

## WASHINGTON SEA GRANT PROJECT COMPLETION SUMMARY REPORT

**INSTRUCTIONS:** Please provide a lay summary for your completed project that includes the following project elements:

- objectives
- methodology
- rationale
- major findings
- significance of results

If relevant, also include:

- students supported (number and degree level)
- partnerships
- outreach activities

Please note that this summary will be submitted in the Washington Sea Grant annual report to the National Sea Grant Office and will be available to the public via the NIMS database and the Washington Sea Grant website.

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WSG Project Number:       **R/F-146**  
Project Title:               Spatial Dynamics, Recruitment Trends and Sustainability  
  of Puget Sound Geoducks

Project period:               2/1/2004 – 1/31/2008

Principal Investigator(s) and Affiliation:  
**Ray Hilborn**               School of Aquatic and Fishery Sciences, University of Washington

### **PROJECT COMPLETION SUMMARY REPORT**

*(Maximum of 5000 words with spaces)*

The geoduck clam is among the most important marine resources in Washington State and supports one of the most profitable fisheries of the region. Landings from the Washington and British Columbia fisheries contribute nearly all the world's supplies of this highly valued product. There has been increasing interest among resource users with regards whether current management approaches used in Washington State and British Columbia could be improved in the light of spatial and temporal heterogeneity in productivity and post-harvest recovery rates. Moreover, an apparent six-decade decline in recruitment previous to the start of the fishery has raised public and scientific concern regarding the long-term sustainability of the geoduck fishery. Concerns about the sustainability of the geoduck fishery have led to a general agreement among scientists

and managers of the state and the tribes about the need to explore alternative management options that take into account the spatial heterogeneity in the dynamics of the populations and its fishery, and the uncertainty in recent and future recruitment scenarios.

Our team of scientists was assembled to (i) analyze the physical and biotic processes affecting the dynamics of this species and (ii) evaluate alternative management approaches that take into account the spatial heterogeneity in the dynamics of the population and the fishery. This project supported a PhD student (Juan Valero) School of Aquatic and Fishery Sciences, his dissertation includes the main results derived from this project. Over the course of this projects we relied and built upon strong collaboration with the Washington State Department of Fish and Wildlife (WDFW), Washington Department of Natural Resources (WDNR) and Department of Fish and Oceans (DFO) in charge of geoduck management and research in both WA state and British Columbia as well as several Puget Sound area Tribes (mainly Puyallup, Jamestown, Tulalip, Suquamish, Squaxin). Thanks to the collaboration with State agencies and Tribes we collected and analyzed the first comprehensive geoduck age frequency sampling effort of the last 2 decades in Washington State. Using this age data we have identified spatial and temporal patterns of geoduck recruitment during the last 6 decades. We have shed light on the processes responsible for some of such patterns and provided advice to stakeholders on current issues of geoduck management. Our findings on long term changes in recruitment allowed to get a better understanding of long term (inter decadal) recruitment dynamics, we confirmed the previously suggested decline in recruitment before the onset of the fishery followed by a rebound of recruitment since the mid 1970s. We have identified environmental variables correlated with those changes in recruitment. Understanding the processes responsible for the mentioned spatial and temporal processes provide crucial information for all stakeholders in issues of geoduck fishery and conservation. We also started a project in collaboration with WDFW, WDNR and Hood Canal Salmon Enhancement Group (HCSEG) to investigate effects of low dissolved oxygen on Hood Canal geoduck populations and the use of geoducks as records of environmental changes in Hood Canal. We developed a model to synthesize available information and provide a tool for evaluating alternative strategies for the sustainable management of the geoduck fishery. This project resulted in the identification of appropriate spatial scales of analysis to evaluate alternative management strategies to the currently in use. Managers and scientist from managing agencies were involved in this development and we are going to provide a tool so that users evaluate alternative management strategies towards geoduck conservation and sustainable management.