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A Different Sort of Invader: The Second Manatee to Visit Rhode Island

Robert D. Kenney
rkenney@uri.edu

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What's Inside...

Observations on the colonization of the invasive tunicate *Didemnum* sp.

BY LINDA A. AUKER AND CANDACE A. OVIATT

An invasive tunicate (Figure 1), referred to presently as *Didemnum* sp. (the organism has not yet been identified to species), has been observed in Narragansett Bay since 2000, when it was found at Coasters Harbor Island in Newport during a rapid assessment survey (Pederson et al. 2001). These tunicates, also called ascidians, have been observed at the University of Rhode Island (URI) Graduate School of Oceanography (GSO) dock since 2002, when Dr. Christopher Deacutis (URI) photographed the dock pilings and noticed *Didemnum* sp. colonizing the pilings above the low water line. *Didemnum* is considered a strong competitor with the ability to rapidly colonize a substrate (Coutts 2002), and it prefers hard substrate, like dock pilings, over soft sediment (Bullard et al. 2007).

The ecology of *Didemnum* sp. is poorly known, and the effects of its introduction to an ecosystem have not been studied in detail. There may be competition for space and food between *Didemnum* sp. and native species (Stachowicz 2004), especially the Blue Mussel (*Mytilus edulis*), a primary food source for important species in Narragansett Bay, e.g., Tautog and Common Eider (Olla et al. 1974). The tunicate frequently overgrows adult mussels, often to the point where the ability of the mussel to open its valves is restricted (personal observation). As part of a larger study of *Didemnum* sp. distribution in Narragansett Bay, we conducted a six-month study at the GSO dock in 2005. We compared *Didemnum* percent cover and recruitment timing to that of *M. edulis*, and also to two other colonial tunicates present in the bay, *Botrylloides violaceous* and *Botryllus schlosseri*.

Dr. Robert Whitlatch of the University of Connecticut has used 100-cm^2 polyvinyl chloride (PVC) panels attached to PVC pipes suspended from floating docks to quantify recruitment of newly settled organisms at different sites in Long Island Sound (Whitlatch and Osman 2005). For our study in Narragansett Bay, the same types of panels were used, which were hung from the GSO dock ladder. Four of these panels—referred to as community panels—were used to examine changes in percent cover of *Didemnum* sp., *B. violaceous*, and *B. schlosseri* over a six-month period. Panels were photographed once per month from May to October in 2005. Photographs were then used to measure percent cover of each of the three colonial ascidians using an image analysis program, Scion Image. All other organisms (i.e., *Mytilus edulis*) were identified and counted. The average rates of growth of each *Didemnum* sp., *B. violaceous*, and *B. schlosseri* on individual panels were calculated as cm^2/day.

Identical panels to those used in the community assemblage study were suspended along with the community panels to measure recruitment. They were replaced once a week and analyzed under a dissecting microscope. All sessile animals were counted and identified using Bullard and Whitlatch (2004), and the counts were averaged by month.

Didemnum sp. and *Mytilus edulis*

Recruitment of Blue Mussels at the GSO site peaked in June, but fell back to very low levels in July (Figure 2). *Didemnum* sp. began to recruit at this time and eventually abundances peaked in September. On the community panels, adult mussels were visible only in August, and occurred at relatively low levels (Figure 3). *Didemnum* was first visible in August, followed by substantial increase in September and a maximum in October.

RHODE ISLAND NATURAL HISTORY SURVEY

Providing Ecosystem Science and Information

A Different Sort of Invader: The Second Manatee to Visit Rhode Island

BY ROBERT D. KENNEY

In the summer of 2006, Rhode Island's Narragansett Bay was one stop on the summer vacation of an animal that was far from its native habitat. While it did not really qualify as an invasive species, it was certainly rare and unusual, but not quite unprecedented. The visitor in question was a Florida Manatee.

Sirenians

Manatees are members of the mammalian order Sirenia, which includes the marine and freshwater species known collectively as "sea cows" (Reynolds and Odell 1991). There are four living sirenian species in two families. Three species of manatees (Family Trichechidae) occur in the tropical Atlantic—the African Manatee (*Trichechus senegalensis*) of west African coastal waters, estuaries, and rivers; the Amazonian Manatee (*T. inunguis*) of the Amazon River system of South America; and the West Indian Manatee (*T. manatus*) of the tropical Americas. The other living species is the Dugong (*Dugong dugon*: Family Dugongidae) of the tropical Indo-Pacific. A fifth species, Steller's Sea Cow (*Hydrodamalic gigas*), was a sub-Arctic dugongid found only around the Commander Islands in the western Bering Sea. It was first discovered in 1741 during the North Pacific explorations of Capt. Vitus Bering, who had been commissioned by Russian Empress Anna Ivanovna. The newly discovered mammal was one of many species recorded in the journals of the voyage by naturalist Georg Wilhelm Steller. The last surviving Steller's Sea Cow was killed and eaten only 27 years later, setting some sort of dubious record for the shortest time between discovery and extinction.

Sirenians are fully aquatic, with many adaptations similar to those seen in the whales and dolphins (Order Cetacea). In fact, sirenians were long considered to be odd, herbivorous cetaceans (e.g., Hamilton 1839), but the two groups are not at all closely related. Sirenians are included with the elephants (Order Proboscidea) and hyraxes (Order Hyracoidea) in a group of mammals that split off early in the evolution of mammals and radiated in Africa, known as the Afrotheria (Murphy et al. 2001, Reyes et al. 2003, Scally et al. 2001). Cetaceans are related to the even-toed hoofed mammals (Order Artiodactyla), most closely to hippopotamuses, within a lineage of mammals that largely radiated in the Northern Hemisphere. Sirenian adaptations for an aquatic lifestyle include a more or less fusiform body, absence of hair except for well-developed vibrissae or whiskers on the muzzle, loss of the hind limbs, forelimbs modified into paddle-like flippers, and swimming powered by a horizontally flattened tail (Figure 1). Dugongs have tails expanded into lateral flukes like a whale, while manatee tails are broad and rounded like a very large ping-pong paddle. All sirenians are obligate herbivores, feeding primarily on seagrasses and also on submerged and floating aquatic vegetation.

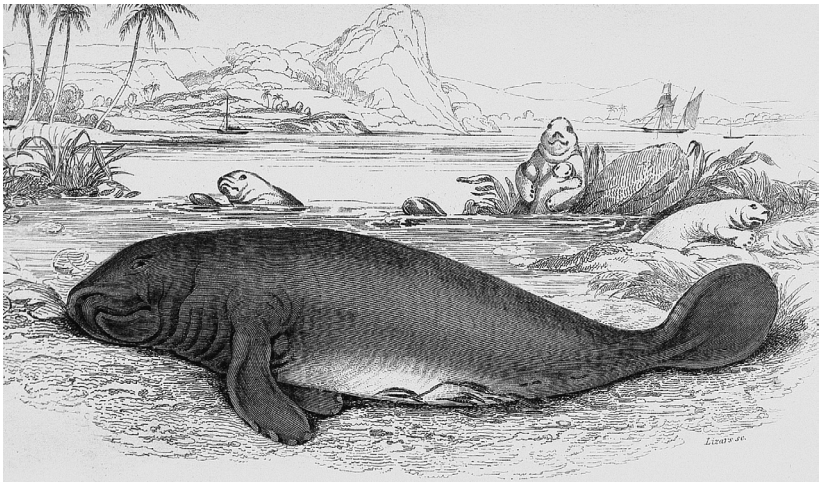

Figure 1. Engraving of West Indian Manatees from Robert Hamilton's 1839 monograph on "Amphibious Carnivora" (seals, sea lions, and walrus) and "Herbivorous Cetacea" (manatees and dugong). Note the depiction of a nursing mother and calf in the background.

West Indian Manatees are large, rotund, docile, and slow-moving, ranging in length from 2.5 to 4.5 m (Jefferson et al. 1993, Wynne and Schwartz 1999). The common name comes from the Carib word "manati," meaning a woman's breast (Reynolds and Powell 2002). Manatees have a single pair of nipples located under the flippers (i.e., in their "armpits"), and a nursing mother and calf present a quite human-like image (Figure 1). The body is tapered and somewhat streamlined, with a relatively small head. The skin is relatively smooth, hairless, and uniformly gray or gray-brown, often with distinctive scars from boat collisions. The eyes are small and deep-set, and the fleshy muzzle is covered with stiff vibrissae. The only teeth present, except for vestigial incisors that are resorbed soon after birth, are 5–7 molars in each upper and lower jaw, which are replaced from the rear and drop out at the front of the row when worn (Caldwell and Caldwell 1985, Husar 1978). The skull and other bones are very dense and heavy, perhaps adapted to serve as internal "dive weights." The forelimbs are relatively long and flexible, with blunt, rounded ends and elephant-like nails. The forelimbs are often used in feeding, in conjunction with

the nearly prehensile upper lips, for manipulating vegetation into the mouth.

West Indian Manatees occur in warm subtropical and tropical waters of the western North Atlantic (Caldwell and Caldwell 1985, Husar 1978, Reynolds and Powell 2002). They are primarily found in freshwater systems, estuaries, and shallow, nearshore, coastal waters. The species ranges from the southeastern U.S. to Central and northern South America, the Caribbean, and the West Indies. The manatees found in Florida are recognized as a distinct subspecies, the Florida Manatee (*Trichechus manatus latirostris*). Florida Manatees aggregate in the winter in warm-water locations like outfalls from power plants, sewage treatment facilities, and industries, as well as freshwater springs, and disperse in the summer to feeding grounds as far north as the Chesapeake (Reynolds and Odell 1991, Reynolds and Powell 2002).

"Chessie"

Our 2006 visitor was not the first Florida Manatee known to make it as far as Rhode Island. That honor belongs to an adult male known as "Chessie" (named for the location of his initial capture) who came to our shores eleven years earlier, in 1995. "Chessie" was first observed in a Chesapeake Bay tributary as winter approached in 1994 (ORG 2003). Because of concerns that he might not be able to survive as temperatures declined, he was captured, transported to Florida, equipped with a radio transmitter that could be tracked by satellite, and released. When the weather warmed the following spring, he departed from Florida and headed north along the coast. "Chessie" did not make his expected left turn into Chesapeake Bay, but continued north past New Jersey into New York Harbor and then into Long Island Sound. He traveled the entire length of the Connecticut and South County, Rhode Island shores before finally reaching Point Judith on the 16th of August. Though it was a very interesting occurrence from a scientific standpoint, it was also quite confounding, since RINHS had just completed what we mistakenly thought was the final draft of the mammal checklist for the *Biota of Rhode Island* vertebrates volume (August et al. 2001). At that point, "Chessie" apparently saw the error of his ways, because he turned around and started back home. He eventually lost the tag near New Haven, Connecticut, but was sighted in Virginia on 23 September and recognized back in his normal winter habitat in Florida in November. He made at least one more trip north, but not as far—he was seen again in Virginia in 2001 (USGS 2006).

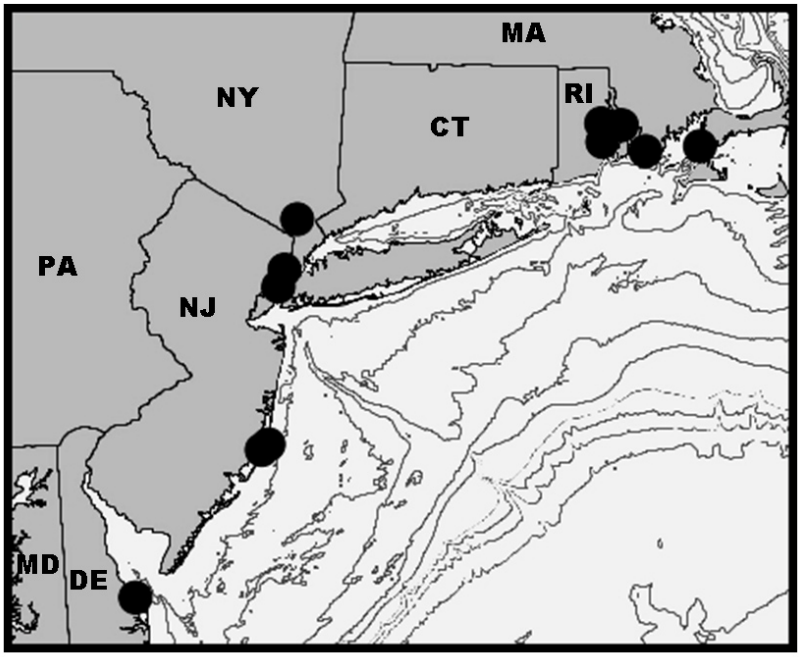

Figure 2. Locations in the northeastern U.S. visited by a wandering Florida Manatee in July to September 2006.

A second Florida Manatee headed our way three years after Chessie's visit, but did not quite reach Rhode Island. This animal was seen in Montauk Harbor at the eastern end of Long Island for about a week in late July of 1998 (Kim Durham, Riverhead Foundation for Marine Research and Preservation, pers. comm.), but the local residents apparently had the good sense not to name it "Monty."

"Tappie"

The manatee that visited us in the summer of 2006 was in fact the third individual to wander as far north as southern New England in just over a decade. This animal traveled from place to place for a month and a half, leaving a trail of sighting reports in its wake (Figure 2, Hamilton and Puckett 2006, and many media reports). It was first reported in Ocean City, Maryland on the 11th of July. It was then seen in Delaware Bay on 14 July and at Barnegat Inlet, New Jersey on 22–23 July. Next it lingered for about a week in the Hudson River, from the 1st to the 8th of August. Analysis of photos showed that it was definitely a different animal and not "Chessie" again. It (the gender is not known) was sighted repeatedly—off Manhattan and Harlem and also more than 40 km upriver north of the Tappan Zee Bridge in Westchester County (where the media christened it "Tappie"). The next sighting was far to the east, in Quissett Harbor near Woods Hole, Massachusetts, on 17 August, before it turned around and started on the return trip. Tappie was seen on the 19th in Westport, Massachusetts, and then decided to take a tour of Narragansett Bay.

"Tappie" began his or her Rhode Island visit by kicking off a minor media frenzy—drinking from a storm drain for a Channel 10 television camera

in a marina in Greenwich Bay on 20 August. The wayward manatee then made a brief appearance in Wickford harbor on Tuesday the 22nd. That initiated an entirely different kind of excitement, because the next demolition at the old Jamestown Bridge was scheduled for Wednesday the 23rd. We already had marine mammal/protected species observer teams scheduled, but we had not planned for the possibility of a manatee in the area. The explosion was delayed for about 45 minutes in order to get a helicopter on scene with two experienced marine mammal observers from the Naval Undersea Warfare Center in Newport. The helicopter crew searched the vicinity of the bridges and along both shores, including shallow coves and bays, but did not locate the manatee. We are confident that "Tappie" was not injured by the explosion, since it turned up one more time the following weekend in Bristol Harbor. Our visitor was not seen again, and was assumed to have headed back home toward Florida. There was one last unconfirmed sighting, heading south, in Barnegat Bay, New Jersey in September.

There have now been three Florida Manatees who have strayed north to our region over eleven years, and two of them have visited Rhode Island. Are we just seeing the vanguard of an increasing manatee presence in the north? Temperatures are clearly getting warmer, which suggests that there could be an increasing potential to see manatees, and maybe other species from warmer climes to our south, as global warming continues to push the thermometer higher. The possibility exists that we might face some interesting questions in the foreseeable future. What does a natural resource manager do when an endangered one-ton marine mammal that eats 100 kilograms of vegetation each day starts munching through an Eelgrass restoration project?

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***Bob Kenney** is an Associate Marine Research Scientist and Adjunct Professor at the URI Graduate School of Oceanography, Secretary of the RINHS Board of Directors, and editor of* Rhode Island Naturalist.