

US EPA ARCHIVE DOCUMENT



Success of a non-indigenous crab threatens salt marsh function

Environmental Issue

Salt marshes provide important ecosystem services:

Primary production, filtration of land runoff, sediment stabilization and nursery habitat for fisheries species

Ribbed mussels (*Geukensia demissa*) interact strongly with marsh vegetation



Mussels facilitate production of cordgrass (*Spartina alterniflora*) by limiting sediment erosion and increasing nutrient availability

Asian shore crabs (*Hemigrapsus sanguineus*) have recently invaded mid-Atlantic salt marshes



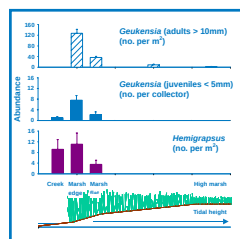
Typically associated with rocky intertidal habitat, *Hemigrapsus* have now successfully colonized multiple salt marshes in Long Island Sound

Hemigrapsus has the potential to negatively affect mussel population growth and *Spartina* production

Crabs readily consume small mussels and may reduce the growth and reproduction of larger individuals by stimulating predator-avoidance behavior

Scientific Approach

Quantify spatial distribution and abundances of adult and juvenile mussels and crabs in marsh



Spatial distributions of mussels, crabs and plants overlap significantly, suggesting the potential for complex interactions

Similarly, mussels and crabs are active at the same times

Determine direct and indirect effects of crabs on mussel survival and growth

Laboratory:

- (1) size-specific mussel consumption by crabs
- (2) nonlethal effects of crabs on mussel behavior
- (3) nonlethal effects of crabs on mussel growth

Field:

- (1) effects of crabs on survival of juvenile mussels
- (2) nonlethal effects of crabs on mussel growth

Experimentally assess the effects of adult mussels on juvenile mussel recruitment in the presence of crabs and on plant survival and production in patches of transplanted *Spartina*



Flax Pond salt marsh, Old Field, NY

Impact

This study identifies factors controlling the distribution and abundances of key species in a critical habitat

Successful conservation and restoration efforts require a mechanistic understanding of processes structuring population dynamics and community interactions

Results will lead to specific recommendations for salt marsh management and restoration

Adding adult mussels to newly restored marshes could confer immediate benefits to both *Spartina* and mussel populations, particularly given increasing pressure from non-indigenous species like *Hemigrapsus*