile fragile*  *Neosiphonia harveyi* |
| **Bryozoans**  *Bugula neritina*  *Membranipora membranacea* | **Sponges**  *Halichondria bowerbanki* | **Anenome**  *Diadumene lineata*  *Sagartia elegans* |

1. ***Gloucester Coast Guard Station, Gloucester, Massachusetts***

*July 26, 2007 14:00 (http://www.uscg.mil/d1)*

The Gloucester Coast Guard Station is located on the southwest portion of Cape Ann within the historic fishing port of Gloucester. Gloucester Harbor still maintains a vibrant commercial fishing industry. Twelve of the seventy-five total species recorded during the 2007 RAS were not native.

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| **Ascidians**  *Ascidiella aspersa Botrylloides violaceus Botryllus schlosseri Styela clava* | **Crustaceans**  *Caprella mutica*  *Carcinus maenas*  *Ianiropsis sp.*  *Praunus flexuosus* | **Algae**  *Melanosiphon intestinalis*  *Neosiphonia harveyi* |
| **Bryozoans**  *Membranipora membranacea* | **Sponges**  *Halichondria bowerbanki* |  |

1. ***Wentworth By The Sea Marina, Newcastle, New Hampshire***

*July 27, 2007 08:30 (http://www.wentworthmarina.com/)*

Wentworth by the Sea Marina is located on Little Harbor east of Portsmouth, NH. The town of Newcastle is situated at the mouth of the Piscatacua River and the entrance to the Great Bay Estuary. The marina maintains four docks with 170 boat slips as well as a fuel dock. Ten non-native species were recorded during the 2007 RAS, eighty-eight species were found in total.

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| **Ascidians**  *Botrylloides violaceus*  *Botryllus schlosseri*  *Styela clava* | **Crustaceans**  *Caprella mutica Carcinus maenas Praunus flexuosus* | **Algae**  *Neosiphonia harveyi* |
| **Bryozoans**  *Membranipora membranacea* | **Sponges**  *Halichondria bowerbanki* | **Mollusks**  *Littorina littorea* |

1. ***Hampton River Marina: Hampton State Pier (HSP), Hampton, New Hampshire***

*July 27, 2007 10:30 (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 total number of species found here was seventy-eight, eleven of which were non-native.

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| **Ascidians**  *Ascidiella aspersa*  *Botrylloides violaceus*  *Botryllus schlosseri*  *Styela canopus* | **Crustaceans**  *Caprella mutica*  *Carcinus maenas*  *Praunus flexuosus* | **Algae**  *Neosiphonia harveyi* |
| **Bryozoans**  *Membranipora membranacea* | **Sponges**  *Halichondria bowerbanki* | **Mollusks**  *Littorina littorea* |

1. ***Wells Harbor, Wells, Maine***

*July 27, 2007 12:45 (http://www.wellstown.org/)*

This site is located at the mouth of the Webhannet River, just south of Kennebunk, Maine. Nearby marsh and beach areas provide nursery habitats for estuary-dependant species. Of the sixty-six species recorded here during the 2007 RAS, ten were non-native.

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| **Ascidians**  *Botrylloides violaceus*  *Botryllus schlosseri* | **Crustaceans**  *Carcinus maenas*  *Praunus flexuosus* | **Algae**  *Bonnemaisonia hamifera*  *Melanosiphon intestinalis*  *Neosiphonia harveyi* |
| **Bryozoans**  *Membranipora membranacea* | **Sponges**  *Halichondria bowerbanki* | **Hexapods**  Anurida maritime |

1. ***Spring Point Marina, South Portland, Maine***

*July 28, 2007 08:30 (http://www.portharbormarine.com/info.php?info\_id=42)*

Spring Point Marina, Maine’s largest full-service marina, hosts several fishing tournaments during the summer. With over 250 slips, Spring Point Marina can accommodate yachts up to 200 ft. in length. Eighty-two total species and eight non-native species were found here during the 2007 RAS.

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| **Ascidians**  *Ascidiella aspersa*  *Botrylloides violaceus Botryllus schlosseri Styela clava* | **Crustaceans**  *Caprella mutica*  *Carcinus maenas* | **Bryozoans**  *Membranipora membranacea* |
| **Sponges**  *Halichondria bowerbanki* |  |  |

1. ***Brewer South Freeport Marine (BFM), South Freeport, Maine***

*July 28, 2007 12:30 (http://www.byy.com/south%20freeport/index.cfm)*

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. Eighty–seven species and ten non-natives were found here during the 2007 RAS.

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| **Ascidians**  *Botrylloides violaceus*  *Botryllus schlosseri* | **Crustaceans**  *Caprella mutica*  *Carcinus maenas*  *Ianiropsis sp.*  *Praunus flexuosus* | **Algae**  *Neosiphonia harveyi* |
| **Bryozoans**  *Membranipora membranacea* | **Sponges**  *Halichondria bowerbanki* | **Molluscs**  *Littorina littorea* |

1. ***Maine Yacht Center, Portland, Maine***

*July 28, 2007 15:00 (http://www.maineyacht.com/)*

Maine Yacht Center is located at the mouth of the Presumpscot River within the Casco Bay Estuary. The marina features a 990 ft. dock with 80 boat slips for transient and recreational boaters. Of the sixty-seven species found here during the 2007 RAS, nine were non-natives.

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| **Ascidians**  *Ascidiella aspersa*  *Botrylloides violaceus*  *Botryllus schlosseri*  *Styela clava* | **Crustaceans**  *Carcinus maenas*  *Praunus flexuosus* | **Bryozoans**  *Membranipora membranacea* |
| **Sponges**  *Halichondria bowerbanki* | **Molluscs**  *Littorina littorea* |  |

1. ***Darling Marine Center, University of Maine, Walpole, Maine***

*July 29, 2007 11:00 (http://www.dmc.maine.edu)*

The Damariscotta River estuary is a tidally dominated embayment. During the 2007 RAS mussels, algae and ascidians were abundant on the floats. Eighty nine species were found in total and seven non-native species were recorded.

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| **Ascidians**  *Botrylloides violaceus*  *Botryllus schlosseri*  *Didemnum vexillum*  *Styela clava* | **Crustaceans**  *Caprella mutica* | **Bryozoans**  *Membranipora membranacea* |
| **Sponges**  *Halichondria bowerbanki* |  |  |
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1. ***Maine Department of Marine Resources Dock, West Boothbay, Maine***

*July 29, 14:00* (*http://www.maine.gov/dmr/library/)*

The Marine Resources Dock is part of the Bigelow Laboratory Facility and is located on Mckown Point in Boothbay Harbor. The facility maintains multiple wooden docks as well as microbiological and biotoxin laboratories, GIS mapping facilities, a wet lab, and a library. Eleven non-native species were found among seventy-eight total species.

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| **Ascidians**  *Botrylloides violaceus*  *Botryllus schlosseri*  *Didemnum vexillum*  *Styela clava* | **Crustaceans**  *Caprella mutica*  *Carcinus maenas*  *Ianiropsis sp.*  *Praunus flexuosus* | **Algae**  *Neosiphonia harveyi* |
| **Bryozoans**  *Membranipora membranacea* | **Sponges**  *Halichondria bowerbanki* |  |

1. ***Wayfarer Marine, Camden, Maine***

***July 30, 2007 10:00 (http://www.wayfarermarine.com/)***

The marina at this site was redesigned in 2006 at the head of Camden Harbor. The site features long piers with wooden pilings and floats for temporary dockage. Salinity and dissolved oxygen levels were lower than at any site visited during the 2007 RAS. Fifty-seven total species were found here, including seven non-natives.

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| **Ascidians**  *Botrylloides violaceus*  *Botryllus schlosseri* | **Crustaceans**  *Carcinus maenas*  *Ianiropsis sp.* | **Algae**  *Neosiphonia harveyi* |
| **Bryozoans**  *Membranipora membranacea* | **Mollusks**  *Littorina littorea* |  |

1. ***Journey’s End Marina, Rockland, Maine***

*July 30, 2007 11:30 (http://www.oharabait.com/marina.php)*

On the shores of Penobscot Bay in historic Rockland, Maine, Journey's End Marina offers 75 deep water slips with transient dockage for up to 225 ft. Mussels, kelp, ascidians, hydroids were found on the docks during the 2003 RAS. In 2007, nine non-natives were reported out of a total of eighty-two species.

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| **Ascidians**  *Botrylloides violaceus*  *Botryllus schlosseri*  *Styela clava* | **Crustaceans**  *Caprella mutica*  *Praunus flexuosus* | **Algae**  *Neosiphonia harveyi* |
| **Bryozoans**  *Membranipora membranacea* | **Sponges**  *Halichondria bowerbanki* | **Molluscs**  *Littorina littorea* |



Table 1. List of non-native marine species identified during the 2007 Rapid Assessment Survey. National Estuary Program abbreviations: Buzzards Bay Program = BBP; Massachusetts Bays Program = MBP; Piscataqua Region Estuaries Partnership = PREP; Casco Bay Estuary Partnership = CBEP. Wells Harbor and sites north of Casco Bay are also listed.

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| **Taxonomic Species** | | **BBP** | **MBP** | **PREP** | **Wells Harbor** | | **CBEP** | **North of CBEP** |
| **Chlorophyceae** | |  |  |  |  | |  |  |
| *Codium fragile* ssp. | | x | x |  |  | |  |  |
| **Rhodophyceae** | |  |  |  |  | |  |  |
| *Bonnemaisonia hamifera* | | x | x |  | x | |  |  |
| *Grateloupia turuturu* | | x | x |  |  | |  |  |
| *Neosiphonia harveyi* | | x | x | x | x | | x | x |
| **Phaecophycophyta** | |  |  |  |  | |  |  |
| *Melanosiphon intestinalis* | |  | x |  | x | |  |  |
| **Porfifera** | |  |  |  |  | |  |  |
| *Halichondria bowerbanki* | | x | x | x | x | | x | x |
| **Cnidaria** | |  |  |  |  | |  |  |
| *Diadumene lineata* | |  | x |  |  | |  |  |
| *Sagartia elegans* | |  | x |  |  | |  |  |
| **Polychaeta** | |  |  |  |  | |  |  |
| *Janua pagenstecheri* | | x |  |  |  | |  |  |
| **Mollusca: Gastropoda** | |  |  |  |  | |  |  |
| *Littorina littorea* | |  |  | x |  | | x | x |
| **Arthropoda: Isopoda** | |  |  |  |  | |  |  |
| *Ianiropsis sp.* | | x | x |  |  | | x | x |
| **Arthropoda: Amphipoda** | |  |  |  |  | |  |  |
| Ca*prella mutica* | | x | x | x |  | | x | x |
| **Arthropoda: Mysidacea** | |  |  |  |  | |  |  |
| *Praunus flexuosus* | |  | x | x | x | | x | x |
| **Arthropoda: Decapoda** | |  |  |  |  | |  |  |
| *Carcinus maenas* | | x | x | x | x | | x | x |
| *Hemigrapsus sanguineus* | | x |  |  |  | |  |  |
| **Arthropoda: Poduromorpha** | |  |  |  |  | |  |  |
| *Anurida maritima* | |  |  |  | x | |  |  |
| **Bryozoa** | |  |  |  |  | |  |  |
| *Bugula neritina* | |  | x |  |  | |  |  |
| *Membranipora membranacea* | | x | x | x | x | | x | x |
| **Urochordata: Tunicata** | |  |  |  |  | |  |  |
| *Didemnum vexillum* | | x | x |  |  | |  | x |
| *Diplosoma listerianum* | |  | x |  |  | |  |  |
| *Ascidiella aspersa* | | x | x | x |  | | x |  |
| *Botrylloides violaceus* | | x | x | x | x | | x | x |
| *Botryllus schlosseri* | | x | x | x | x | | x | x |
| *Styela canopus* | |  |  | x |  | |  |  |
| *Styela clava* | | x | x | x | x | | x | x |
| ***Total Species/ Region*** | | 16 | 20 | 12 | 11 | | 12 | 12 |
| Table 2. List of study participants, their affiliation and areas of interest. | | | | | | | | |
| **Participant Name** | **Affiliation** | | | | | **Area of Interest** | | | |
| ***Field Team*** |  | | | | |  | | | |
| Renee Bernier | Gulf Fisheries Centre | | | | | Fisheries and Oceans Canada | | | |
| Chris Boyko | Museum of Natural History | | | | | Div. of Invertebrate Zoology | | | |
| James Carlton | Williams College-Mystic Seaport | | | | | Ombudsman | | | |
| Jennifer Dijkstra | University of New Hampshire | | | | | Support, scientist | | | |
| Clinton Dawes | University of South Florida | | | | | University of South Florida | | | |
| Adriaan Gittenberger | National Museum of Natural History | | | | | Photographer | | | |
| Sara Grady | Massachusetts Bays Program | | | | | Water Quality | | | |
| Larry Harris | University of New Hampshire | | | | | Ombudsman, Lab | | | |
| Gretchen Lambert | University of Washington, Friday Lab | | | | | Tunicates | | | |
| Charles Lambert | University of Washington, Friday Lab | | | | | Tunicates | | | |
| Antonion Carlos Marques | University of Sao Paulo, Brazil | | | | | Cnidaria | | | |
| Arthur Mathieson | University of New Hampshire | | | | | Phycologist | | | |
| Judy Pederson | MIT Sea Grant College Program | | | | | Co-organizer | | | |
| Jan Smith | Mass Bays Estuary Program | | | | | Co-organizer | | | |
| Megan Tyrrell | Wells National Estuarine Research Reserve | | | | | Support, scientist | | | |
| Erica Westermann | University of New Hampshire | | | | | Dept. of Zoology | | | |
| Jason Williams | Hofstra University | | | | | Biologist | | | |
| ***Logistics/ Support Team*** |  | | | | |  | | | |
| Jay Baker | MA Coastal Zone Management | | | | | Data Management | | | |
| April Blakeslee | University of New Hampshire | | | | | New Hampshire | | | |
| Valerie Diamond | EPA | | | | | Logistics | | | |
| Becky Gladych | University of Connecticut | | | | | Support, scientist | | | |
| Peter Hanlon | Mass Bays Program | | | | | Support, scientist | | | |
| Lisa Martinielli | University of New Hampshire | | | | | Support, scientist | | | |
| Jeremy Miller | Wells National Estuarine Research Reserve | | | | | Support, scientist | | | |
| Adrienne Pappal | MA Coastal Zone Management | | | | | Data Management | | | |
| Michael Callahan | University of Southern Maine | | | | | USM Aquatic Systems Group | | | |
| Barbara Warren | Salem Sound Coastwatch | | | | | Logistics, Salem | | | |
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Table 3. Surface and maximum depth temperatures, dissolved oxygen, and salinity. nd = no data.

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| Locations | Surface  Temp  (ºC) | Max Depth  Temp  (ºC) | Surface  DO  (mg/L) | Max  DO  (mg/L) | Max  Salinity  (psu) |
| Woods Hole, Eel Pond | 23.4 | 22.9 | nd | nd | 31.0 |
| Woods Hole USCG Station | 24.0 | 24.2 | 8.53 | 5.42 | 31.1 |
| Sandwich Marina | 19.6 | 19.7 | 7.29 | 5.25 | 31.0 |
| Mass. Maritime Academy | 21.1 | 21.1 | 7.38 | 5.85 | 31.0 |
| Rowes Wharf | 19.1 | 19.1 | 8.88 | 6.49 | 30.6 |
| Hawthorne Cove Marina | 21.9 | 22.0 | 7.92 | 5.82 | 31.1 |
| Gloucester USCG Station | 21.5 | 21.5 | 7.79 | 5.71 | 30.7 |
| Wentworth Marina | 18.9 | 18.9 | 7.8 | 5.65 | 30.1 |
| Hampton State Pier | 20.3 | 20.3 | 6.74 | 5.23 | 30.5 |
| Wells Harbor | 21.1 | 21.2 | 7.94 | 6.03 | 30.4 |
| Spring Harbor Marina | 17.0 | 17.1 | 8.41 | 6.28 | 30.1 |
| Brewer South Freeport Marine | 23.2 | 26.2 | 7.26 | 5.10 | 30.8 |
| Maine Yacht Center | 18.9 | 18.9 | 8.21 | 6.00 | 28.7 |
| Darling Marine Center | 17.0 | 17.1 | 7.96 | 5.90 | 31.1 |
| Maine Dept. of Marine Resources | 19.3 | 19.44 | 8.84 | 6.62 | 31.2 |
| Wayfarer Marina | 20.0 | 20.1 | 6.11 | 4.92 | 10.8 |
| Journey's End Marina | 17.9 | 17.9 | 7.66 | 5.39 | 30.6 |