

Survey of European Green Crabs and Asian Shore Crabs in Salem Sound

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Abstract

The European green crab (*Carcinus maenas*) has been the dominant crab species in New England rocky intertidal zones since the late 1800's, but since around 2000 they have begun to be outcompeted by a new invasive species, the Asian shore crab (*Hemigrapsus sanguineus*). Rocky intertidal zones at Chandler Hovey Park in Marblehead, MA and Pavilion Beach in Ipswich, MA were surveyed for both species monthly at low tide from June 2019 through March 2020. Asian shore crabs made up 94% of all crabs surveyed compared to European green crabs (6%). Also, at both sites, the average carapace width of European green crabs was found to be larger than that of the Asian shore crabs collected. From this survey, it appears that Asian shore crabs are outcompeting European green crabs at these locations.



Green Crab
(*Carcinus maenas*)



Asian Shore Crab
(*Hemigrapsus sanguineus*)

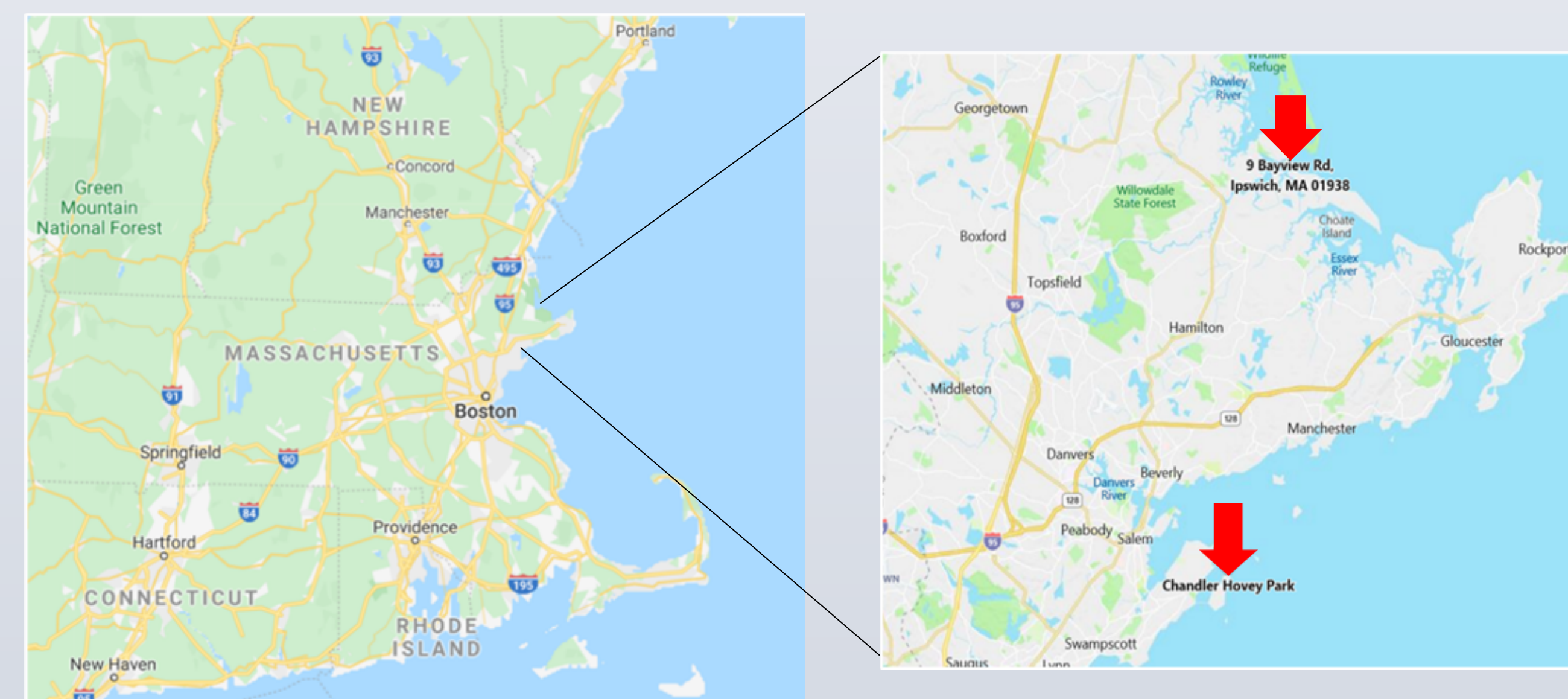
Introduction

Since the late 1800's, the dominant crustacean in New England rocky intertidal zones has been the nonindigenous European Green Crab (*Carcinus maenas*). However, over the past 10-15 years a new invasive species of crab, the Asian shore crab (*Hemigrapsus sanguineus*) has become the dominant species in the same rocky intertidal habitats that the green crabs had primarily occupied. It has been observed that Asian shore crabs have out-competed green crabs and have become dominant in the intertidal zone at Chandler Hovey Park in Marblehead, MA (AY, pers. obs.). This study was undertaken to evaluate the current relative abundances of these two species along our local coast. Two different sites in Salem Sound were chosen to survey -- Chandler Hovey Park (CHP) and Pavilion Beach (PB) in Ipswich, MA.

Methods

Rocky intertidal zones at two locations -- Chandler Hovey Park in Marblehead (42.5°N / 70.8°W) and Pavilion Beach in Ipswich (42.7°N / 70.8°W) -- were surveyed monthly at low tide from June 2019 through March 2020. Loose rocks were flipped to expose green crabs and Asian shore crabs hiding beneath. Sex was determined, and carapace width was measured (in mm) with calipers for each crab collected. Water temperature (°C) and salinity (‰) was measured using a YSI Model 33 salinometer

Locations Surveyed



Chandler Hovey Park, Marblehead, MA



Pavilion Beach, Ipswich, MA

Results

A total of 907 Asian shore crabs and 63 European green crabs were found at both sites combined. Asian shore crabs comprised 94% of the total crabs collected (95% at PB; 92% at CHP). Figures 1 & 2 show the number of crabs of both species collected per month for both sites with the water temperature superimposed. Neither species was found when the water temperature was below 4.0 °C. Asian shore crabs were found again when the water temperature rose to 4.8 °C while European green crabs were still absent in March. In Tables 1 & 2, carapace width of both species per survey site is shown. It was also found that male Asian shore crabs were on average bigger than females at both sites while male green crabs were on average bigger at only Pavilion Beach (but only 8 female green crabs were collected).

Figure 1:

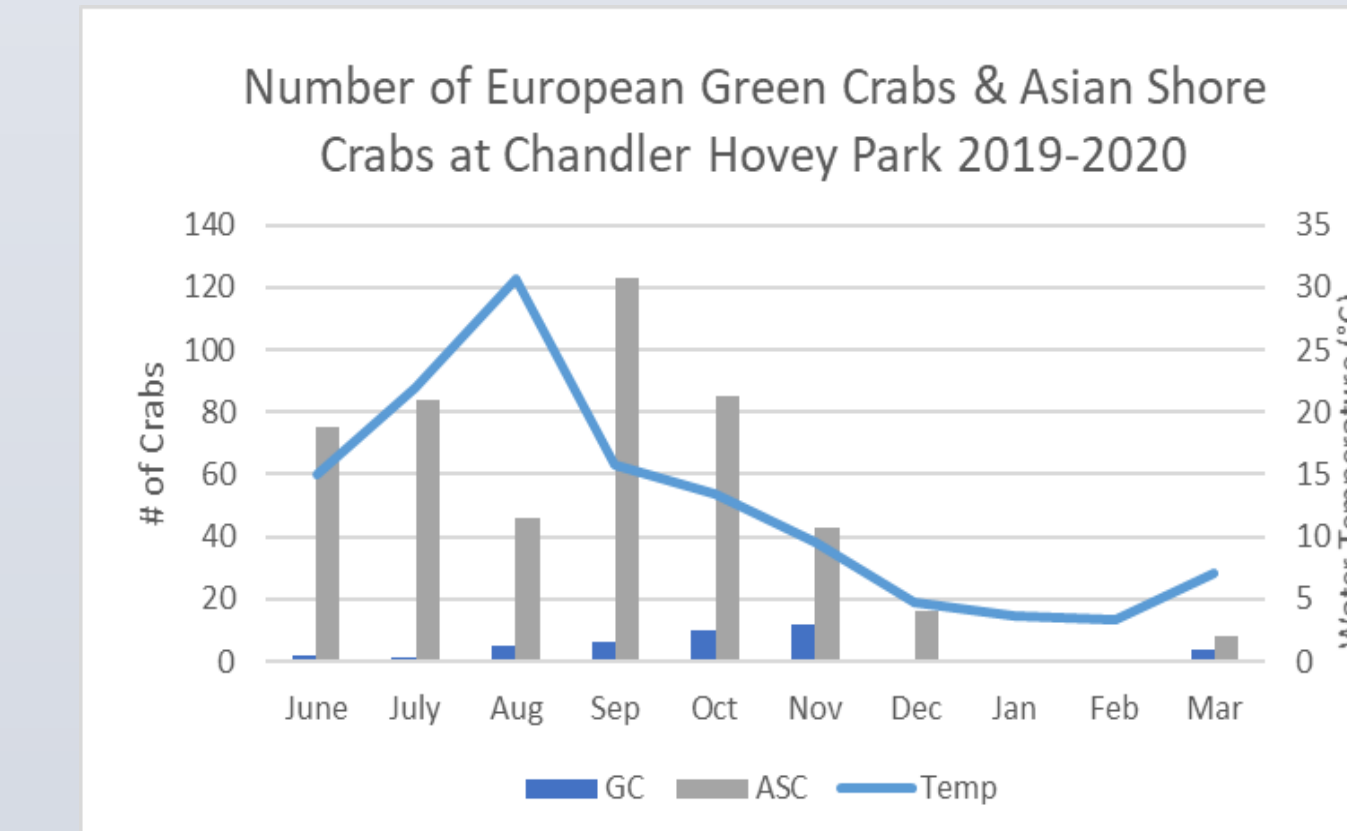


Figure 2:

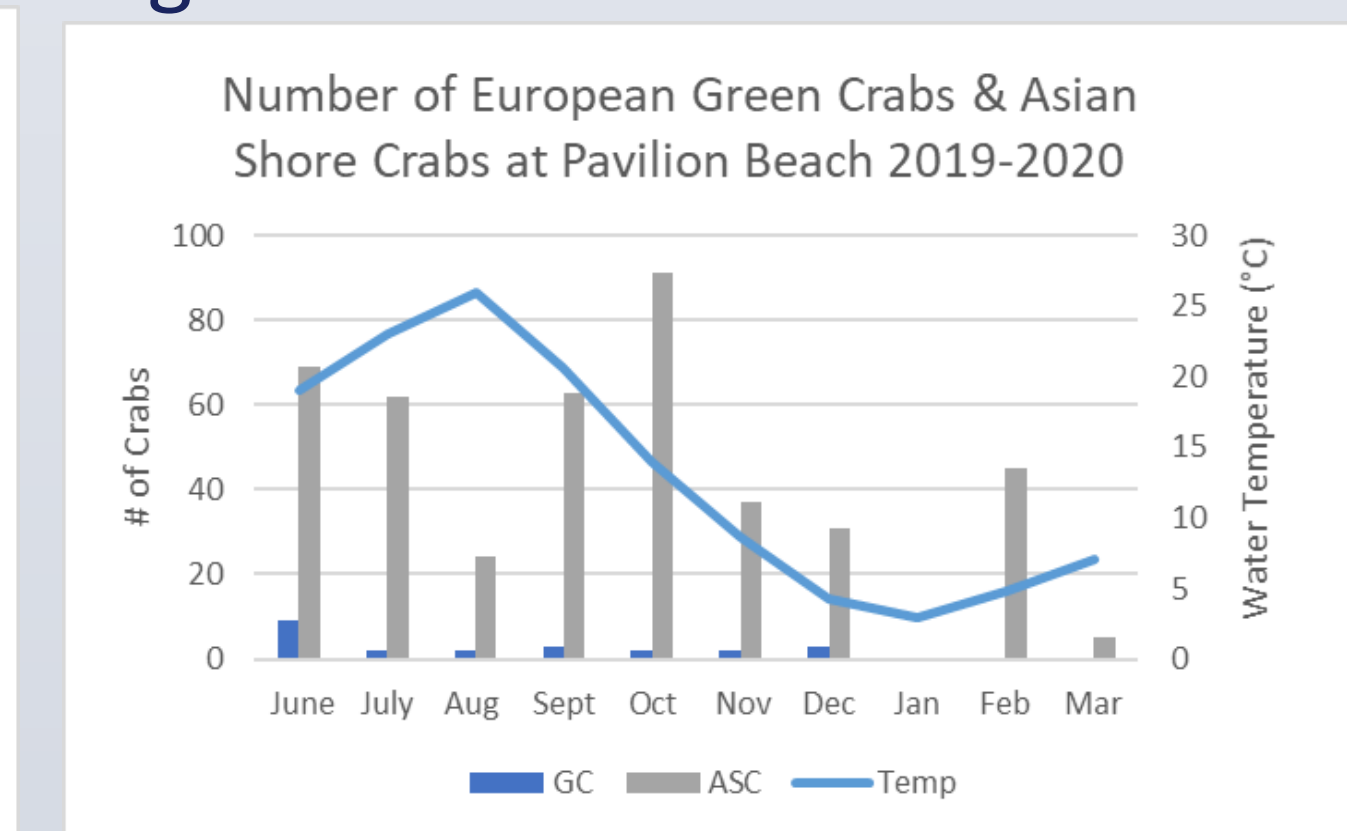


Table 1: Carapace Width of Asian Shore Crabs

Carapace Width (mm)	Asian Shore Crabs					
	Chandler Hovey Park			Pavilion Beach		
	Total	Males	Females	Total	Males	Females
Mean (N)	18.6 (480)	19.6 (239)	17.7 (241)	17.3 (427)	16.8 (252)	18.1 (175)
Range	5-35	5-35	10-31	3-36	3-36	5-35

Table 2: Carapace Width of European Green Crabs

Carapace Width (mm)	European Green Crabs					
	Chandler Hovey Park			Pavilion Beach		
	Total	Males	Females	Total	Males	Females
Mean (N)	25.1 (50)	24.3 (47)	38.0 (3)	30.5 (21)	30.9 (17)	28.8 (4)
Range	10-65	10-65	27-56	7-70	7-70	9-59

Conclusions

Recent observations have shown that the New England rocky intertidal coastline, which was once dominated by the European green crab (*Carcinus maenas*), now appears to be dominated by the Asian shore crab (*Hemigrapsus sanguineus*). This study found that, at both locations surveyed, numbers of Asian shore crabs exceeded the numbers of European green crabs, providing corroborating evidence for this observation.