

Non-native Oyster Research Program
Summary of Products to Date
Updated 8/10/07

**Understanding *C. ariakensis* within its native range:
Taxonomy, pathogens, and ecology**

1. A histological investigation of oyster parasites and pathology in three Chinese estuaries containing varying mixtures of coexisting oyster species including *C. ariakensis*

NA04NMF4570427

PIs: Bushek, Ford, Guo

Project dates: 12/04-11/06 No-cost extension ends 11/07

Reports:

- Quarterly progress reports
- PIs intend to produce final report by October 2007

Posters:

- Scarpa, E., D. Bushek, S. Ford, L. Ragone Calvo, X. Guo, B.J. Landau, K. Reece, G. Brown, J. Moss, R. Carnegie, E. Burreson. Surveying oysters in Asia for parasites and pathogens in response to the proposed introduction of *Crassostrea ariakensis* to the east coast of North America. Aquaculture 2007. Feb 26-Mar 2, 2007, San Antonio, TX
- Scarpa E., S. Ford, X. Guo, L. Ragone Calvo and, D. Bushek. A histological investigation of oyster parasites and pathology in China. 98th Annual Meeting of the National Shellfisheries Association. March 26-30, 2006, Monterey, CA. J. Shellfish Res., 25(2):772 (Abstract)

2. Assessing levels of genetic variation within and among native populations of hatchery stocks of the Suminoe oyster *C. ariakensis* using a suite of molecular markers

NA04NMF4570432

PIs: Cordes, Reece

Project dates: 10/04-3/07

Reports:

- Quarterly progress reports
- Final report overdue (due June 29, 2007)

Publications:

- Zhang, Q., Allen, S.K., Jr. and Reece, K.S. (2005) Genetic variation in wild and hatchery stocks of the Suminoe oyster (*Crassostrea ariakensis*) assessed by PCR-RFLP and microsatellite markers. Mar. Biotechnol. 7(6):588-599.

Manuscripts in Preparation:

- Reece, K.S., J.F. Cordes, J.B. Stubbs, E. Francis, and K. Hudson. In Prep. Molecular phylogeny of *Crassostrea* spp. as inferred from mitochondrial and nuclear DNA sequences.
- Cordes, J.F., J. Xiao, and K.S. Reece. In Prep. Discrimination of oyster species (*Crassostrea*: Mollusca) based on restriction fragment-length polymorphism (RFLP) analysis of nuclear and mitochondrial DNA markers.
- Xiao, J., J.F. Cordes, K.C. Jones, S.K. Allen, Jr., and K.S. Reece. In Prep. Characterization and inheritance of microsatellite loci in the Suminoe oyster *Crassostrea ariakensis*.
- Xiao, J., J.F. Cordes, and K.S. Reece. In Prep. Population genetic differentiation in the Asian oyster *Crassostrea ariakensis* inferred from nuclear microsatellite loci.

Posters:

- Xiao, J., J.F. Cordes, and K.S. Reece. 2006. Genetic differentiation among four *Crassostrea ariakensis* populations in Asia by microsatellite polymorphism. Poster presentation at 98th Annual Meeting National Shellfisheries Association.
- Xiao, J., Cordes, J.F. and Reece, K.S. (2006) Genetic differentiation among four *Crassostrea ariakensis* populations in Asia by microsatellite polymorphism. Poster presentation at NSA Annual Meeting, Monterey, CA March 26-30, 2006. *J. Shellfish Res.* 25:792.
- Cordes, J.F., J.B. Stubbs, S.K. Allen, Jr., and K.S. Reece. 2006. Species identification and development of novel microsatellite loci for the Suminoe oyster *Crassostrea ariakensis*. Poster presentation at Chesapeake Bay Integrated Research Program Annual Symposium, Laurel, MD.
- Cordes, J.F., J.B. Stubbs, S.K. Allen, Jr., and K.S. Reece. 2005. Species identification and development of novel microsatellite loci for the Suminoe oyster *Crassostrea ariakensis*. Poster presentation at XIII Plant and Animal Genome Conference.

Presentations:

- Reece K.S. (2006) Genetic considerations in broodstock selection for oyster restoration, aquaculture development and non-native species introductions. Plenary talk at International Conference on Shellfish Restoration 2006, Charleston, SC Nov. 15-18, 2006.
- Reece, K.S., and Cordes, J.F. 2005. Species identification and *Crassostrea* spp. phylogeny. Invited Oral Presentation. Wera-99 Workshop. March, 2005, Philadelphia, PA.
- Cordes, J.F., J. Stubbs, and K.S. Reece. (2005) Discriminating among the different species of Asian *Crassostrea* oysters: will the real Suminoe oyster please stand up? Invited speaker. Tidewater Oyster Gardeners Association.
- Reece, K.S. A Non-native Oyster for Chesapeake Bay? Seminar presentation at Oregon State University February 24, 2004.

- Reece, K.S. A Non-native Oyster for Chesapeake Bay; Penny-wise, pound-foolish? Seminar presentation at Juniata College. June 30, 2004.
- Reece, K.S. *Crassostrea ariakensis* for Chesapeake Bay? Species Identification and *Crassostrea* spp. Phylogeny, Diseases in the Native Range. Seminar presentation at Rutgers University, Nov, 22, 2004.
- Reece, K.S., J. Carlsson, J.F. Cordes, R.B. Carnegie, M. Camara. 2006. Genetic considerations in broodstock selection for oyster reef restoration. Oral presentation at 98th Annual Meeting National Shellfisheries Association.
- Reece, K.S., Carlsson, J., Cordes, J.F., Carnegie, R.B. and Camara, M.D. (2006) Genetic considerations in broodstock selection for oyster reef restoration. Oral presentation at NSA Annual Meeting, Monterey, CA March 26-30, 2006. J. Shellfish Res. 25:765.
- Cordes, J.F., J. Xiao, S.K. Allen, Jr., and K.S. Reece. 2005. Genetic diversity within and among native populations and hatchery stocks of the Suminoe oyster *Crassostrea ariakensis*. 8th International Conference on Shellfish Restoration.
- Reece, K.S., J. Carlsson, R.B. Carnegie, J.F. Cordes, and S.K. Allen. 2005. Genetic variation for restoration, species introductions, or aquaculture development: what amount is necessary, sufficient, or ideal for each application? Oral presentation at 8th International Conference on Shellfish Restoration.
- Carnegie, R.B., J. Carlsson, J.F. Cordes, E.M. Burreson, and K.S. Reece. Foolproof or foolhardy? The use of selected aquaculture stocks for large-scale restoration of natural oyster populations. Oral presentation at 8th International Conference on Shellfish Restoration.
- Cordes, J.F., J. Stubbs, and K.S. Reece. 2005. Genetic Identification of Oyster Species Based on PCR-RFLP Analysis of ITS-1 and COI Gene Regions. Oral presentation at 97th Annual Meeting National Shellfisheries Association
- Cordes, J.F., J.B. Stubbs and K.S. Reece. 2005. Phylogenetics and species identification of *Crassostrea* oysters based on sequences and PCR-RFLP analyses of ITS-1 and COI markers. Oral presentation at 97th Annual Meeting of the National Shellfisheries Association, April 10-14, 2005, Philadelphia, PA. J. Shellfish. Res. 24(2):647.
- Cordes, J.F., J. Stubbs, and K.S. Reece. 2004. Genetic Identification of Oyster Species Based on PCR-RFLP Analysis of ITS-1 and COI Gene Regions. Oral Presentation at 7th International Conference on Shellfish Restoration.

3. Genetic and ecological structure of oyster estuaries in China and factors affecting success of *C. ariakensis*

NA04NMF4570424

PIs: Guo

Project dates: 12/04-11/07

Reports:

- Quarterly progress reports

Publications:

- Wang, H. X. Guo, G. Zhang and F. Zhang. 2004. Classification of jinjiang oysters *Crassostrea rivularis* (Gould, 1861) from China, based on morphology and phylogenetic analysis. *Aquaculture*, 242:137-155.
- Wang, H. and X. Guo. Identification of *Crassostrea ariakensis* and related oysters by multiplex species-specific PCR. *J. Shellfish Res.*, accepted.
- Wang, Y. and X. Guo. ITS length polymorphism in oysters and its potential use in species identification. *J. Shellfish Res.*, accepted.

Manuscripts in Preparation:

- Wang, H., G. Zhang, X. Liu and X. Guo. Classification of common oysters from northern coast of China. In prep.
- Wang, H., L. Qian, G. Zhang, X. Liu, A. Wang and X. Guo. Distribution of *C. ariakensis* in China. In prep.

Posters:

- Wang, L., H. Wang and X. Guo. Microsatellite polymorphism and genetic diversity in populations of Pacific oyster *Crassostrea gigas* and Portuguese oyster *Crassostrea angulata*. Presented at Aquaculture 2007, February 26 – March 2, 2007, San Antonio, TX.

Presentations:

- Guo, X. Oyster culture in China. Presented at Aquaculture 2007, February 26 – March 2, 2007, San Antonio, TX.
- Guo, X., H. Wang, G. Zhang, L. Qian, X. Liu and A. Wang. 2006. Understanding Oysters of China. Presented at the IX International Congress on Medical and Applied Malacology, October 17-20, 2006, Qingdao, China.
- Guo, X., G. Zhang, L. Qian, H. Wang, X. Liu and A. Wang. 2006. Oysters and oyster farming in China: a review. *J. Shellfish Res.*, 25(2):734.
- Wang, Y., and X. Guo. 2006. Identification of *Crassostrea ariakensis* using ITS length polymorphism. *J. Shellfish Res.*, 25(2):790-791.
- Wang, H., and X. Guo. 2006. Identification of *Crassostrea* species from China using SNP-based markers. *J. Shellfish Res.*, 25(2):789.
- Wang, H., L. Qian, G. Zhang, X. Liu, A. Wang, Y. Shi, N. Jiao and X. Guo. 2006. Distribution of *Crassostrea ariakensis* in China. *J. Shellfish Res.*, 25(2):789-790.
- Wang, H., X. Guo, G. Zhang, and F. Zhang. 2005. *Crassostrea ariakensis* and related species in China. *J. Shellfish Res.*, 24(2):682.

Life history and ecology:

Potential for population growth and sustainability of *C. ariakensis* in Chesapeake Bay
 Interactions between *C. ariakensis* and native oyster species
 Potential for *C. ariakensis* to become a fouling nuisance
 Ecosystem services and functions
 Potential for population growth and sustainability of *C. ariakensis* in Chesapeake Bay

- 1. Long-term mesocosm studies of competitive interactions between diploid *C. virginica* and *C. ariakensis***
NA04NMF4570414, NA04NMF4570417, NA04NMF4570418, NA04NMF4570419
PIs: Newell, Luckenbach, Breitburg, Dungan
Project dates: 3/05-2/08

Reports:

- Quarterly progress reports

Presentations:

- Diseases among diploid native and Suminoe oysters in mesohaline Choptank R. waters: 2004 – 2006. Dungan, C.F., C.B. McCollough, R.M. Hamilton, R.E.I. Newell, C. Kelly, M. Luckenbach, D. Breitburg 2007. Feb. 2007 Quarterly Review of Non-native Oyster Research webconference.
- Newell, R I. E. Comparative studies of diploid *Crassostrea virginica* and *C. ariakensis*: Preliminary results on competition and growth, susceptibility to predation, and larval behavior. IAN seminar series for Managers, NOAA Conference Building Annapolis, MD November 2006.

- 2. Comparative performance of triploid *C. ariakensis* and *C. virginica* in bottom habitats in Virginia and Maryland**

NA05NMF4571240

PIs: Luckenbach, Allen, Kingsley-Smith, Paynter, Meritt

Project dates: 7/05-12/07

Reports:

- Quarterly progress reports

Posters:

- Harwell, H.D., P.R. Kingsley-Smith, M.L. Kellogg, S.K. Allen, Jr., D.W. Meritt, K.T. Paynter, and M.W. Luckenbach. (2006). Oyster Reef Morphology and Habitat Utilization: A Comparison of *C. ariakensis* and *C. virginica* in On-bottom Environments in Chesapeake Bay. Presented at the 9th International Conference on Shellfish Restoration, Charleston, SC.

Presentations:

- Kingsley-Smith, P.R., Harwell, H.D., Kellogg, M.L., Allen, S.K. Jr., Meritt, D.W., Paynter, K.T.Jr. & Luckenbach (2006). Inter-site and inter-specific differences in rates of survival and growth of *C. ariakensis* and *C. virginica*. Presented at the 9th International Conference on Shellfish Restoration, Charleston, SC.

- 3. Extension of ongoing *C. ariakensis* deployment in Maryland**

NA05NMF4571239

PIs: Paynter

Project dates:7/05-6/06

Reports:

- Quarterly progress reports
- Final report – received March 2007

**4. Comparative post-settlement growth and survival in the Suminoe oyster *C. ariakensis* exposed to intertidal emersion
NA04NMF4570429**

PIs: Luckenbach, Kingsley-Smith

Project dates: 4/05-3/06

Reports:

- Quarterly progress reports
- Final report – received June 2007

Manuscripts in Preparation:

- Kingsley-Smith, P. R. and M. W. Luckenbach. (*In Prep*). Post-settlement survival and growth of the Suminoe oyster, *Crassostrea ariakensis*, exposed to simulated emersion regimes. For submission to *Journal of Shellfish Research*.
- M. W. Luckenbach and A. G. Curry, Jr. (*In Prep*). Interspecific competition for space between a native and an exotic species: implications for a proposed introduction. For submission to *Ecology*

Presentations:

- Luckenbach, M. W., P. R. Kingsley-Smith and H. D. Harwell. 2007. World Aquaculture Society and National Shellfisheries Association meeting, San Antonio, TX. “Tolerance for intertidal exposure in *Crassostrea ariakensis*: Implications for its invasion of coastal habitats in the Western Atlantic”
- Kingsley-Smith, P.R. and M. W. Luckenbach 2006. National Shellfisheries Association meeting, Monterey, CA. “Comparisons of post-settlement survival and growth in *Crassostrea virginica* and *C. ariakensis* in relation to tidal emersion”

Other Luckenbach et al. presentations:

- Luckenbach, M. W. 2005. Marine Benthic Ecology Meeting, Williamsburg, VA, “Density-dependent growth, competition and reef-forming capability in *Crassostrea ariakensis*”
- Luckenbach, M. W. and A. G. Curry, Jr. 2005. 8th International Conference on Shellfish Restoration, Brest, France, “Density-dependent growth, competition and reef-forming capability of *Crassostrea ariakensis*”
- Luckenbach, M. W. 2004. 7th International Conference on Shellfish Restoration, Charleston, SC, “Observations on the Ecology of *Crassostrea ariakensis* in its Native Environment

- Luckenbach, M. W. 2006. IX International Congress on Medical and Applied Malacology, Qingdao, China, “Oyseters Management in Chesapeake Bay, U.S.A.: Restoration of the native oyster *Crassostrea virginica* and the proposed introduction of *Crassostrea ariakensis*.”
- Luckenbach, M. W. 2005. Marine Benthic Ecology Meeting, Williamsburg, VA, “Density-dependent growth, competition and reef-forming capability in *Crassostrea ariakensis*”
- Luckenbach, M. W. 2005. 8th International Conference on Shellfish Restoration, Brest, France, “Deliberations on Introducing *Crassostrea ariakensis* to the Chesapeake Bay: The Role of Science and Uncertainty in the Decision-Making Process.
- Luckenbach, M. W. 2004. Atlantic Estuarine Research Society, Salisbury, MD, “Identifying and Prioritizing Research Required to Evaluate Ecological Risks and Benefits of Introducing Diploid *Crassostrea ariakensis* to Restore Oysters to Chesapeake Bay”.
- Luckenbach, M. W. 2003. Restore America’s Estuary Conference, Baltimore, MD, “Non-native oysters in Chesapeake Bay: What do we know and what do we need to know to make a rational decision on introduction?”
- Luckenbach, M. W. 2006. Virginia Polytechnical University, Department of Crop and Soil Environmental Sciences, Blacksburg, VA, “Deliberations on Introducing *Crassostrea ariakensis* to the Chesapeake Bay: The Role of Science and Uncertainty in the Decision-Making Process.”
- Luckenbach, M. W. 2006. Old Dominion University, College of Sciences, “Oysters in Chesapeake Bay: Native oyster restoration, non-native introduction and the development of aquaculture.”
- Luckenbach, M. W. 2005. School of Ocean Sciences, University of Wales, Bangor, U.K. “Deliberations on the Intentional Introduction of an Asian Oyster Species, *Crassostrea ariakensis*, to the East Coast of the United States: Salvation of the Oyster Industry or Ecological Folly”
- Luckenbach, M. W. 2004. University of Central Florida, Department of Biology, “Oyster Restoration in the Chesapeake Bay: Ecological and Political Considerations Related to Native Oysters versus Introducing an Exotic Species”
- Luckenbach, M. W. 2004. Old Dominion University, Oceanography Department, “*Crassostrea ariakensis*: Panacea or Pandora? The need to reduce uncertainty in the march towards introduction”
- Luckenbach, M. W. 2004. University of Maryland, Horn Point Environmental Laboratory, “Oyster restoration in Chesapeake Bay: Should we use the native or a non-native species?”
- Luckenbach, M. W. 2004. North Carolina Coastal Federation meeting, Morehead City, NC, “Oyster Restoration in Virginia: A Review of Current Efforts and Progress”
- Luckenbach, M. W. 2003. Zhanjiang Ocean University, Zhanjiang, Guangdong, China, “Introducing an Asian oyster species to the East Coast of the United States—Good or Bad Idea?”

- Luckenbach, M. W. 2003. University of Maryland, Chesapeake Bay Seminar Series, Annapolis, MD, “*Crassostrea ariakensis*—Panacea or Pandora. The need to reduce uncertainty in the march towards introduction”
- Luckenbach, M. W. 2003. University of Tokyo, Tokyo, Japan. “Evaluating the risks and benefits of introducing the Suminoe oyster to the east coast of the United States”

5. Oxygen tolerance of native and non-native oysters

NA05NMF4571237

PI: Paynter

Project dates: 7/05-6/06

Reports:

- Quarterly progress reports
- Final report – received March 2007

6. Predation by polyhaline invertebrate predators on young non-native oysters, *C. ariakensis*, in Chesapeake Bay

NA04NMF4570425

PIs: Kennedy, Newell

Project dates: 3/05-3/07 No-cost extension ends 3/08

Reports:

- Quarterly progress reports

Publications:

- Newell, R.I.E., V.S. Kennedy, and K.S. Shaw (2007). Comparative vulnerability to predators, and induced defense responses, of eastern oysters *Crassostrea virginica* and non-native *Crassostrea ariakensis* oysters in Chesapeake Bay. *Marine Biology* 152:449–460.

Manuscripts in Preparation:

- Kennedy, V. S., K.S. Shaw and R.I.E. Newell (in prep). Predation by two oyster drill species and a seastar on eastern oysters *Crassostrea virginica* and non-native Suminoe oysters *C. ariakensis*. To be submitted to *Biological Bulletin*.

Presentations:

- Relative susceptibility of *Crassostrea virginica* and *Crassostrea ariakensis* to mesohaline predators. V.S. Kennedy, K. Stevens, and R. I. E. Newell. Oral Presentation, Benthic Ecology Meeting, April 2005. Williamsburg VA.
- Predation by Mesohaline Invertebrate Predators on Non-Native Oysters, *Crassostrea ariakensis*, in Chesapeake Bay. K. Stevens, V.S. Kennedy, and R.I. E. Newell. Oral presentation, National Shellfisheries Association meeting, April 2005. Philadelphia PA.
- Changes in shell strength of *Crassostrea virginica* and *Crassostrea ariakensis* in response to crab predators from Chesapeake Bay. R.I. E. Newell, V.S. Kennedy,

and K. S. Shaw. Oral presentation, National Shellfisheries Association meeting, March 2006. Monterey CA.

7. Will predation mortality differ for larvae of native and non-native oysters?

NA05NMF4571232

PIs: Breitburg, Fulford, Luckenbach, Newell

Project dates: 3/06-2/08

Reports:

- Quarterly progress reports

8. Behavior, substrate selection and survival of *C. ariakensis* pediveliger larvae and juveniles to variation in environmental conditions

NA04NMF4570420

PIs: Tamburri, Luckenbach, Breitburg

Project dates: 3/05-2/07

Reports:

- Quarterly progress reports
- Final report – received August 2007

Publications:

- Tamburri, M. N., M. W. Luckenbach, D. L. Breitburg and S. M. Bonniwell. (In press). Settlement of *Crassostrea ariakensis* larvae: Effects of substrate, biofilms, sediment and adult chemical cues. *Journal of Shellfish Research* (accepted, in press).

Presentations:

- Luckenbach, M. W., S. M. Bonniwell, M. N. Tamburri and D. L. Breitburg 2005. 8th International Conference on Shellfish Restoration, Brest, France, “The effects of substrate and adult chemical cues on the settlement of *Crassostrea virginica* pediveliger larvae”
- Benthic Ecology Meeting, April 6-9, 2005, Williamsburg, VA. Settlement of *Crassostrea ariakensis* larvae under conditions found in the Chesapeake Bay
- 98th Annual National Shellfisheries Association, March 26-30, 2006, Monterey, CA. Settlement of *Crassostrea ariakensis* larvae under conditions found in the Chesapeake Bay
- Estuarine Research Federation Conference, November 4-8, 2007, Providence, RI. Potential Direct and Indirect Interactions Between *Crassostrea ariakensis* and *Crassostrea virginica*.

9. Quantifying the response of different strains of *C. ariakensis* larvae to environmental change under spatially realistic conditions

NA04NMF4570423

PIs: Newell, Kennedy, Manuel

Project dates: 3/05-2/07 No-cost extension ends 2/08

Reports:

- Quarterly progress reports

Manuscripts in Preparation:

- Manuscript for publication anticipated in November 2007

Presentations:

- Newell, R I. E. Comparative studies of diploid *Crassostrea virginica* and *C. ariakensis*: Preliminary results on competition and growth, susceptibility to predation, and larval behavior. IAN seminar series for Managers, NOAA Conference Building Annapolis, MD November 2006.

10. The use of non-native oysters in the restoration of Chesapeake Bay oyster populations and the potential threats posed by harmful algae

NA05NMF4571234

PIs: Glibert, Meritt, Stoecker

Project dates: 10/05-9/07 No-cost extension ends 9/08

Reports:

- Quarterly progress reports

Publications:

- Alexander, J.A. D. K. Stoecker, D. W. Meritt, S. T. Alexander, A. Padeletti, D. Johns, L. Van Heukelem and P. M. Glibert (In press). Differential feces and pseudofeces production by the oyster *Crassostrea ariakensis* when exposed to diets containing harmful dinoflagellate and raphidophyte species. *J. Shellfish Res.* In press
- Stoecker, D.K., J.E. Adolf, A.R. Place, P.M. Glibert, and D. Meritt (In press). Effects of the dinoflagellates *Karlodinium veneficum* and *Prorocentrum minimum* on early life history stages of the Eastern Oyster, *Crassostrea virginica*. *Marine Biology*. In press

Manuscripts in Preparation:

- Glibert, P., D. Stoecker, D. Meritt, J. Alexander, S. Alexander, D. Johns, and A. Padeletti. Oyster recruitment failure due to toxic dinoflagellates. In revision for *Aquatic Biology*.

Posters:

- Alexander, J.A. D. K. Stoecker, D. W. Meritt, S. T. Alexander, A. Padeletti, D. Johns, L. Van Heukelem and P. M. Glibert. Differential feces and pseudofeces production by the oyster *Crassostrea ariakensis* when exposed to diets containing harmful dinoflagellate and raphidophyte species.

Presentations:

- Glibert, P.M., J. Alexander, D.K. Stoecker, and D. Meritt. Impacts of eutrophication-related blooms of *Prorocentrum minimum* and *Karlodinium veneficum* on early life stages of oysters in Chesapeake Bay. National HAB symposium, Woods Hole, Oct 2007.
- Stoecker, D.K., J.E. Adolf, A.R. Place, P.M. Glibert, and D. Meritt. Effects of the dinoflagellates *Karlodinium veneficum* on early life history stages of the Eastern Oyster, *Crassostrea virginica*. Phycological Society of America, Aug 2007

11. Developing a Relationship between Gamete Concentration, Turbulent Mixing and Fertilization Efficiency in *Crassostrea*

NA06NMF4570246

PIs: Luckenbach, Mann, North

Project dates: 7/06-6/07 No-cost extension ends 6/08

Reports:

- Quarterly progress reports

12. Fertilization interference between *C. ariakensis* and *C. virginica*

NA04NMF4570428

PIs: Bushek, Guo, DeBrosse, Quinlan

Project dates: 12/04-11/06

Reports:

- Quarterly progress reports
- Final report – received July 2007

Publications:

- Bushek, D., A. Kornbluh, H. Wang, X. Guo, G. DeBrosse and J. Quinlan. (2007) Fertilization interference between *Crassostrea ariakensis* and *Crassostrea virginica*: a gamete sink? Journal of Shellfish Research. (accepted)

Manuscripts in Preparation:

- A second manuscript is being considered based on flume work and four-way gamete crosses not completed when above manuscript was written.

Presentations:

- Bushek, D. The American Oyster Fishery, Dermo Disease and Gamete Competition with Asian Oysters, Hainan University, April 14, 2007 Haikou, Hainan Province, China
- Bushek, D., A. Kornbluh, G. DeBrosse, H. Wang, and X. Guo. Oyster sex wars: evidence for a 'gamete sink' if *Crassostrea virginica* and *Crassostrea ariakensis* spawn synchronously. 98th Annual Meeting of the National Shellfisheries Association. March 26-30, 2006, Monterey, CA. J. Shellfish Res. 2006, 25(2):716
- Bushek, D. X. Guo and G. DeBrosse. Gamete survival and fertilization experiments with *Crassostrea virginica* and *Crassostrea ariakensis*. ICSR 05: 8th

International Conference on Shellfish Restoration, Brest, France. October 2-5, 2005.

13. Growth and Reproduction of the Suminoe Oyster in a U.S. Sub-Tropical Environment: EIS Ramifications?

NA06NMF4570245

PIs: Scarpa, Newell, Laramore, Dungan

Project dates: 10/06-9/07

Reports:

- Quarterly progress reports

14. Developing the capacity for fisheries use of the non-native oyster, *Crassostrea ariakensis*

NA03NMF4520274 (grant from NOAA Fisheries Southeast Regional Office to NC Dept of Environment and Natural Resources, Division of Marine Fisheries)

PIs: Peterson, Bishop

Project dates: 12/02-5/05

Reports:

- Final report to NC Division of Marine Fisheries 5/12/05

Publications:

- Bishop MJ, Peterson CH (2006). When r-selection may not predict introduced-species proliferation: Predation of a non-native oyster. *Ecological Applications* 16:718-730
- Bishop MJ, Peterson CH (2006). Direct effects of physical stress can be counteracted by indirect benefits: Oyster growth on a tidal elevation gradient. *Oecologia* 147:426-433
- Grabowski, J.H., Peterson, C.H., Powers, S.P., Gaskill, D. & Summerson, H.C. (2004). Growth and survivorship of non-native (*Crassostrea gigas* and *Crassostrea ariakensis*) vs. native eastern oysters (*Crassostrea virginica*). *Journal of Shellfish Research* 23:781-793.

15. Assessing asian oyster dispersion and potential risk of reproduction using a Chesapeake Bay hydrodynamic model with age-distribution functions

NA03NMF4570361

PIs: Mann, Moore, Shen, Snyder, Southworth, Hudson, Erskine

Project dates: 10/04-9/05

Reports:

- Final report (part 1 of 2) – Dye studies of potential oyster larval dispersal in the Chesapeake Bay
- Final report (part 2 of 2) – Assessing Asian Oyster Dispersion and Potential Risk of Reproduction Using a Chesapeake Bay Hydrodynamic Model with Age-Distribution Function

Oyster Diseases: Susceptibility of *C. ariakensis* to known disease-causing parasites and pathogens

1. Pathogenic *Bonamia* species from North Carolina

NA04NMF4570422

PIs: Carnegie, Burreson, Audemard, Peterson

Project dates: 10/04-9/07

Reports:

- Quarterly progress reports

Publications:

- Audemard, C., R. B. Carnegie, N. A. Stokes, M. J. Bishop, C. H. Peterson, E. M. Burreson. (*in press*). Effects of salinity on *Bonamia* sp. survival in the Asian oyster *Crassostrea ariakensis*. *Journal of Shellfish Research*.
- Bishop, M.J., R.B. Carnegie, N.A. Stokes, C.H. Peterson, and E.M. Burreson (2006). Predicting the outcome of a non-native oyster introduction: facilitation of an enzootic parasite. *Marine Ecology Progress Series* 325: 145-152.
- Carnegie, R.B., E.M. Burreson, P.M. Hine, N.A. Stokes, C. Audemard, M.J. Bishop, and C.H. Peterson (2006). *Bonamia perspora* n. sp. (Haplosporidia), a parasite of the oyster *Ostreola equestris*, is the first *Bonamia* species known to produce spores. *Journal of Eukaryotic Microbiology* 53(4): 232-245.
- Burreson, E.M., Stokes, N.A., Carnegie, R.B. & Bishop, M.J. (2004). *Bonamia* sp. (Haplosporidia) found in non-native oysters, *Crassostrea ariakensis*, in Bogue Sound, North Carolina. *Journal of Aquatic Animal Health*. 16:1-9.

Manuscripts in Preparation:

- Carnegie, R.B., N.A. Stokes, C. Audemard, M.J. Bishop, C.H. Peterson, A.E. Wilbur, T.D. Alphin, M.H. Posey, and E.M. Burreson. *Bonamia* sp. parasitism may limit invasion of euhaline waters by introduced *Crassostrea ariakensis*. *In preparation*.
- Carnegie, R.B., N.A. Stokes, C. Audemard, M.J. Bishop, C.H. Peterson, A.E. Wilbur, T.D. Alphin, M.H. Posey, L.D. Coen, and E.M. Burreson. An introduced pathogen acquires a native oyster host: *Bonamia* sp. infection in *Ostreola equestris* on the southern Atlantic coast of the USA. *In preparation*.
- Audemard, C., R. B. Carnegie, M. J. Bishop, C. H. Peterson, E. M. Burreson. *Bonamia* sp. survival in *C. ariakensis*: influence of low temperature. *In preparation*.

Presentations:

- Audemard, C., R.B. Carnegie, K.M. Hill, N.A. Stokes, M.J. Bishop, C. Peterson and E.M. Burreson. Influence of reduced salinity on *Bonamia* sp. survival and pathogenicity in the oyster *Crassostrea ariakensis*. World Aquaculture Society and National Shellfishery Association joint meetings. San Antonio, Texas.

- February 2007*
- Carnegie, R.B., N.A. Stokes, C. Audemard, and E.M. Bureson. Newly discovered species change our view of *Bonamia*, a genus of haplosporidian oyster parasites. International Symposium on Aquatic Animal Health. San Francisco. *September 2006*
 - Stokes, N.A., R.B. Carnegie, C. Audemard, K.M. Hill, and E.M. Bureson. Development and application of molecular diagnostics to study *Bonamia* sp., a pathogen of *Crassostrea ariakensis* in North Carolina. International Symposium on Aquatic Animal Health. San Francisco. *September 2006*
 - Audemard, C., R.B. Carnegie, K.M. Hill, N.A. Stokes, M.J. Bishop, C. Peterson and E.M. Bureson. Effects of environmental factors on *Bonamia* sp. survival and pathogenicity in the oyster *Crassostrea ariakensis*: implications for *C. ariakensis* introduction. International Symposium on Aquatic Animal Health, San Francisco, California. *September 2006*
 - Carnegie, R.B., N.A. Stokes, C. Audemard, E.M. Bureson, M.J. Bishop, C.H. Peterson, A.E. Wilbur, T.D. Alphin, and M.H. Posey. Potential impact of a new *Bonamia* parasite on the oyster *Crassostrea ariakensis* cultured in Virginia and Maryland, USA. AQUA 2006. Florence, Italy. *May 2006*
 - Carnegie, R.B., N.A. Stokes, C. Audemard, E.M. Bureson, M.J. Bishop, C.H. Peterson, A.E. Wilbur, T.D. Alphin, and M.H. Posey. Potential impact of *Bonamia* sp. on *Crassostrea ariakensis* in Chesapeake Bay and North Carolina. National Shellfisheries Association Annual Meeting. Monterey, California. *March 2006*
 - Carnegie, R.B., C. Audemard, N.A. Stokes, E.M. Bureson, M.J. Bishop, and C.H. Peterson. Epizootiology of *Bonamia* sp. in *Crassostrea ariakensis* in North Carolina, and implications for aquaculture. Eastern Fish Health Workshop. Shepherdstown, West Virginia. *June 2005*
 - Audemard, C., R.B. Carnegie, N.A. Stokes, M.J. Bishop, and E.M. Bureson. Salinity effects on the persistence of *Bonamia* sp. in *Crassostrea ariakensis*. Eastern Fish Health Workshop. Shepherdstown, West Virginia. *June 2005*
 - Bureson, E.M., R.B. Carnegie, N.A. Stokes, C. Audemard, M.J. Bishop, and C.H. Peterson. *Crassostrea ariakensis*-pathogenic *Bonamia* research in VA and NC: Progress through April 2005. NOAA Chesapeake Bay Office Integrated Research Program Symposium, Laurel, MD. *April 2005*
 - Carnegie, R.B., N.A. Stokes, C. Audemard, and E.M. Bureson. Bonamiasis in the crested oyster, *Ostreola equestris*, in North Carolina, USA. Third Meeting of the Microcell Working Group, Gloucester Point. *April 2005*
 - Audemard, C., R.B. Carnegie, N.A. Stokes, E.M. Bureson, M.J. Bishop. Salinity effects on the susceptibility to, and persistence of, *Bonamia ostreae* and *Bonamia* sp. in *Crassostrea ariakensis*. Third Meeting of the Microcell Working Group, Gloucester Point. *April 2005*
 - Audemard, C., R.B. Carnegie, N.A. Stokes, E.M. Bureson, M.J. Bishop. Salinity effects on the susceptibility to, and persistence of, *Bonamia ostreae* and *Bonamia* sp. in *Crassostrea ariakensis*. Annual Meeting of the National Shellfisheries Association, Philadelphia. *April 2005*

- Stokes, N.A., R.B. Carnegie, R.K. Crockett, E.M. Burreson, and M.J. Bishop. Molecular insights into *Bonamia* spp. infections in native and non-native oysters in North Carolina. Annual Meeting of the National Shellfisheries Association, Philadelphia. *April 2005*
- Carnegie, R.B., N.A. Stokes, C. Audemard, and E.M. Burreson. Bonamiasis in the crested oyster, *Ostreola equestris*, in North Carolina, USA. Annual Meeting of the National Shellfisheries Association, Philadelphia. *April 2005*
- Carnegie, R.B., C. Audemard, N.A. Stokes, E.M. Burreson, M.J. Bishop, and C.H. Peterson. *Bonamia*-related oyster mortality in North Carolina, and potential for infection of *Crassostrea ariakensis* in Chesapeake Bay. Annual Meeting of the Maryland Watermen Association. Ocean City, Maryland. *January 2005*
- Carnegie, R.B. Research on *Bonamia* in mid-Atlantic *Crassostrea ariakensis*. Haskin Shellfish Research Laboratory, Rutgers University. *November 2004*
- Carnegie, R.B., N.A. Stokes, C. Audemard, E.M. Burreson, M.J. Bishop, and C.H. Peterson. Recent developments in *Bonamia* research in Virginia and North Carolina. International Conference on Shellfish Restoration. Charleston, South Carolina. *November 2004*
- Carnegie, R.B., E.M. Burreson, N.A. Stokes, and K.S. Reece. Asian oyster *Crassostrea ariakensis* mortality in North Carolina reveals a previously unappreciated diversity of haplosporidian parasites. American Society of Parasitologists Annual Meeting. Philadelphia. *July 2004*

2. Susceptibility of *C. ariakensis* to *Bonamia* species: Potential for increased disease transmission between oyster species

NA05NMF4571242

PIs: Vasta, Robledo

Project dates: 7/05-7/07

Reports:

- Quarterly progress reports

Publications:

- Eric J. Schott, José A. Fernández-Robledo, Mohammad R. Alavi, and Gerardo R. Vasta (2007) Susceptibility of *Crassostrea ariakensis* (Fujita 1913) to *Bonamia* and *Perkinsus* spp. infections: potential for disease transmission between oyster species. *J. Shellfish Res.* (Submitted)

Presentations:

- Eric J. Schott, Mohammad R. Alavi, Keiko Saito, Satoshi Tasumi, and Gerardo R. Vasta. *Perkinsus* spp. and *Bonamia* spp. infections in *Crassostrea ariakensis* maintained in a fully contained aquaculture setting. Annual Meeting, Monterey, CA March 26-30, 2006. *J. Shellfish Res.* Vol 25.
- Gerardo R. Vasta. Antioxidant activities in the intracellular protistan parasite *Perkinsus marinus*. Invited speaker, Biomedical & Comparative Immunology Symposium (FIU), Miami. March 2006

- Mohammad R. Alavi, Eric J. Schott, Keiko Saito, Satoshi Tasumi, José A. F. Robledo, and Gerardo R. Vasta Assessment of the ability of *Crassostrea ariakensis* hemocytes to kill *Perkinsus marinus* in vitro. Annual Meeting, Monterey, CA March 26-30, 2006. *J. Shellfish Res.* Vol 25.
- Gerardo R. Vasta. Lectins in the Eastern Oyster *Crassostrea virginica*: Recognition and Effector Roles in *Perkinsus* spp Infections. Invited Speaker at the Workshop: “Immunity of Mollusks” 10th Congress of the International Society of Comparative and Developmental Immunology, Charleston, South Carolina, July 2006

3. Potential for *C. ariakensis* to serve as a vector for exotic pathogens in Chesapeake Bay

NA04NMF4570431

PIs: Reece, Carnegie, Burreson, Moss, Dungan

Project dates: 10/04-3/07 No-cost extension ends 3/08

Reports:

- Quarterly progress reports

Publications:

- Moss, J.A., E.M. Burreson and K.S. Reece. (2006) Advanced *Perkinsus marinus* infections in *Crassostrea ariakensis* maintained under laboratory conditions. *J. Shellfish. Res.* 25(1):65-72.
- Moss, J.A., Burreson, E.M., Corder, J.F., Dungan, C.F., Brown, G.D., Wang, A., Wu, X. and Reece, K.S. In press. Pathogens in *Crassostrea ariakensis* and other Asian oyster species: Implications for non-native oyster introduction to Chesapeake Bay. *Dis. Aquat. Org.*
- Moss, J.A., Xiao, J., Dungan, C.F. and Reece, K.S. in prep. A Novel *Perkinsus* sp. Parasite of Oysters in Southern China; a Description of *Perkinsus beihaiensis* n. sp. For submission to *Journal of Eukaryotic Microbiology*.

Manuscripts in Preparation:

- Moss, J.A., Xiao, J., Dungan, C.F. and Reece, K.S. in prep. A novel *Perkinsus* sp. parasite of oysters in Southern China; a description of *Perkinsus beihaiensis* n. sp. For submission to *Journal of Eukaryotic Microbiology*.

Posters:

- Moss, J.A. and Reece, K.S. (2006) Observations of Asian *Perkinsus* species in the Suminoe oyster, *Crassostrea ariakensis*, Poster presentation. ICOPA, 11th Annual Congress of Parasitology, Glasgow, Scotland, August 6-11, 2006.

Presentations:

- Moss, J.A. and Reece, K.S. (2006) Observations of Asian *Perkinsus* species and *Perkinsus marinus* in the Suminoe oyster, *Crassostrea ariakensis*. Oral presentation at NSA Annual Meeting, Monterey, CA March 26-30, 2006. *J. Shellfish Res.* 25:757.

- Reece, K.S., Moss, J.A., Stokes, N.A., Carnegie, R.B., Dungan, C.F. and Burrenson, E.M. (2005) Characterization of *Perkinsus* spp. and oyster herpes-like virus found in oysters collected in China, Japan and Korea. Invited Oral Presentation. 38th Annual Meeting of the Society for Invertebrate Pathology, University of Alaska Anchorage, August 7 -11, 2005, Anchorage, AK.
- Reece, K.S., Moss, J.A., Dungan, C.F., Carnegie, R.B., and Burrenson, E.M. (2005). Detection And Identification Of Oyster Herpes Viruses (OsHV) And *Perkinsus* Species From Oysters In Asia: Relevance To Chesapeake Bay. Invited Oral Presentation. 30th Annual Eastern Fish Health Workshop, June 13-17, 2005, Leetown, WV.
- Moss, J.A. and Reece, K.S. 2005. Pathogens of the Asian oyster, *Crassostrea ariakensis*, in its native range: current findings and work in progress. 97th Annual Meeting of the National Shellfisheries Association, April 10-14, 2005, Philadelphia, PA. J. Shellfish. Res. 24(2):668.
- Reece, K.S., Stokes, N.A., Carnegie, R.B., Moss, J.A., Crockett, R.K. and Burrenson, E.M. (2004). Pathogen Detection in *Crassostrea ariakensis* in its Native Range and on the US Mid-Atlantic Coast. Aquaculture 2004, March 1-5, Honolulu HI.
- Moss, J.A. and Reece, K.S. (2004). The presence of oyster herpes-like virus and *Perkinsus* in Pacific oyster populations. American Estuarine Research Society Meeting. March 25-27, 2004, Salisbury, MD.

4. Potential for *C. ariakensis* to harbor pathogens of humans and shellfish: Potential for increased disease transmission between oyster species

NA05NMF4571243

PIs: Vasta, Schott, Breitburg, Hines

Project dates: 7/05-7/07 No-cost extension ends 7/08

Reports:

- Quarterly progress reports
- Upon request, Breitburg could write up data on overwintering survival and growth in a low salinity, low tidal flushing environment.

Publications:

- Mohammad R. Alavi, Eric J. Schott, Keiko Saito, and Gerardo R. Vasta (2007). Comparative Survey of Bacterial Pathogens Associated with *Crassostrea virginica* and *C. ariakensis* (Fujita 1913). *J. Shellfish Res.* (Submitted)

Manuscripts in Preparation:

- Mohammad R. Alavi and Gerardo R. Vasta (2007). Development of an In Vitro Assay for the comparative evaluation of the intrahemocytic survival of *Perkinsus* spp. in *Crassostrea virginica* and *C. ariakensis* (Fujita 1913). (In preparation)
- Mohammad R. Alavi and Gerardo R. Vasta (2007). Analysis of bacterial pathogens associated with *Crassostrea virginica* and *C. ariakensis* (Fujita 1913). (In preparation)

Presentations:

- Gerardo R. Vasta, Mohammad R. Alavi, Eric J. Schott, José A. F. Robledo, Keiko Saito, Satoshi Tasumi, Wolf T. Pecher. *Perkinsus* spp. and *Bonamia* spp. infection in the Asian oyster (*Crassostrea ariakensis*) maintained in a fully contained aquaculture setting. The annual meeting of National Shellfish Association, Philadelphia, PA, April, 2005.
- Mohammad R. Alavi, José A. F. Robledo, Eric J. Schott, Keiko Saito, Satoshi Tasumi, and Gerardo R. Vasta. Assessment of the ability of *crassostrea ariakensis* hemocytes to kill *perkinsus marinus* in vitro. The annual meeting of National Shellfish Association, Monterey, CA, March 26-30, 2006.
- Eric J. Schott*, José A. F. Robledo, Mohammad R. Alavi, Keiko Saito, Satoshi Tasumi, and Gerardo R. Vasta. *Perkinsus* spp. and *Bonamia* spp. infections in *Crassostrea ariakensis* maintained in a fully contained aquaculture setting. The annual meeting of National Shellfish Association, Monterey, CA, March 26-30, 2006.
- Gerardo R. Vasta. Biotecnología Marina: La Próxima Revolución (Marine Biotechnology: The Next Revolution) Invited Conference, Sede Central de la Fundación Areces, Madrid, Spain, March 2006

Human Consumption Risk

1. Does *C. ariakensis* accumulate more microbial pathogens from *C. virginica* increasing the pathogenic risk for human consumption?

NA05NMF4571230

PI: Mitchelmore

Project dates: 7/05- 6/07

Reports:

- Quarterly progress reports
- Final report expected by end of September 2007

Manuscripts in Preparation:

- Manuscript being written in summer/fall 2007

2. Comparing microbiological characteristics of *C. ariakensis* and *C. virginica* with respect to uptake and elimination of bacterial and viral pathogens in situ

NA06NMF4570248

PIs: Kator, Reece , Audemard, Rhodes, Paynter

Project dates: 10/06-9/07 No cost extension ends 9/08

Reports:

- Quarterly progress reports

3. Environmental tolerance-dependent competition between adult *C. ariakensis* and *C. virginica* in recovering and retaining waterborne disease agents in relation to water salinity

NA04NMF4570426

PI: Graczyk

Project dates: 4/05-3/06

Reports:

- Quarterly progress reports
- Final report – received August 2006

Publications:

- Graczyk, T.K., A.S. Girouard, L. Tamang, S.P. Nappier, and K. J. Schwab. 2006. Recovery, Bioaccumulation, and Inactivation of Human Waterborne Pathogens by the Chesapeake Bay Nonnative Oyster, *Crassostrea ariakensis*. Applied and Environmental Microbiology. 72(5): 3390–3395.

4. Human pathogen uptake and retention comparison between *C. ariakensis* and *C. virginica* under wild and laboratory conditions

Funded by NOAA Ocean Service, National Centers for Coastal Ocean Science, Center for Coastal Fisheries and Habitat Research, 101 Pivers Island Rd., Beaufort, NC 28516

PIs: Govoni, Morris

Project dates: 1/05-9/05

Publications:

- Bean, T., J.A. Morris, Jr., R.T. Noble, P.K. Fowler. 2006. Comparative Microbial Dynamics in *Crassostrea virginica* and *Crassostrea ariakensis*. NOAA Technical Memorandum NOA NCCOS 25. 32 pp.

Aquaculture

1. Biosecurity and comparative field trials of triploid *Crassostrea ariakensis* with *C. virginica*.

NA03NMF4570379 (grant to the Virginia Center for Innovative Technology)

PI's: Allen, Reece, Burreson

Project dates: 7/03-3/05

Manuscripts in Preparation:

- Comparative industry trials between triploid *Crassostrea virginica* and *C. ariakensis* at eight field sites in Virginia: I. Growth, survival, and condition.
- Comparative industry trials between triploid *Crassostrea virginica* and *C. ariakensis* at eight field sites in Virginia: II. Reversion and gametogenesis.

Posters:

- Hudson, K.L., S.K.Allen, Jr. 2004. Biosecurity and comparative field trials of triploid *Crassostrea ariakensis* with *C. virginica*. NOAA Chesapeake Bay Office Integrated Research Symposium FY 2003, Laurel, MD. April, 2004.

Presentations:

- Hudson, K.L., A. Kozlowski, A.J. Erskine, S.K. Allen, Jr. 2004. Comparative field trials of triploid *Crassostrea ariakensis* with *C. virginica*. Maryland Waterman's Trade Show and Exposition, Ocean City, MD. February 6-8, 2004.
- Hudson, K.L., A. Kozlowski, A.J. Erskine, S.K. Allen, Jr. 2005. Comparative field trials of triploid *Crassostrea ariakensis* with *C. virginica* at eight field sites in the Chesapeake Bay: growth, mortality, condition, reversion and gametogenesis. National Shellfisheries Association, Philadelphia, PA. April 10-14, 2005.
- Hudson, K.L., A. Kozlowski, S.K.Allen, Jr. 2005. Biosecurity and comparative field trials of triploid *Crassostrea ariakensis* with *C. virginica*. NOAA Chesapeake Bay Office Integrated Research Symposium FY 2004, Laurel, MD. April 27-28, 2005.

**2. Comparative economic evaluation of triploid *C. ariakensis* and triploid disease-resistant *C. virginica*: Companion trial to 2005 VSC deployment
NA05NMF4571241**

PIs: Allen, Hudson, Fisher

Project dates: 10/05-9/07

Reports:

- Quarterly progress reports

Manuscripts in Preparation:

- The effect of hardening on incidence of *Polydora* and shell stock shelf life in triploid *C. ariakensis* and *C. virginica*.
- Prospective plan for operation and biosecurity of a triploid *Crassostrea ariakensis* oyster culture industry.
- The role of triploid *Crassostrea ariakensis* aquaculture as an adjunct to native oyster culture in Virginia.

Presentations:

- Allen, Jr., S.K. 2006. Risky business: Prospective look at triploid *C. ariakensis* aquaculture. National Shellfisheries Association, Monterey, CA. March 27-31, 2006.

2. The potential for using triploid *C. virginica* for on bottom culture in Chesapeake Bay

NA05NMF4571235

PIs: Southworth, Mann, Leggett, Erskine

Project dates: 7/05-12/07 No-cost extension ends 6/08

Reports:

- Quarterly progress reports
- PIs anticipate producing a report for peer review by October 2007

3. Developing the capacity for fisheries use of the non-native oyster, *Crassostrea ariakensis*

NA03NMF4520274 (grant from NOAA Fisheries Southeast Regional Office to NC Dept of Environment and Natural Resources, Division of Marine Fisheries)

PIs: Peterson, Bishop

Project dates: 12/02-5/05

Reports:

- Final report to NC Division of Marine Fisheries 5/12/05

Publications

- Grabowski JH, Peterson CH, Bishop MJ, Conrad R (in press, 2006). The bioeconomic feasibility of culturing *Crassostrea ariakensis* in North Carolina. *Journal of Shellfish Research*.
- Bishop MJ, Peterson CH (2005). Constraints to *Crassostrea ariakensis* aquaculture: Season and method of culture strongly influence success of grow-out. *Journal of Shellfish Research* 24:994-1006.
- Bishop, M.J. & Hooper, P.J. (2005). Flow, stocking density and treatment against *Polydora* spp.: Influences on nursery growth and mortality of the oysters *Crassostrea virginica* and *C. ariakensis*. *Aquaculture* 246:251-261.
- Bishop MJ, Peterson CH (2005). Consumer ratings of the Suminoe oyster, *Crassostrea ariakensis*, during home cooking. *Journal of Shellfish Research* 24:497-502.
- Grabowski, JH, SP Powers, CH Peterson, MJ Powers, DP Green (2003). Consumer ratings of non-native (*Crassostrea gigas* and *Crassostrea ariakensis*) vs. native (*Crassostrea virginica*) oysters. *Journal of Shellfish Research* 22:21-30.

Economics

1. Supply and management of oyster harvests in the Chesapeake Bay: An examination of historical factors and their implications for introduction of non-native oysters and targeted alternatives.

NA05NMF4571231

PI: Wieland

Project dates: 8/05-1/08

Reports:

- Quarterly progress reports
- Final report (part 1) – Operating costs in the Chesapeake Bay Oyster Fishery. August 16, 2006.

- Final report (part 2) – Estimated return to harvest due to the Maryland Department of Natural Resources repletion activities 1990-2006. November 26, 2006 (check with author David Herberich prior to peer review)
- Final report (part 3) – Managing oyster harvests in Maryland’s Chesapeake Bay. January 22, 2007
- Final report (part 4) – report evaluating Managed Reserves (put-and-take fishery) anticipated by end of Fall 2007

Manuscripts in Preparation:

- Financial Returns to Oyster Aquaculture
- Estimating values of oyster stock enhancement at different rates of achievement in the Chesapeake Bay

Presentations:

- Public and Private Costs in Maryland’s Chesapeake Bay Oyster Fishery. Presented at the 2006 AFS Annual Meeting as part of a symposium on Chesapeake Bay Fisheries Issues.
- Managing Oyster Harvests in Maryland’s Chesapeake Bay. Presented February 2007 at Horn Point Laboratory’s Brown Bag Lecture Series.

Support

1. Biological material support for studies on *C. ariakensis*

NA04NMF4570433

PI: Allen

Project dates: 10/04-9/07

Reports:

- Quarterly progress reports

Manuscripts in Preparation:

- High fidelity of tetraploid x diploid crosses improves prospects for all-triploid (non-native) *C. ariakensis* culture.