

Patterns of larval dispersal of the invasive green mussel throughout the GTMNERR

Matthew R. Gilg, Jennifer Jetchev, Peter Sheng*, Ryan
Turner, Michael Middlebrook and Ryan Howard

University of North Florida

*University of Florida

Introduced Species

- Can cause both ecological and economic damage (U.S. \$137 billion/year; Pimentel et al., 2000)
- Second only to habitat destruction as cause of local extinctions
- But, offer outstanding opportunities to study many ecological and evolutionary processes in “real time”
 - Adaptation, competition, dispersal, range expansion

Green Mussel (*Perna viridis*) Biology

- Native to Indo-Pacific
- Occupies low intertidal and high subtidal habitats
- Utilizes hard substrates
- Tropical
- Brackish/saltwater
- Larval period ~3 weeks
- Grows quickly, can become reproductive 3 months after settlement
- Known biofouler – clogs pipes, attaches to ships, etc.
- Suggested to have displaced oysters in some areas in Tampa Bay



History of Introductions



- 1990 Trinidad
 - 1995 Venezuela
 - 1998 Jamaica
 - 1999 Tampa Bay, FL
 - 2002 St. Augustine, FL
 - 2003 Savannah, GA
- (Agard et al., 1992; Rylander et al., 1996; Benson et al., 2001; Ingrao et al., 2001; Buddo et al., 2003)

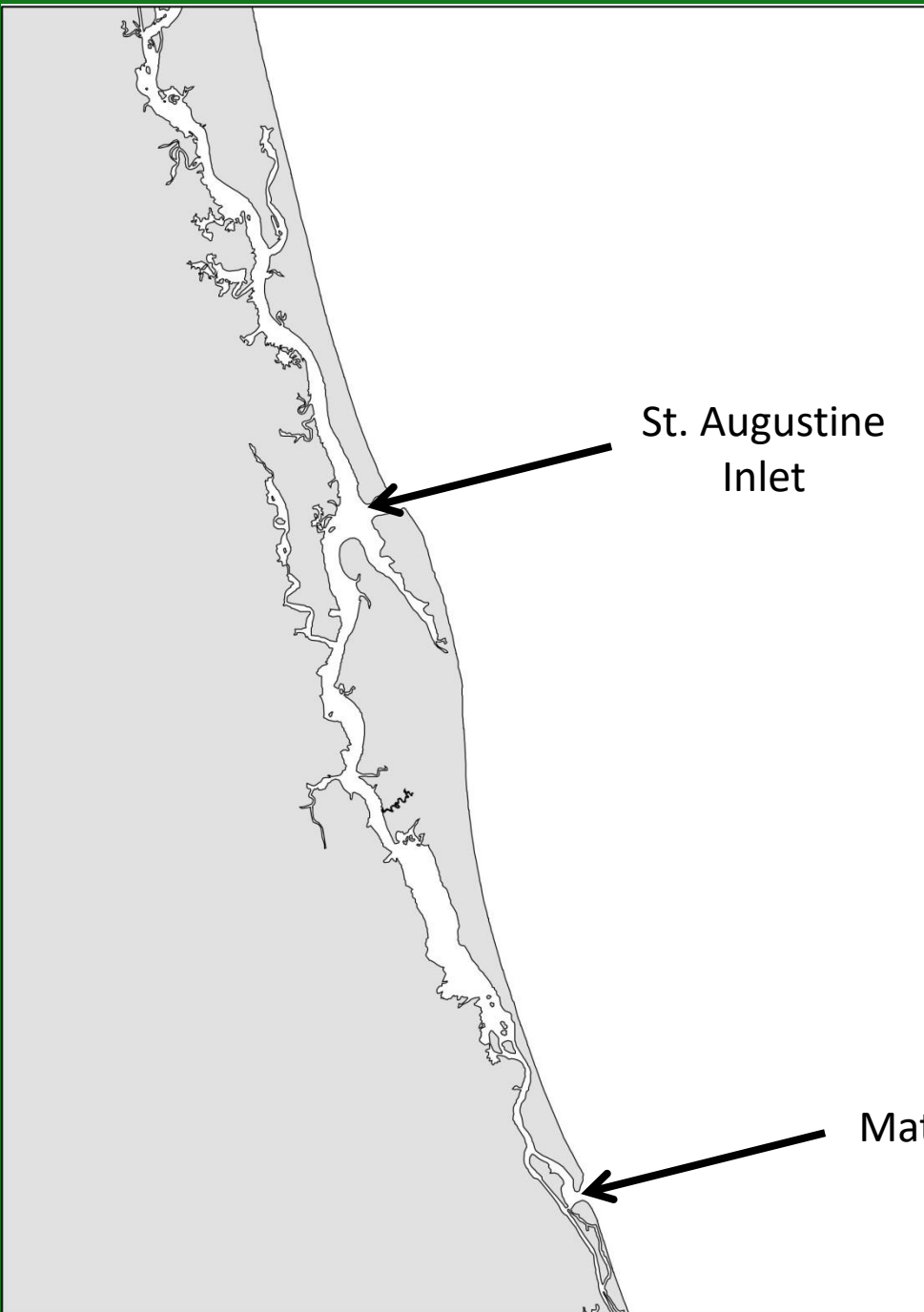
Predicting Population Expansion

- Ecological Niche Models (ENM) – utilize data on an organism's biology to determine which habitats are likely to be occupied in the future
 - Habitat preferences (Gilg et al., 2010)
 - Environmental limitations (Urian et al., 2011)
 - Dispersal capability

Dispersal in Marine Invertebrates

- Extremely difficult to measure
 - Genetic Markers
 - Chemical Signature
- Population spread from known sites of origin

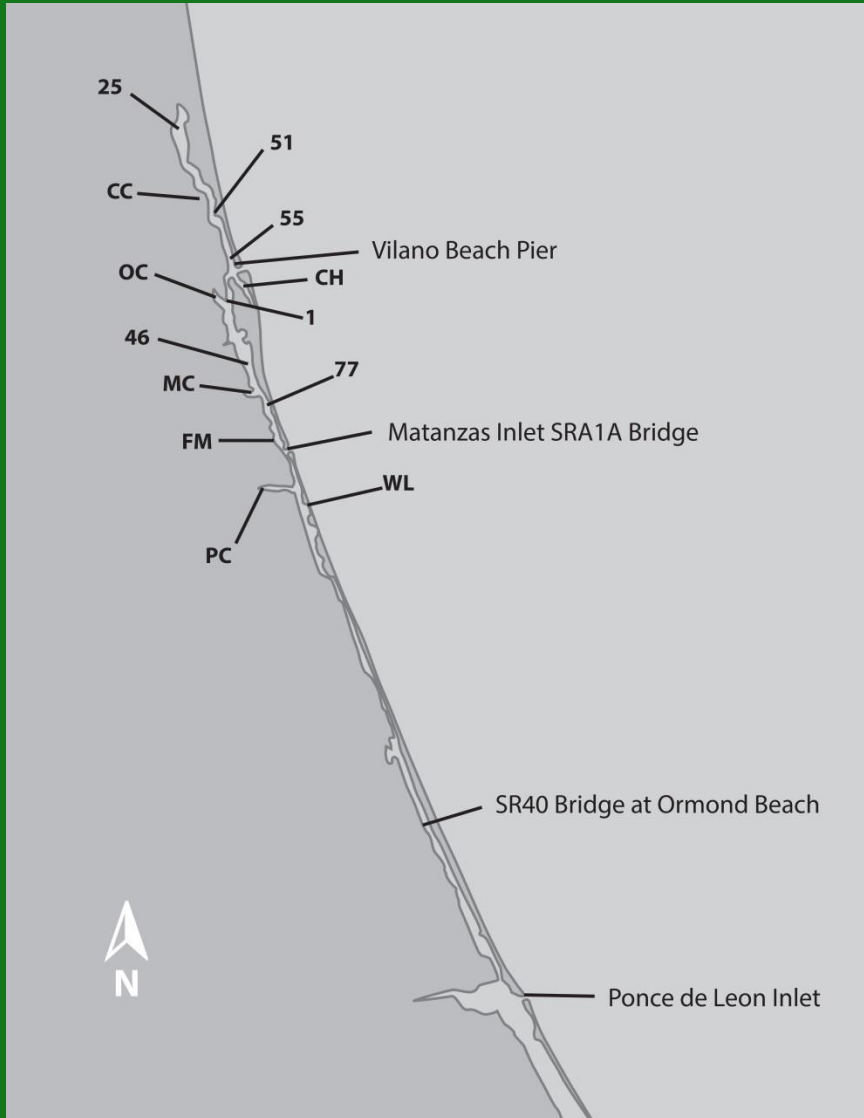
Green mussel population centers



Questions

- Is green mussel larval settlement habitat dependent?
- How far do green mussel larvae typically disperse (both average and maximum distance)?
- Are dispersal patterns predicted by physical oceanography of the Intracoastal Waterway?

Collection Sites



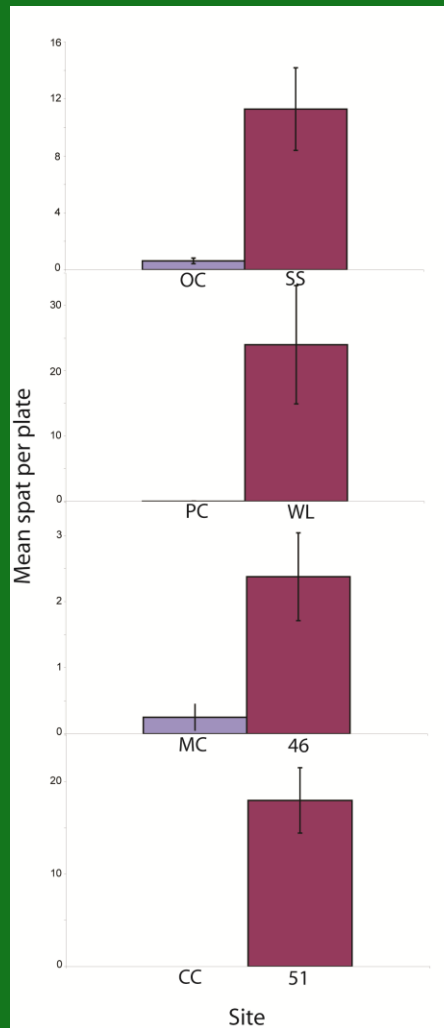
- 13 total sites (9 within channel of ICW, 4 in adjacent feeder creeks)
- Vary in distance from population centers
- 4 channel sites at same distance from inlets as the 4 creek sites

Spat Collection

- Monthly collections of four tiles at each site
- Number of green mussel spat enumerated on each tile
- Mean spat density determined for each site in each month



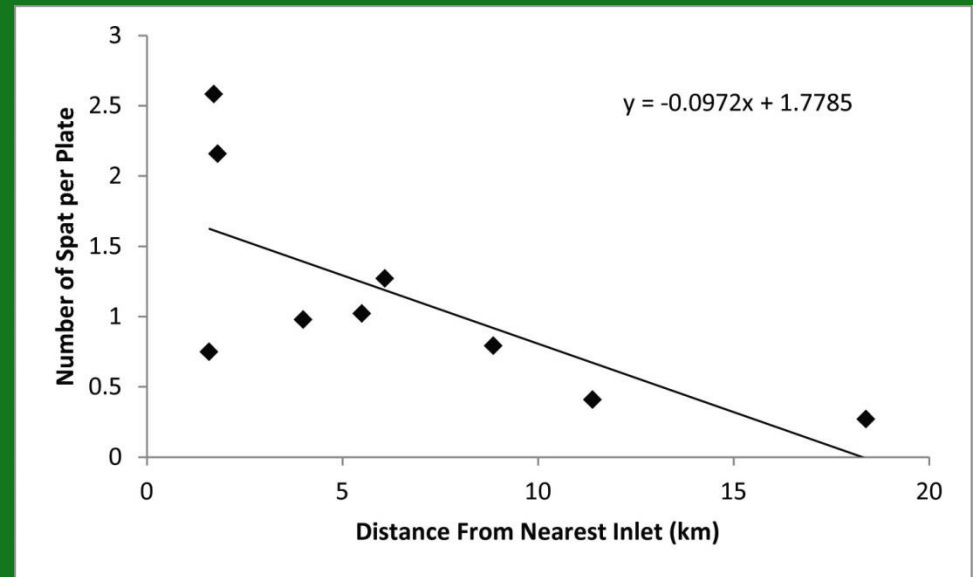
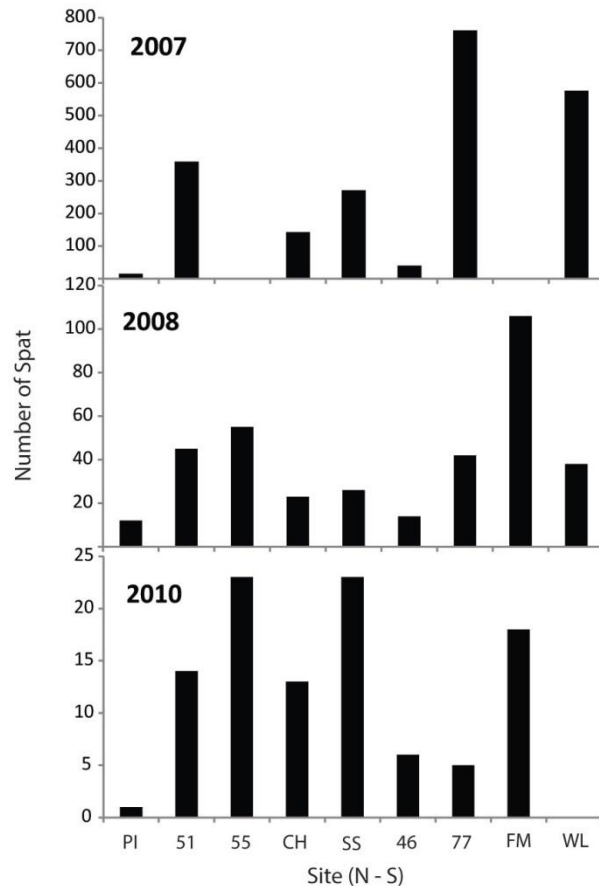
Is larval settlement habitat dependent?



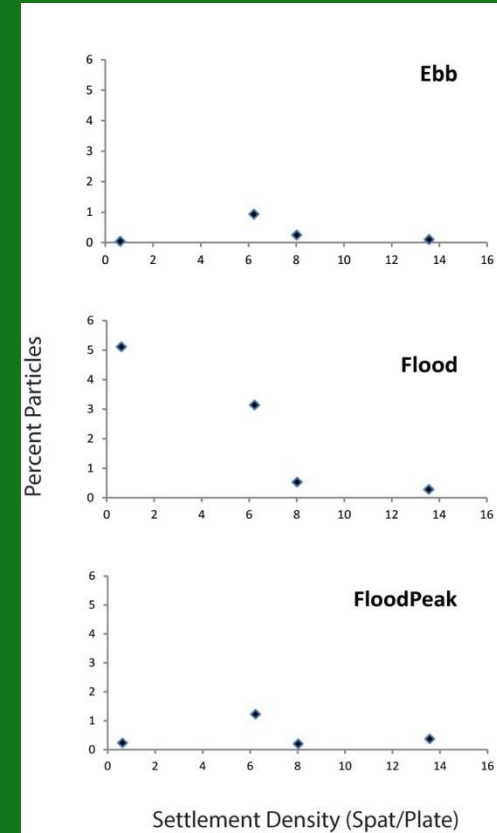
Significant differences in 3 out of 4 comparisons.

How far do green mussel larvae typically disperse?

Fig. 3



Are dispersal patterns predicted by physical oceanography of the Intracoastal Waterway?



Conclusions

- Is green mussel larval settlement habitat dependent?
 - Yes; little settlement in feeder creeks
- How far do green mussel larvae typically disperse (both average and maximum distance)?
 - Most settlement within 10 km of source. Maximum distance detected nearly 20 km.
- Are dispersal patterns predicted by physical oceanography of the Intracoastal Waterway?
 - Not correlated. Models predict most larvae will move south > 100 km.

Questions?



- Acknowledgements: Katie Petrinic and the GTM NERR staff
- Funding from

