Will the Asian Shore Crab Increase its Range in Maine?

An Analysis of Sea Surface Temperatures to Assess Risk of Further Invasion.

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Hemigrapsus sanguineus
- Native to Japan, China, and Russia
- Likely arrived in ships’ ballast water
- Carapace width up to ~ 35 mm
- Omnivorous diet
- Primarily an intertidal crab
- Has reached high densities (~100+ per m²) in southern New England.
- Detected in Southern Maine in 2001, now found as far north as Penobscot Bay in low densities.

Will the Asian shore crab, Hemigrapsus sanguineus, continue to spread up our coast and reach high densities in Maine?

- How are the abundance and distribution of Hemigrapsus sanguineus in Maine correlated with temperature?
- Based on temperatures, will H. sanguineus continue its invasion in Maine?
- How can I answer these questions with GIS?

Factors that may affect distribution and abundance patterns of H. sanguineus in Maine:
- Biological Factors:
  - Competition for food/shelter
  - Presence of predators
- Physical Factors
  - Currents/Larval supply
  - Salinity
  - Presence of suitable substrate
  - Temperature

Why Temperature?
Temperature has a major impact on the global distribution of species.
- mortality – freezing, overheating
- can affect reproduction and development
Methods

- Surveyed sites along Maine coast to determine abundance of *H. sanguineus*
- Installed temperature loggers at selected sites to obtain localized temperature data. Data collected from 2003-2004.

Results

Methods

Temperature analysis:
- As per Adey and Steneck 2001
- Mean Summer Temperatures (Average of July, August, September)
- Mean Winter Temperatures (Average of January, February, March)

Methods

Used results from site surveys and GIS-aided temperature analysis to:
- determine the relationship between temperature and crab demographics
- predict risk of further invasion.
Conclusions

- *H. sanguineus* is unlikely to increase its current range.
- The population densities of *H. sanguineus* may increase in areas around Pemaquid Point, and Casco Bay, and, with less likelihood, Penobscot Bay.

Future Research Using GIS:

- Analyze differences in temperature and *H. sanguineus* abundances between southern New England and Maine.
- Analyze temperature patterns in the native range of *H. sanguineus* to aid in predicting the crab’s ultimate range in Maine.
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