

Resolving the Benefits and Risks of *Crassostrea ariakensis* in Chesapeake Bay and Atlantic Coast Estuaries

Position of the University of Maryland Center for Environmental Science

The decline of natural populations and commercial production of the Eastern Oyster, *Crassostrea virginica*, in many Atlantic Coast estuaries, such as Chesapeake Bay, Delaware Bay and Pamlico Sound, has led scientists and fisheries interests to examine the prospects of culture of non-native oyster species that are less susceptible to rampant oyster diseases. Trials in Virginia using sterile, triploid individuals of an Asian oyster species, *Crassostrea ariakensis*, have to date shown it to survive and grow rapidly under a wide range of conditions found in Chesapeake Bay and to be far less susceptible to disease than *C. virginica*. Consequently, many oyster resource interests want to move forward with expanded culture of sterile, triploid *C. ariakensis*. However, this poses a risk of reversion of some cultured oysters to a fertile, diploid state, with the potential for unintentional establishment of populations of this non-native oyster. Furthermore, some suggest that because more disease-resistant oyster populations would produce substantial economic and ecological benefits, the intentional establishment of self-sustaining *C. ariakensis* populations should be actively considered. Others, however, argue that such an introduction should not be pursued or risked because of the history of undesirable consequences of many introductions of marine organisms.

The Virginia Institute of Marine Science, which has conducted most of the research on triploid *C. ariakensis* culture to date, has issued a statement on the future direction of efforts to evaluate its potential benefits and risks. Conservation organizations and federal and state agencies have also issued position statements. As a contribution to this discourse, scientific experts within the University of Maryland Center for Environmental Science have collectively developed the following perspectives:

1. Efforts should continue to evaluate the feasibility of aquaculture of sterile, triploid *C. ariakensis*, but only with strict biosecurity¹ and vigilant monitoring in place to minimize the risks of introduction.
2. Risks of the establishment of reproducing populations from triploid aquaculture should be carefully determined. While these risks probably cannot be totally eliminated, they potentially can be reduced to a very low level. Key objectives of this assessment should include quantifying risks in a manner so that decision makers can knowledgeably determine whether the risks are acceptable and evaluating the technical, economic and regulatory practicality of appropriate biosecurity measures.
3. Seed stock can be propagated in hatcheries in ways that eliminate the risk of infection by protist pathogens such as Dermo and MSX. This should be done in compliance with the internationally accepted code of practice². At present, similar controls on the transmission of viral diseases are not possible. Although there are no indications that such viral diseases pose a threat to the Eastern Oyster

- or other organisms, the potential for such cross-infection should be rigorously investigated.
4. Both the intentional introduction of reproductively capable *C. ariakensis* into Atlantic coast estuaries and experimental aquaculture trials that pose significant risks of this are irresponsible and should be guarded against until the potential impacts of such introductions on these ecosystems are thoroughly analyzed².
 5. More concerted efforts are required to improve the level of confidence of predictions of the impacts (both beneficial and detrimental) of reproducing populations of *C. ariakensis*, not only in Virginia or the Chesapeake Bay as a whole, but in coastal environments along a likely range of habitation on the Atlantic coast. Developing such predictions should involve investigations of *C. ariakensis* in its native habitats and in areas where it may have been introduced, such as Oregon and northern California, as well as carefully managed experiments in the laboratory and in Atlantic coast field settings.
 6. The State of Maryland has taken a risk-avoiding position concerning the potential for introduction of *C. ariakensis*. Nonetheless, it is important that Maryland scientists are actively engaged in assessments of biosecurity measures, risks and consequences associated with introduction in order to ensure that the State's concerns are fully addressed. Much of this can be done through collaboration in experiments and trials taking place in Virginia or North Carolina; however, some carefully controlled experiments on factors such as competition, predation, disease, and reproduction may be required to evaluate performance or ecological consequences in the extensive low-salinity, turbid environments prevalent in Maryland. Any such studies must be conducted under strict biosecurity protocols.
 7. There is a sense of urgency in addressing issues surrounding *C. ariakensis* aquaculture and introduction due to the economic and social benefits of improved oyster production, the challenge of restoring the ecological functions of oyster reefs, and the potential for counter-productive conflicts among economic and regulatory interests. Because the issues are of national significance, a broad group of experts convened by a body such as the National Research Council should identify the needed knowledge and develop a research agenda. Regional scientists should strive to address this agenda in a concerted and timely manner without compromising the rigor of science or rushing to judgment. With appropriate resources and effective organization such a strategic scientific evaluation could be accomplished over a 3 to 5 year period. Meanwhile, there is no reason to conclude that efforts to restore populations of the native *C. virginica* should be postponed or abandoned.

¹ Protocols have been developed under the International Commission for the Exploration of the Seas (<http://www.dfu.min.dk/ffi/wgagfmweb/rep94-98/wgagfm99.rtf>).

² International Council for the Exploration of the Sea. 1994. ICES Code of Practice on the Introductions and Transfers of Marine Organisms (<http://www.ices.dk/pubs/itmo.pdf>).