Virginia Seafood Council Proposal to Continue Non-native Oyster Tests Gets a Facelift, with Help from VIMS

Editor's Note— The Virginia Seafood Council (VSC) recently submitted a proposal to deploy 1 million sterile non-native oysters into Chesapeake Bay as a large-scale test of the economics of oyster aquaculture. The following article by Dr. Stan Allen provides background on how VIMS is fulfilling its research and advisory role in relation to non-native oysters and VSC requests. Dr. Allen is Director of VIMS' Aquaculture Genetics and Breeding Technology Center (ABC).

The Suminoe oyster *Crassostrea ariakensis* is a market favorite in southeastern China.

In 1995, VIMS began testing non-native oysters in Chesapeake Bay as one way to help revitalize the Bay's oyster population. These tests, requested by the Virginia General Assembly through House Resolution 450, have all used sterile oysters produced by newly developed technology.

VIMS' initial field tests focused on the Pacific oyster, *C. gigas*, the most popular oyster species in the world. But Pacific oysters are seldom reared in estuaries like the Chesapeake and their disappointing performance here emphasized why—they do not thrive in warm, low salinity, turbid waters. In 1997, trials began with another non-native oyster, the Suminoe or Asian oyster *C. ariakensis*, which excelled. Its growth and survival was outstanding and it even passed muster with local oyster connoisseurs.

By 2000, the success of the VIMS tests had piqued industry interest, and the Virginia Seafood Council (VSC) proposed a small trial of about 6,000 sterile oysters distributed among 6 growers. Results were so encouraging that VSC proposed another trial the following year with 60,000 oysters and 13 growers. In 2002, VSC proposed the largest test yet, with one million oysters to be distributed among as many as 39 growers.

All the VSC proposals were submitted to the Virginia Marine Resources Commission (VMRC), the agency with sole authority for the release of non-native species in Virginian waters. VMRC and other regulatory agencies will make any future decisions regarding the use of non-native oysters in light of a National Academy of Sciences report that is due in June 2003 (see article on facing page).

The 2002 VSC proposal differed from previous efforts in several significant ways. First, the sterile oysters VSC proposed to use would have been produced by technology inferior to that available today. The new technology, which now resides at VIMS, was not available when VSC penned their proposal. Second, the participant list was three times larger than the 2001 trials and included aquaculture novices as well as seasoned veterans. There were other less significant issues, but the main criticisms of the 2002 proposal concerned "biosecurity."

In the context of non-native oyster trials, biosecurity refers to measures taken to prevent the inadvertent introduction of a species, its pathogens, or associated pests. VIMS has taken great care in its trials to exercise biosecurity (see the Spring 2002 issue of the *Crest*). Biosecurity measures in the VSC proposal were less stringent, and realizing this, they withdrew their proposal from consideration. Following the withdrawal, VIMS discussed their concerns with VSC and offered guidance on improving the proposal. A revised proposal was written for 2003 and will be before VMRC in a public hearing on February 25th.

In addition to articulating biosecurity guidelines, VIMS contributed in other significant ways to the revised proposal. VIMS' most substantive contribution—and the one most important to biosecurity of the project—is making available its cutting-edge technology for producing sterile oysters. VIMS' Aquaculture Genetics and Breeding Technology Center (ABC) brought this technology on-line during summer 2002.

The technology involves a unique method to breed oysters with many more chromosomes than normal. The effect this has on the oyster varies with the number of chromosomes. For example, a normal oyster (called a diploid) has 20 chromosomes comprising 2 "sets" of 10. It obtained the two sets from its parents—one from mom, one from dad. Oysters containing 3 sets of chromosomes (triploid) are sterile because of their inability to produce normal eggs and sperm. However, endowing an oyster with 4 sets (tetraploid) re-establishes fertility. The cutting-edge technology is that process that creates tetraploid oysters, which are then mated with diploids to make sterile triploids.

Mating tetraploid and diploid to make sterile oysters is the key to large-scale trials of non-native oysters, in this case *C. ariakensis*, and of any future proposals to begin commercial aquaculture. ABC's accomplishment last summer was creation of significant numbers of the heretofore elusive tetraploids to enable the production of sterile triploids. This method of making triploids is superior to any other because a mating between tetraploid and diploid produces young oysters that are all—each and every one—sterile.

VIMS also contributed to the 2003 VSC proposal by offering to provide a comprehensive analysis of the economics of sterile *C. ariakensis* aquaculture. One of the principal reasons to expand trials with non-natives from 60,000 to a million is to study the cash flow and economic feasibility of oyster aquaculture, and the marketability of non-native oysters. To date, the vast bulk of oysters processed for sale in Virginia have been from natural harvests, not controlled aquaculture. The Marine Advisory Service at VIMS, through economist Tom Murray, has designed a quantitative assessment of *C. ariakensis* aquaculture, to the extent that the VSC proposal is now titled "Economic analysis of triploid *C. ariakensis* aquaculture."

The continued examination of *C. ariakensis* aquaculture is consistent with VIMS' official position statement on non-native oysters, which counsels a careful, systematic approach. Specifically, VIMS recommends that "scale-up to commercial production needs to be accompanied by implementation of and improvements in biosecurity."

The seafood industry is understandably eager to make an investment in the promise shown by *C. ariakensis* by expanding research trials to the development phase. Progressively larger industry trials are keeping stakeholders on their toes regarding the eventual use of non-natives. With the worst oyster catch on record this year in Maryland, the Bay community at large will be carefully watching the results of the VSC project, if approved. VIMS will be there to support the science of revitalizing the oyster industry and the goal of environmental stewardship.

For more information on VIMS' research and advisory role concerning non-native oysters, visit the Aquaculture Genetics and Breeding Technology Center web site at www.vims.edu/abc/