

Potential effects of non-native eelgrass on bay clam populations in Netarts Bay, Oregon



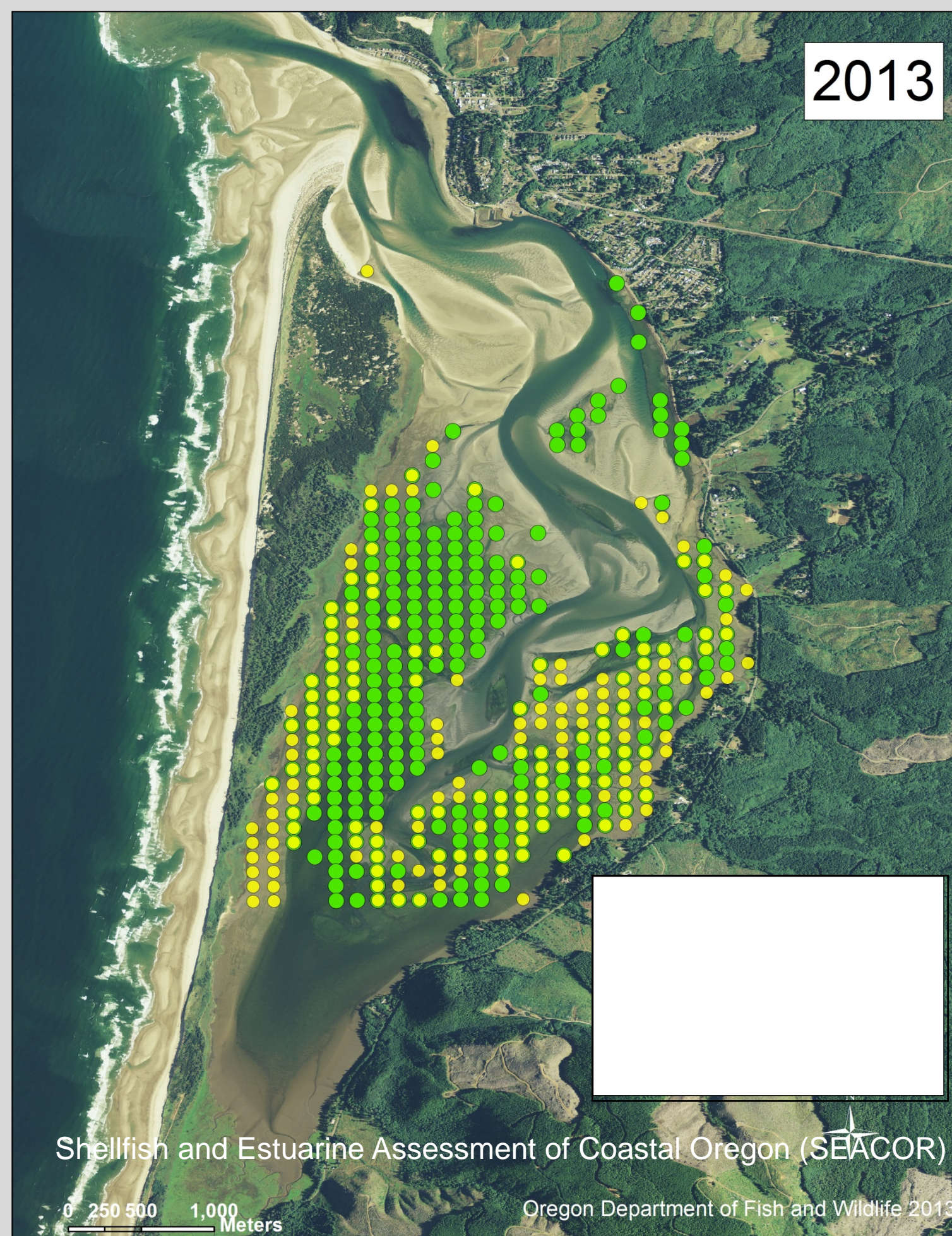
Cinamon Moffett, Anthony D'Andrea, Elizabeth Perotti, and Stacy Strickland

Oregon Department of Fish and Wildlife, Marine Resources Program, Newport, OR

ODFW.SEACOR@state.or.us

Non-native Eelgrass, *Zostera japonica*

- Introduced in the early to mid 1900s to the Pacific Northwest and is now well established in many estuaries
- Limited information about expansion impacts on ecosystem structure and function^{1,2}
- Z. japonica* was not present in Netarts Bay 1975 surveys³
- State and federal regulations vary²

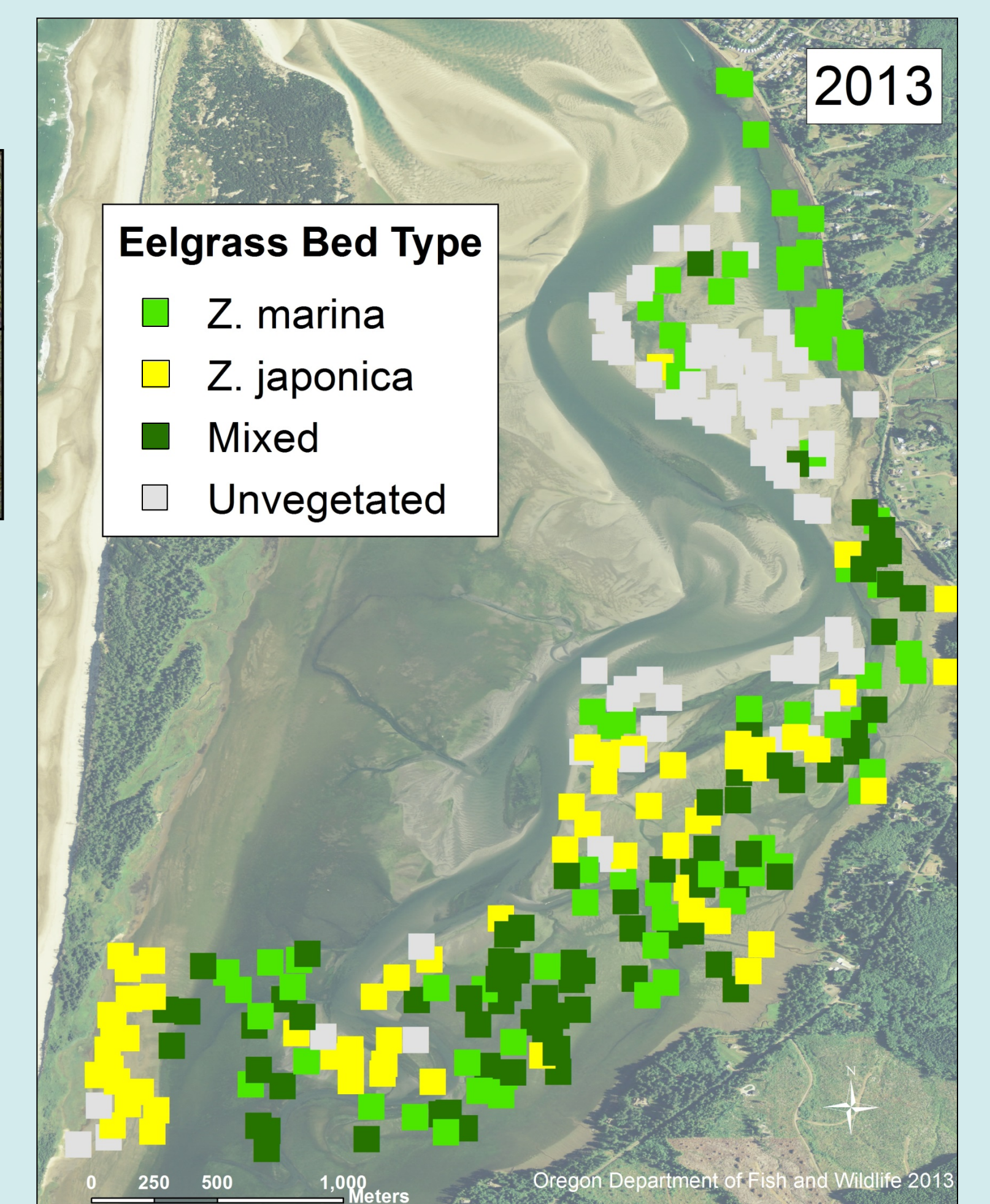
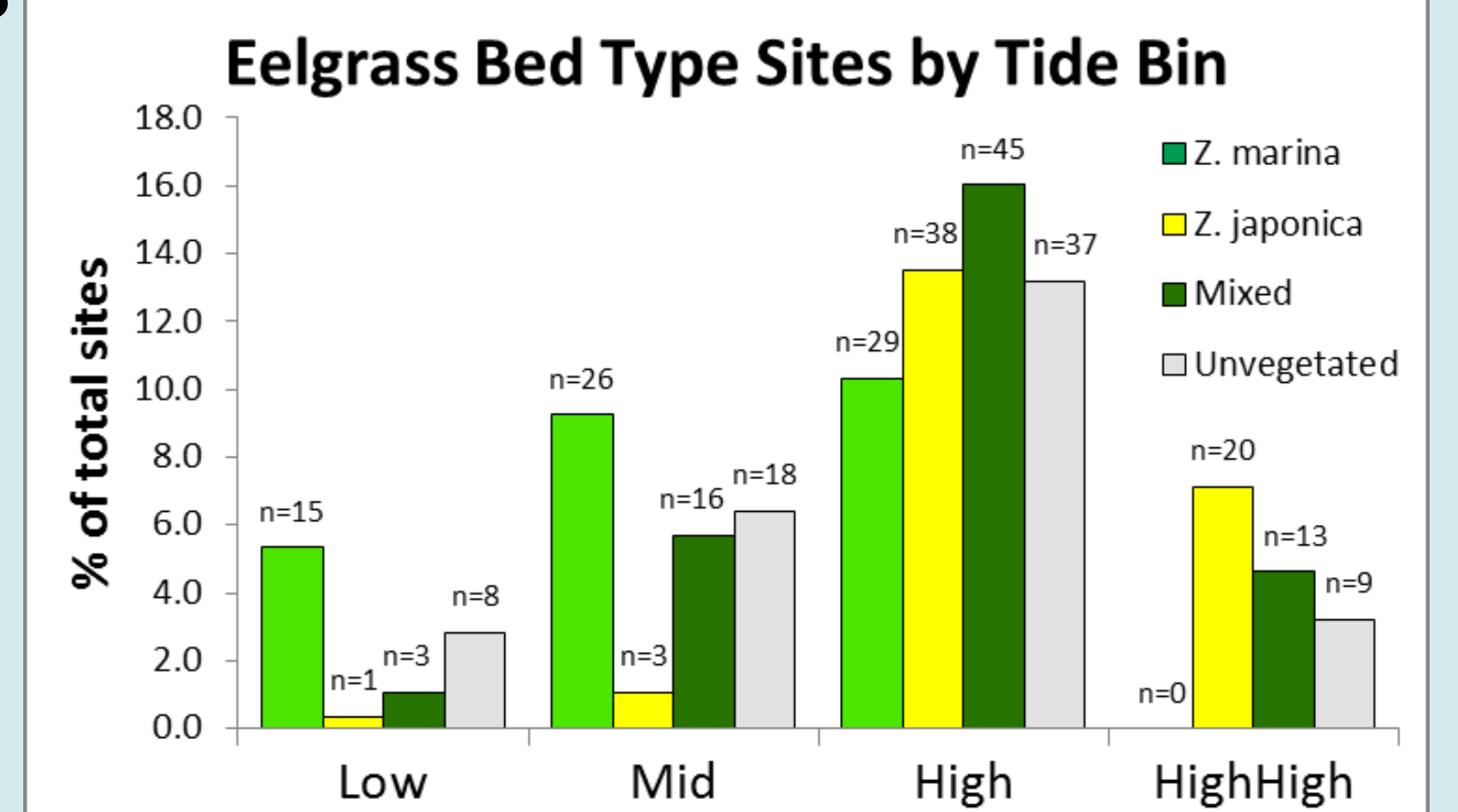
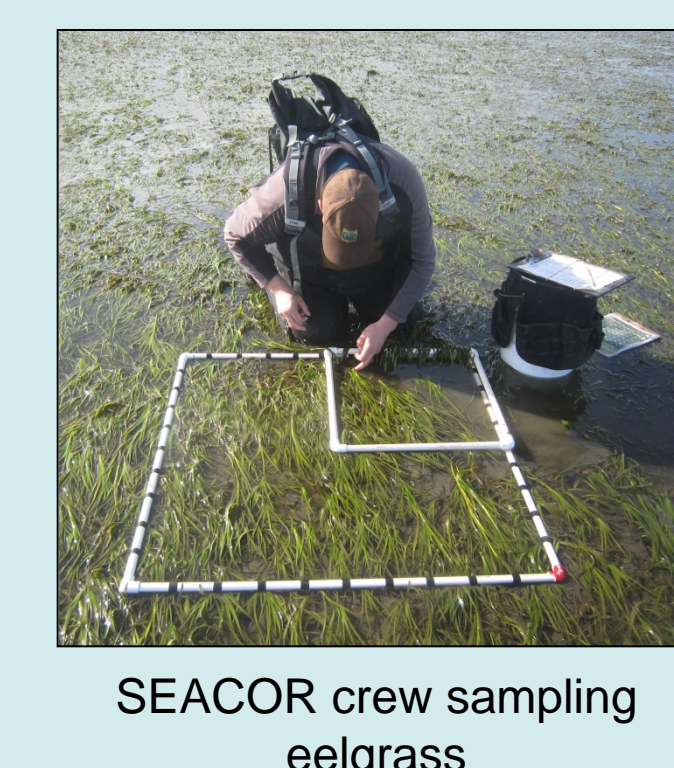
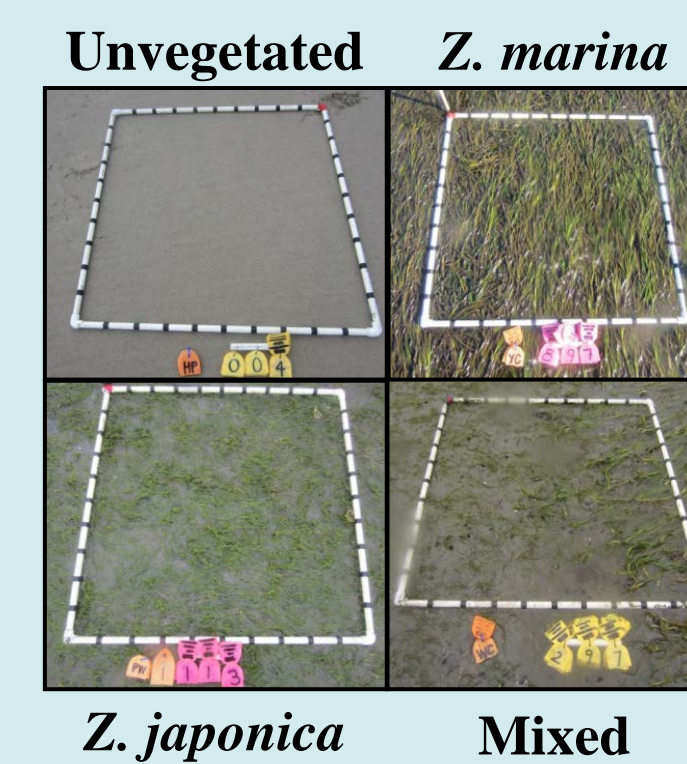
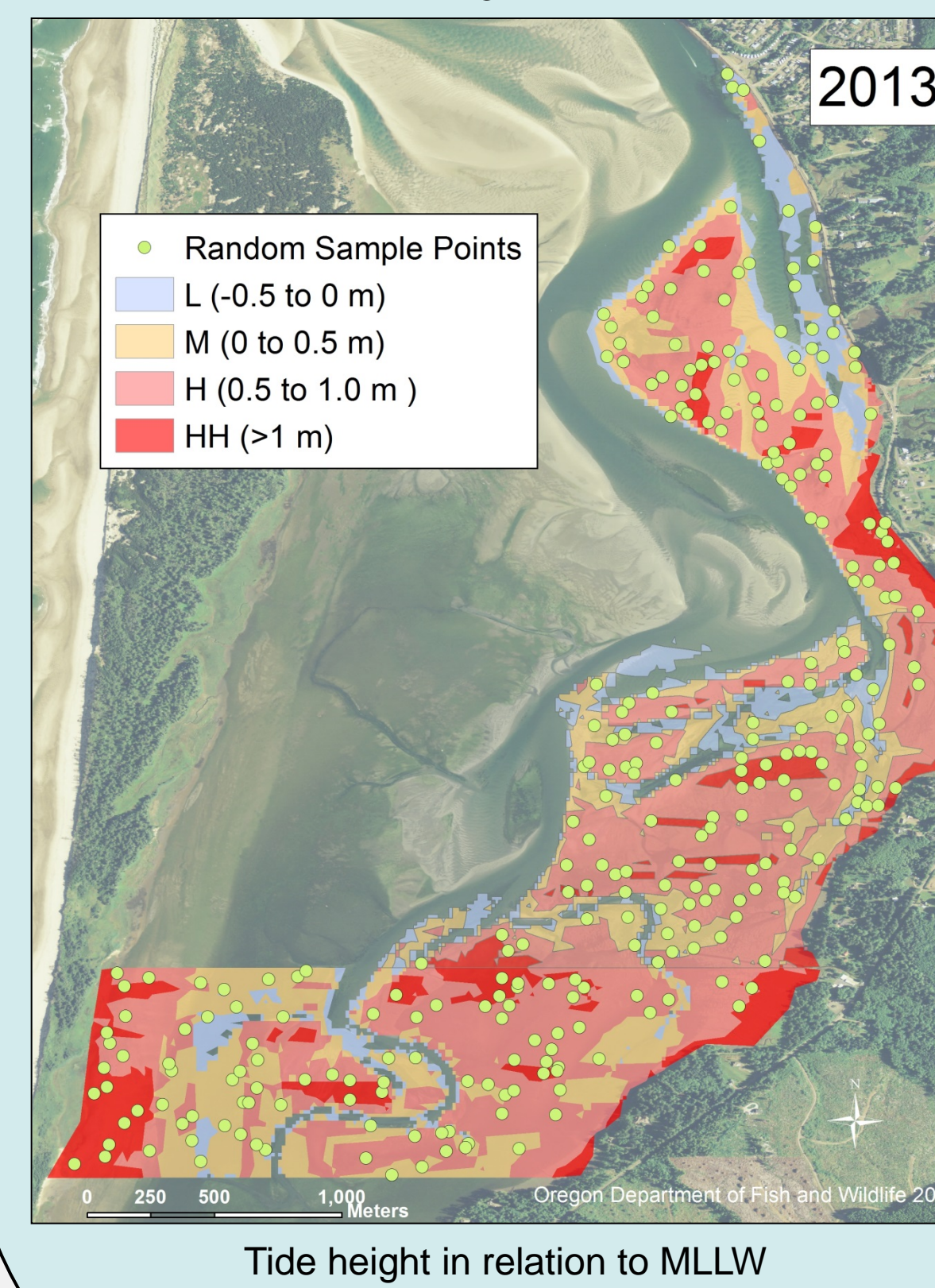


References upon request

1. Eelgrass Bed Type Patterns

- Z. japonica* is widely distributed in the bay with an overlapping distribution with native *Z. marina* in Netarts Bay
- We found a significant relationship between bed type and tide bin to clam community composition (PERMANOVA)

Random samples stratified by area and tide bin



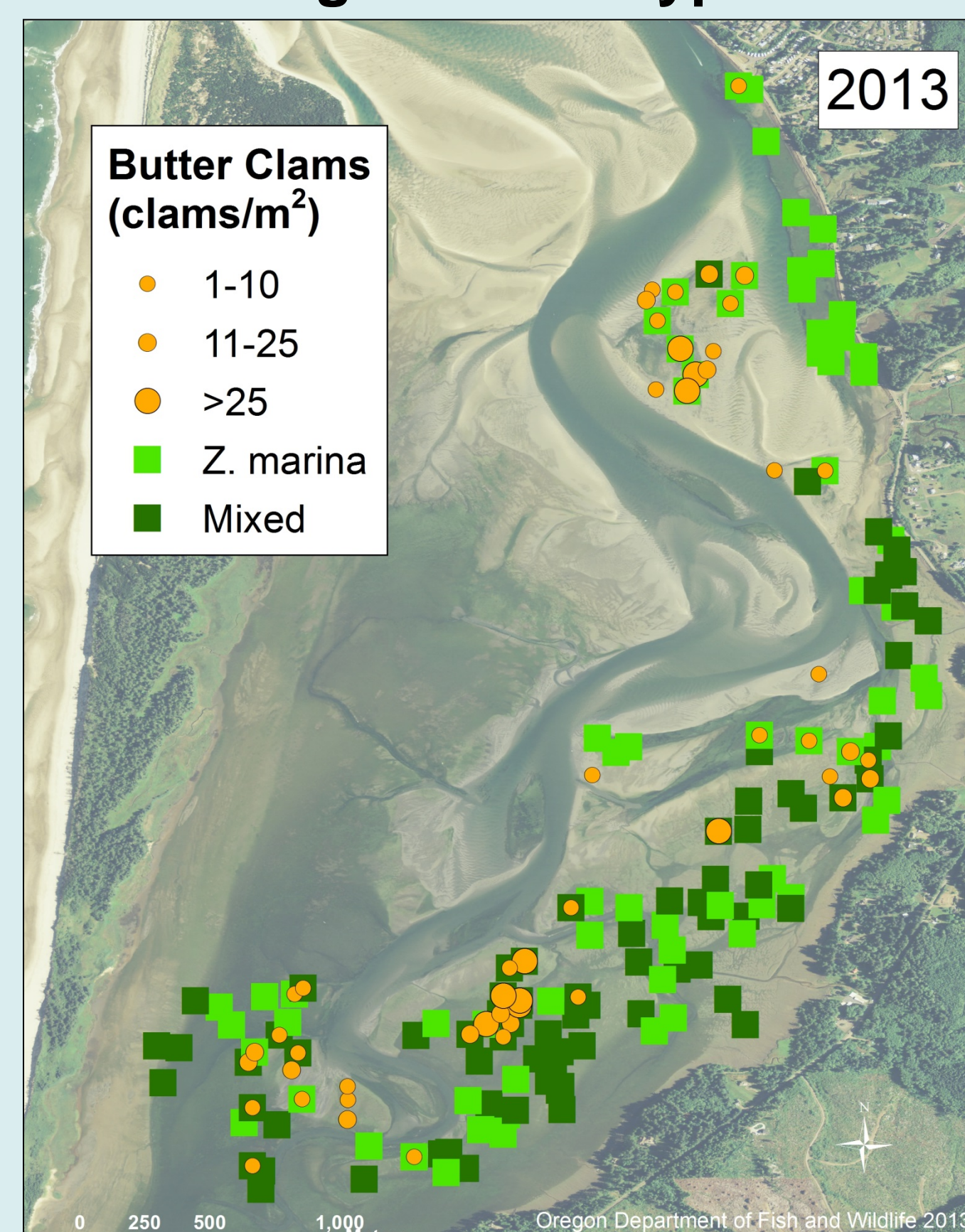
Does the presence of non-native eelgrass affect bay clam populations?

2. Bay Clam Associated with Native Eelgrass

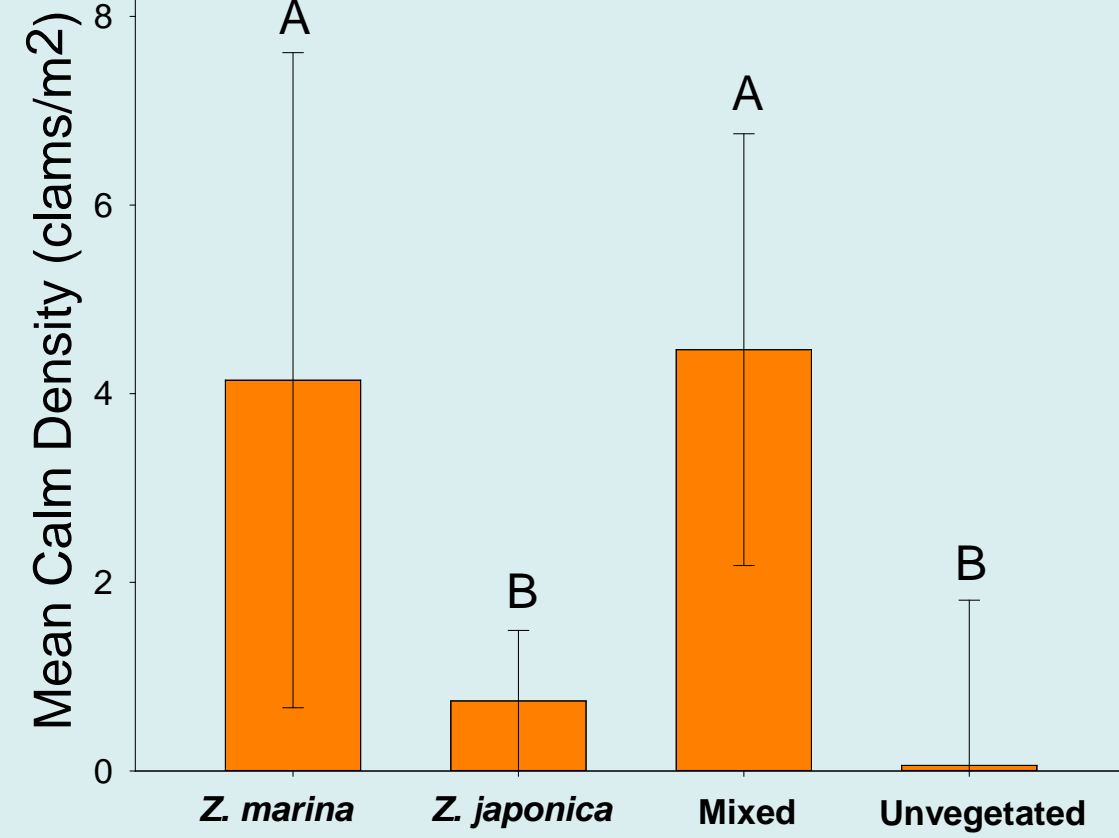
Butter Clams (*Saxidomus gigantea*)

- Density significantly associated with bed type
- More prevalent in *Z. marina* and mixed eelgrass beds
- Density not significantly associated with tide bin

Butter Clam Density by Eelgrass Bed Type



Mean Butter Clam Density by Eelgrass Bed Type

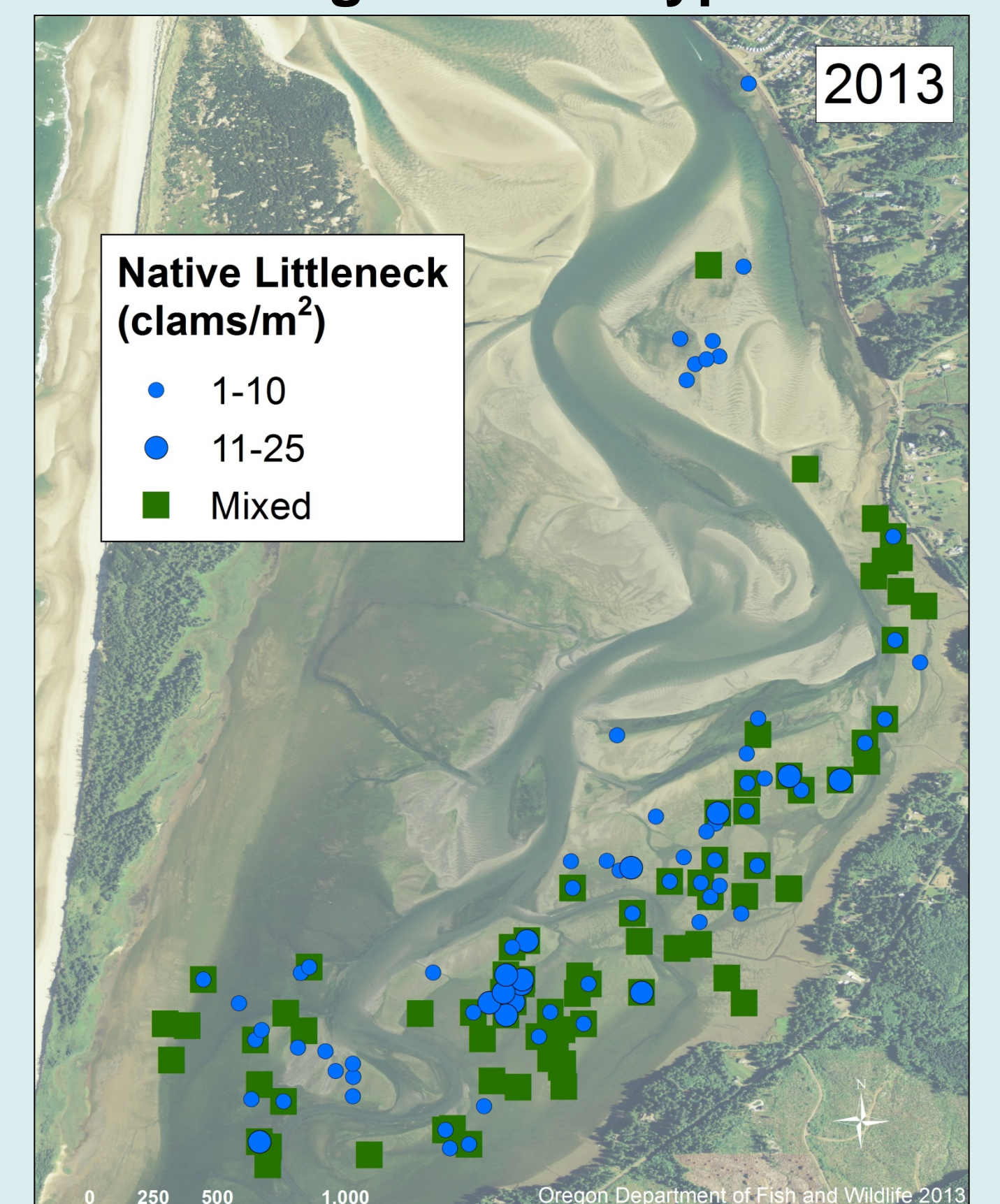


3. Bay Clam Associated with Mixed Eelgrass

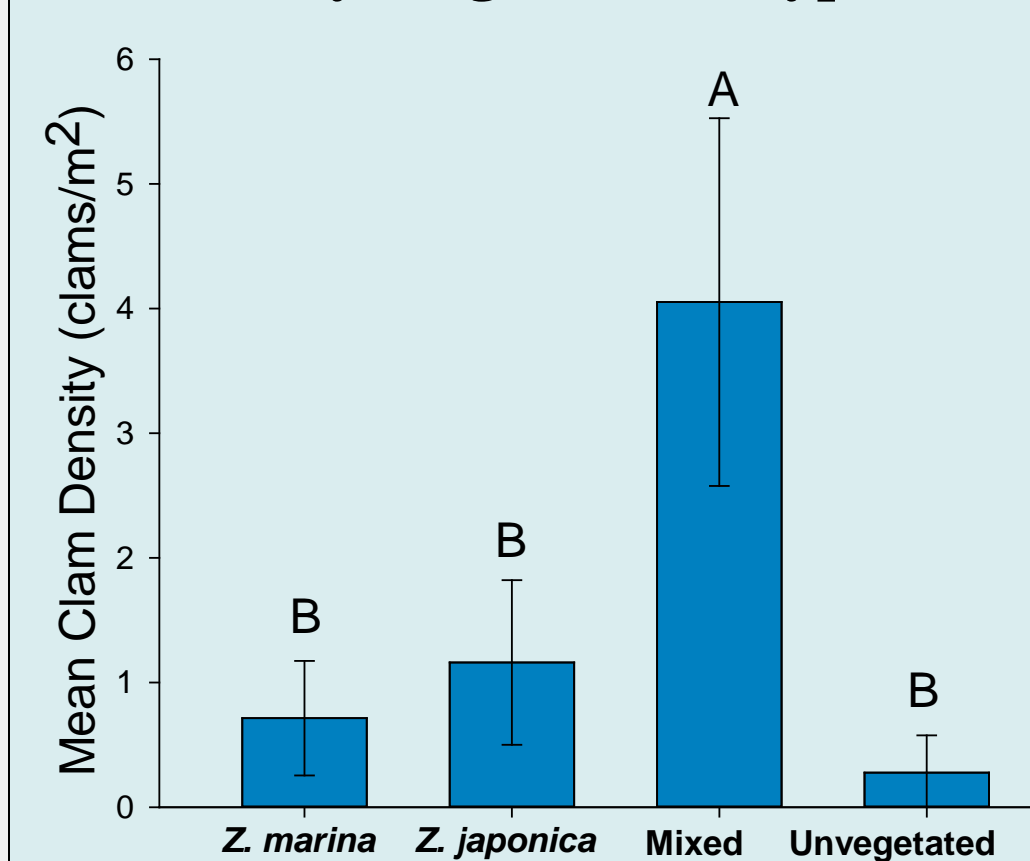
Native Littleneck Clams (*Leukoma staminea*)

- Density significantly associated with bed type
- More prevalent in mixed eelgrass beds
- Density significantly associated with tide bin and was more prevalent in the HH tide bin where majority of sites contained *Z. japonica* (data not shown)
- Population distribution seems to have increased since 1975

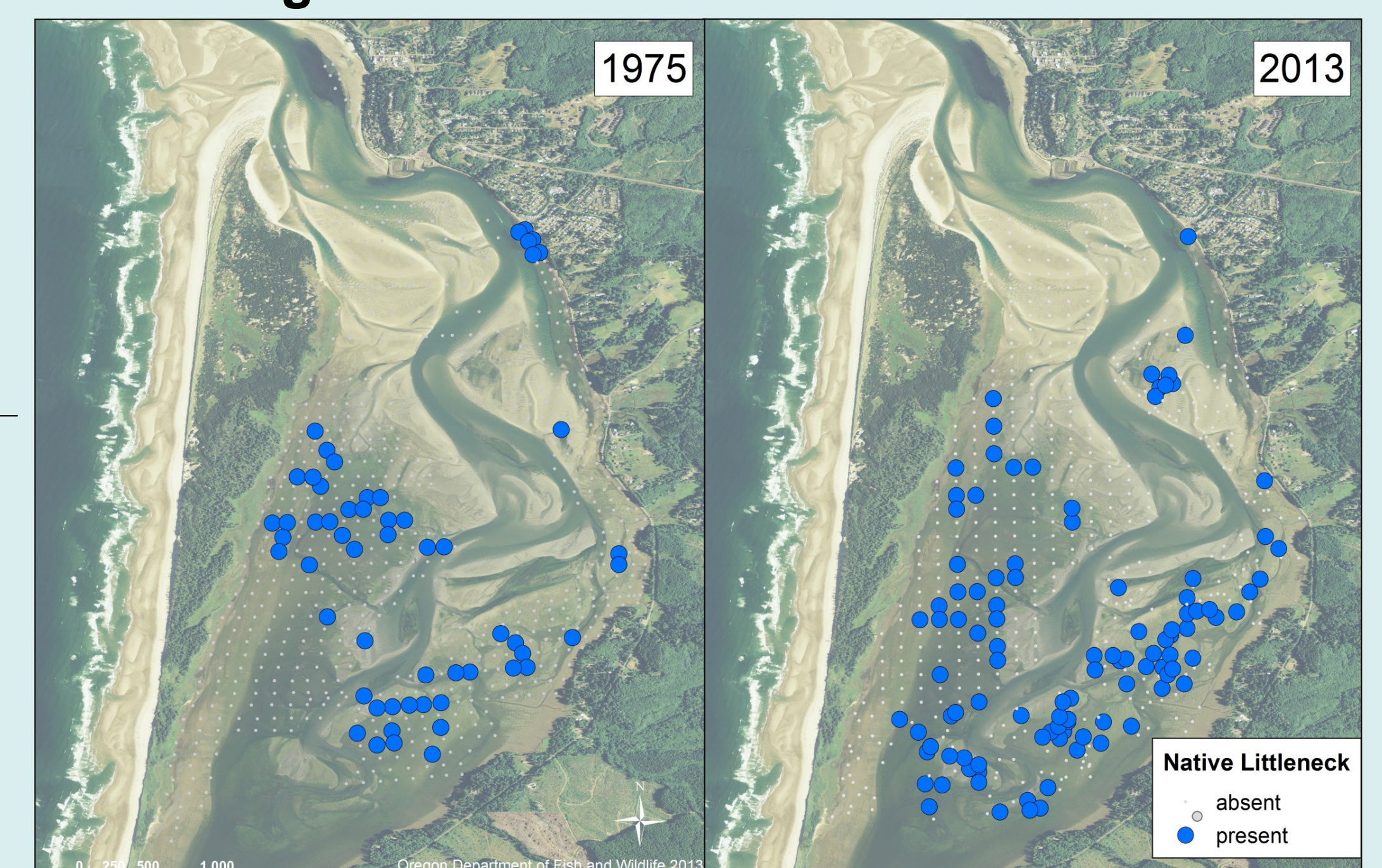
Native Littleneck Density by Eelgrass Bed Type



Mean Native Littleneck Clam Density by Eelgrass Bed Type



Change in Native Littleneck Clam Presence



Further Study

- Eelgrass bed type has an effect on bay clam density patterns; to refine these relationships more studies are needed.
- SEACOR will continue to provide eelgrass distribution maps once each decade for estuaries of study providing information necessary for management decisions.
- Netarts Bay provides an opportunity to study the interactions and effects of *Z. japonica* within established overlapping species beds on recreationally important shellfish species.
- Additional studies need to be conducted to explicitly examine how *Z. japonica* expansion affects ecosystem structure and function.

Acknowledgments

The Shellfish Project is supported by recreational shellfish license fees

SEACOR

- Project goal is to conduct bay clam population and estuarine habitat studies documenting recreationally important bay clams abundance, biomass, and preferred habitat type in Oregon estuaries
- Rapid assessment methods collected environmental and biological data within a 1m² quadrat in a 100x100m grid
- Detailed assessment methods applied only to random-stratified sampling points with respect to tidal elevation.

Netarts Bay

- Bar-built estuary located in Tillamook county on the central coast of Oregon
- Shallow marine dominated system with extensive intertidal areas
- Popular recreational clamming destination that supports commercial mariculture operations
- Extensive eelgrass and highly productive clam beds across tidal elevations
- Classified as a Conservation estuary to “...be managed for long-term use of renewable resources...”⁴
- *Z. japonica* was not present in 1975 surveys³
- In 2013, both *Z. marina* and *Z. japonica* were widely distributed

References

1. Mach M. et al. 2010. Distribution and potential effects of a non-native seagrass in Washington state *Zostera japonica* Workshop, Friday Harbor Lab, San Juan Island, WA.
2. Shafer D. et al. 2013. Science and Management of the Introduced Seagrass *Zostera Japonica* in North America. *Environmental Management*. 53 (1):147-162.
3. Hancock D.R. et al. 1979. Subtidal clam populations: distribution, abundance, and ecology. Oregon State University, Sea Grant.
4. LCDC. 1977. Administrative Rule Classifying Oregon's Estuaries. Salem, OR

Programs: JMP 10-Welch's ANOVA and Steel-Dwass, $\alpha=0.05$ and Primer- PERMANOVA, $\alpha=0.05$

Contacts



ODFW.SEACOR@state.or.us

