The Molluscan Broodstock Program (MBP) works in partnership with the West Coast oyster industry to improve the performance of Pacific oysters through genetic selection.

The objectives of MBP are: 1) to improve Pacific oyster broodstock through selection in order to enhance commercial yields and other desirable traits, 2) to establish a broodstock management program with industry for sustainable, long-term improvements in commercial production, 3) to maintain a repository for genetically selected oyster families and cryopreserved gametes.

Oyster families are planted in partnership with the West Coast oyster industry at sites in California, Oregon, Washington and Alaska. Families with the highest yields (meat weights) are identified and crossed to produce subsequent generations for selection. Selected broodstock and advice on broodstock management are provided to industry to enhance commercial production. Seed produced by the Molluscan Broodstock Program is cultured under conditions that exclude potential infections from harmful microorganisms and parasites. A repository preserves valuable genetic material for future applications.

MBP has been producing and selecting oyster families since 1996. Two “cohorts” (50 families of oysters) are produced each year. Each family is the result of a cross between male and female oysters from different parental families. The program started with 6 founder cohorts, produced from 100 oysters each, collected from different areas on the west coast. This founder population of nearly 600 oysters provided a broad genetic base from which to begin selection. This broad base, along with pedigreed families helps avoid the negative effects of inbreeding on family performance.

MBP focuses on selecting for yield. Yield is the sum of both survival and growth. Future characteristics to be selected for include shell and mantle color and shell shape.

MBP has achieved an average increase in yield per generation of approximately 20% (whole live weight) over unselected oysters. These are excellent results, compared with previous work in cultured marine species. The West Coast oyster industry has already made extensive use of MBP broodstock, and plans to continue this in the future. MBP is funded as a special project through the U.S. Department of Agriculture/CSREES.
The Molluscan Broodstock Program (MBP) has achieved an average increase in yield of 41% (whole live weight) over two generations of selection compared with yields of unselected oyster lines (MBP average all families = yellow bar vs. wild = blue bar). The average of the top 5 MBP selected families (red bar) was 87% above unselected lines (blue bar) and 77% above the industry control average (green bar). Using pedigreed broodstock, such as selected MBP oysters, prevents in-breeding, which has been shown to substantially depress yield (inbred = black bar).

MBP supplies West coast hatcheries with superior oyster broodstock for use in commercial-scale spawns. Detailed pedigree records allow us to recommend crosses among specific parental families in order for industry to recreate the highest-yielding MBP families. These specific parental families have been given paired names, such as “Adan and Eve” and “Ying and Yang”. MBP currently maintains a repository of superior oyster families in Netarts Bay, Oregon. Additional information about broodstock availability can be obtained at www.hmsc.oregonstate.edu/projects/mbp.

The Molluscan Broodstock Program is also investigating breeding for oyster shell and mantle color, as well as shell shape. Initial data indicate that oyster shell and mantle color are under a high degree of genetic control. Selection for shell shape also looks promising. One day, U.S. oyster growers may be able to custom order high yielding oyster seed of a specific shell color and shell shape, enabling them to better compete for specialty market shares.