



Molluscan Shellfish Broodstock Management

Who cares and why?

Clams and oysters are the most economically important groups of mollusks in the U.S. Total commercial landings of all clam species in 2004 were valued at \$117 million. Commercial landings of Eastern oysters in 2004 were valued at \$111 million, and production of Pacific oysters on the West Coast in 2003 was valued at \$63 million. Diseases and overfishing have contributed to major declines in the oyster harvest on the Atlantic and Gulf Coasts. Although the Pacific oyster is not susceptible to major diseases, losses due to “summer mortality” have caused considerable economic damage to the industry. WERA-099 provides a forum for U.S. and international molluscan geneticists, physiologists, and pathologists to exchange ideas and information on genetics, reproduction, diseases, chromosome and genetic manipulation techniques, broodstock management, and breeding programs. This coordination allows researchers to reduce duplication of efforts and costs; identify research needs for enhancement of commercial molluscan production through genetic improvement; evaluate different approaches for restoration of depleted stocks of native oysters; and provide industry members with up-to-date research information that will lead to optimal broodstock management and breeding programs to enhance commercial production nationwide.

What has the project done so far?

This project has provided a forum for U.S. and international molluscan researchers to exchange ideas and information. Discussions among project researchers have helped modify current breeding programs to make them more efficient. Proposal and research activities have been coordinated

This project has facilitated discussions among researchers that have helped modify current breeding programs to make them more efficient, relevant, and transferable to industry.



Chris Langdon, Oregon State University's oyster breeder, keeps track of the progress of males and females in dozens of families and generations of Kumamoto oysters. Photo by Lynn Ketchum.

and leveraged. International developments have been factored into U.S. efforts. For example, project researchers learned from international participants about strategies to transfer selected broodstock information to industry.

Impact Statements

Developed markers for genetic selection that could be used in more efficient breeding programs to produce disease-resistant mollusks.

Provided industry with research on stocks, families, and lines that show improved performance.

Worked on an international effort to map the genome of the Pacific and Eastern oyster, demonstrating the genetic basis of disease resistance, growth, and survival in these oysters.

Studied larval survival related to coastal and hatchery water quality, coastal upwelling, ocean acidification, and bacteria that attack oysters.

Released improved, sterile oysters in cages in Chesapeake Bay, raising interest in oyster aquaculture.

Worked with industry to develop tools for diagnosing disease status and markers for certain desirable characteristics, providing farmers with higher quality oysters.

What research is needed?

The USDA-NIFA funded West Coast Molluscan Broodstock Program has lost funding and will focus on transferring developed breeding technologies and improved broodstock to industry. The West Coast USDA-Agricultural Research Service oyster genetics program will revitalize its genetic research efforts by developing direct partnerships with industry. These partnerships will use mixed-family approaches to conduct more sophisticated experiments on larval traits under more relevant conditions. Better understanding of oyster RNA and genome should be used to develop high-density silicon chips that can be used to identify the presence of specific DNA sequences. In addition, testing sterile planted triploids for disease resistance, shelf life, hybrid vigor, and production improvement is needed and widespread water quality issues must be mitigated.



A researcher tends to an oyster nursery. Photo by Lynn Ketchum.

Want to know more?

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Edited and designed by Sara Delheimer



By studying the biology and ecology of native mollusks, researchers can help industry develop effective tools and methods for maintaining healthy mollusk populations. Photo courtesy of the Virginia Institute of Marine Science.