

Data Comparison

Comparison of data presented as seasonal averages each year from 2006–2008.

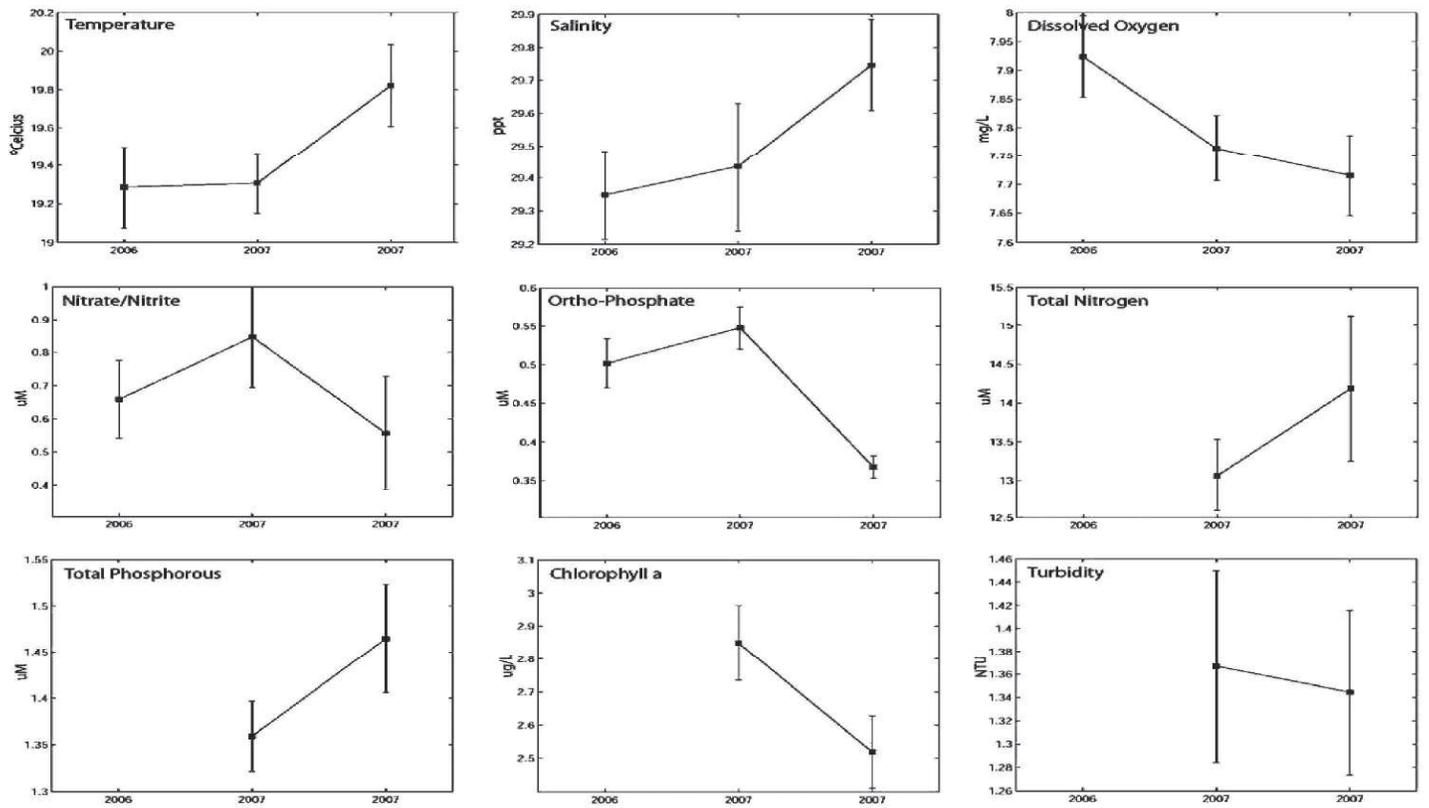


Figure 6

Figure 8 shows the locations of 3 sites monitored along Namskaket Creek in Orleans. The site furthest upstream has noticeably higher concentrations of nutrients.

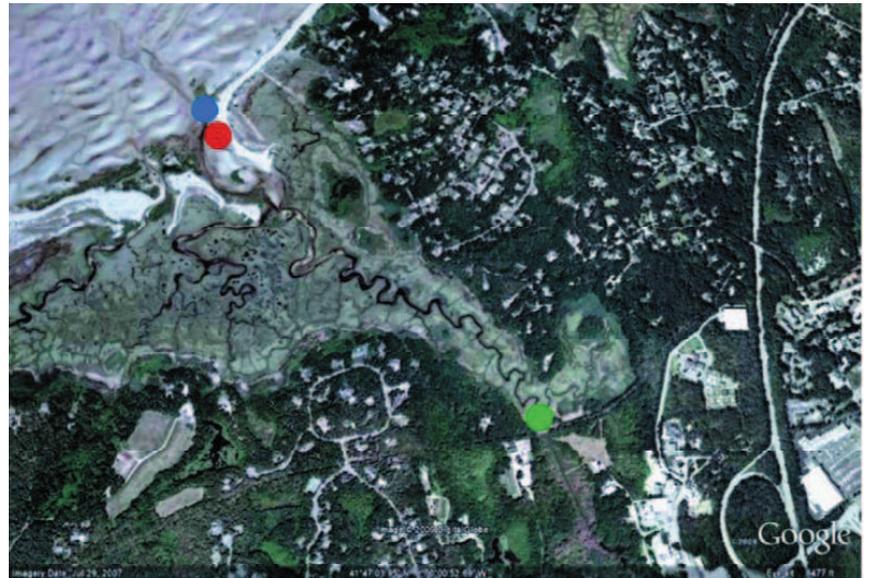
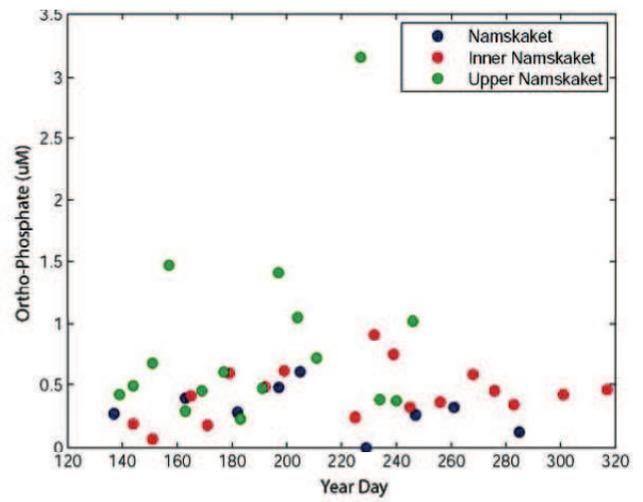
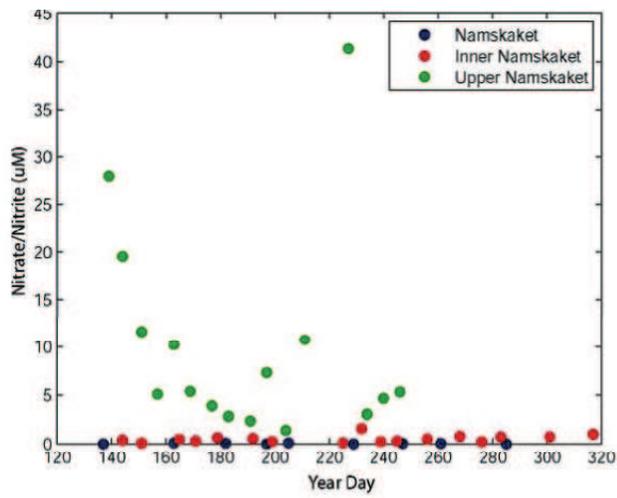


Figure 8



Eelgrass Habitat Studies



13 July 2007

15 April 2008

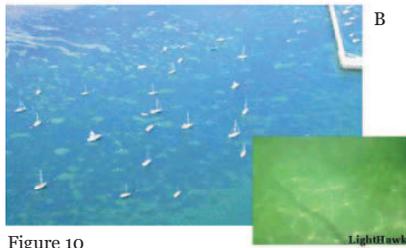
28 July 2008

Because of the close relationship between water quality and eelgrass ecosystems, we expanded the objectives of the Cape Cod Bay Monitoring Program in 2007 to encompass eelgrass habitat studies. Initial work in 2007 focused on qualitative data collection to assess the extent and viability of eelgrass habitat in Cape Cod Bay. Much of this work was made possible through our collaboration with LightHawk, a volunteer-based not-for-profit aviation corporation that provides free flights for environmental organizations. PCCS completed five aerial surveys photo-documenting the presence and extent of eelgrass beds and the seasonal and interannual variation in these beds. The series of photographs shown in Figure 9 demonstrates some of the seasonal changes in eelgrass cover we have observed.

In 2008 PCCS began to look at finer-scale characteristics of eelgrass beds. SCUBA divers placed underwater sensors on moored buoys in select eelgrass beds (Figure 11). These sensors continuously record light and temperature data, both of which are instrumental in determining the distribution, productivity, and survival of eelgrass. Future studies to measure characteristics of eelgrass habitat (e.g. shoot density, shoot length, epiphytic load, associated macrofauna) are scheduled to begin in 2009.



A



B

Figure 10

Although two years is not enough time to determine whether the eelgrass of Cape Cod Bay is improving or declining in health, PCCS has documented small-scale impacts from physical destruction that have resulted in habitat loss in some areas. Two common signs of eelgrass habitat destruction are scars left from draggers, fishing boats that target shellfish, (Figure 10a) and scars left from mooring chains (Figure 10b).



Figure 11

Monitoring of Marine Invasive Species

The Cape Cod Bay Monitoring Program also includes monitoring for marine invasive species. As their name implies, invasives are non-native species that can thrive in their new environment. Under the direction of Massachusetts Coastal Zone Management, we train volunteers to identify 13 known marine invaders and seven potential invaders (Table 2) at select sites in Cape Cod Bay.

Two of the sites monitored in 2007 were docks in Sesuit Harbor and Rock Harbor (Figure 12). Several species of marine invasives were identified at these locations including three species of tunicates, *Botrylloides violaceus* (native to Japan), *Botryllus schlosseri* (British Isles), *Didemnum sp.* (Japan), and the European green crab, *Carcinus maenas*.

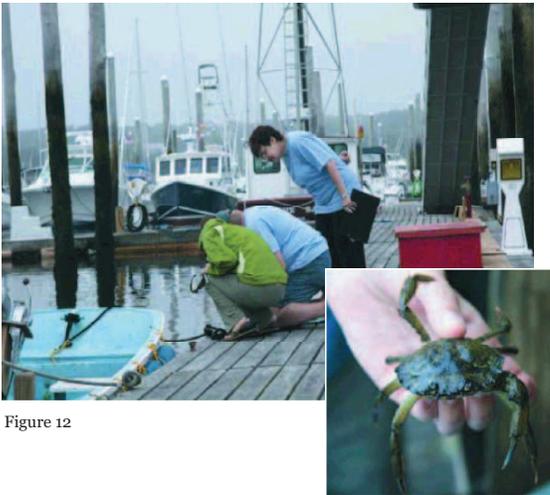


Figure 12

Species	Common Name	Description	Status
<i>Codium fragile</i> ssp. <i>Tomentosoides</i>	Green fleece, dead man's fingers	Green algae	Established
<i>Grateloupia turuturu</i>		Red algae	Established
<i>Unidaria pinnatifida</i>	Brown kelp, wakame seaweed	Brown algae	Potential invader
<i>Sargassum muticum</i>	Japanese seaweed, wire-weed	Brown algae	Potential invader
<i>Styela clava</i>	Club tunicate	Solitary tunicate	Established
<i>Botrylloides violaceus</i>	Orange or red sheath tunicate	Colonial tunicate	Established
<i>Botryllus schlosseri</i>	Star tunicate	Colonial tunicate	Established
<i>Didemnum sp.</i>		Colonial tunicate	Established
<i>Asciidiella aspersa</i>	European sea squirt	Solitary tunicate	Established
<i>Diplosoma listerianum</i>	Compound sea squirt	Solitary tunicate	Established
<i>Corella eumyota</i>		Solitary tunicate	Potential invader
<i>Membranipora membranacea</i>	Lacy crust bryozoans	Bryozoans	Established
<i>Diadumene lineate</i>	Orange-striped anemone	Anemone	Established
<i>Ostrea edulis</i>	European flat oyster	Oyster	Established
<i>Rapana venosa</i>	Veined or Asian rapa whelk	Whelk	Potential invader
<i>Synidotea laevidorsalis</i>	Asian isopod	Isopod	Potential invader
<i>Carcinus maenas</i>	European green crab	Crab	Established
<i>Hemigrapsus sanguineus</i>	Asian shore crab	Crab	Established
<i>Eriocheir sinensis</i>	Chinese mitten crab	Crab	Potential invader
<i>Hemigrapsus takanoi</i>	Brush-clawed shore crab	Crab	Potential invader