

## *Phragmites australis* invasion and consequent effects on Fiddler Crab behavior and bioturbation R/6646-001

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### Research Summary

Fiddler crabs are important parts of Atlantic Coast salt marshes. As they dig burrows into the marsh sediments, they increase the oxygen content of the sediments, which allows for faster breakdown of decaying material by bacteria and increases the levels of nutrients in the sediments. This, in turn, increases the growth of marsh plants and provides more food for blue crabs, finfish, wading birds, and other animals who depend on the marsh directly or indirectly for food. Historically, New Jersey salt marsh plants have been dominated by the grass species *Spartina alterniflora*, which occurs in a tall-growth and a short-growth form,



covering about 90% of marsh surfaces. Recently, however, NJ salt marshes have been invaded by the common reed, *Phragmites australis*, which is replacing *S. alterniflora*.

Recent laboratory research has been dedicated to investigating the impacts of this plant change on the activities of fiddler crabs. Data from the last two years indicates that areas of tall-form *Spartina alterniflora* which have been replaced by *Phragmites australis* have significantly reduced numbers of burrows which are also more clumped together, although the



average size of burrows does not change. These changes should tend to reduce the turnover of sediment and production of nutrients. In areas of short-form *S. alterniflora* replaced by *P. australis*, the situation is reversed, with the number and size of burrows increasing, and the burrows becoming more randomly spaced. Thus, invasion in these areas may act to increase sediment turnover and nutrient regeneration.

The researchers are currently working to experimentally determine the exact cause of these changes in crab behavior. Plots which have had the aboveground parts of the plants removed do not show any differences in crab burrow numbers from untreated plots, suggesting that the crabs are not responding to the different aboveground structures of the different plant types. Models of plant root systems are also being made to see if crabs are responding differently to the specific shapes and sizes of the roots as they burrow into the sediment. Finally, we are examining the activity of various naturally-occurring radioactive elements in marsh sediments, which will give a measurement of exactly how much sediment turnover is occurring in native and invaded marshes. These studies should provide a better understanding of how *Phragmites australis* invasion is affecting the food webs of New Jersey salt marshes.