

17 Aquaculture: Overview

The commercial culturing of marine species in California is limited primarily to the production of shellfish such as abalone, clams, mussels and oysters. While the culturing of finfish for enhancement purposes is well established in California, commercial culturing has been limited in scale and remains focused on solving technical questions through research. The commercial production of most cultured shellfish has remained about the same or declined slightly from recent peaks in the last 6 years. Oyster production is down from a peak in 1994, clam production has leveled off from a peak in 2004, mussel production is down but has leveled off from a recent peak in 2002, and abalone production is down slightly but has leveled off from a historical peak in 2004. In several instances, demand exceeded production and the declines reflected several ongoing challenges faced by these industries in their efforts to maintain production. More information on production levels can be found in the specific sections that follow.

Developing and maintaining production of cultured marine species is still influenced by technical problems, in some cases in spite of a well-established production history. Fledgling industries, such as those engaged in scallop and finfish production, face technical challenges in developing breeding and rearing techniques. Many technical problems are being solved and there is now interest in developing a commercial offshore aquaculture demonstration project in southern California. Several species that are established in California waters have been raised in captivity and have good market appeal. As marine capture fisheries reach their limits of production, farming of marine finfish is one means of providing consumers with high quality seafood.

Environmental change or disease impacts also present technical challenges in maintaining production to the well-established industries, such as oyster and abalone culture. Human-caused changes in water quality, for example, present significant challenges to culture facilities that are sited in bays and estuaries. In order to address product safety concerns in these areas, the production of filter-feeding bivalves such as mussels, oysters, and clams are often subject to lengthy closures or depuration (removal of contaminants) requirements. The presence of a shellfish aquaculture facility or lease in an area can, as a consequence, provide a contamination early-warning system for recreational harvest of shellfish and an assessment of the water quality conditions in the general area.

Passage of the 1993 Shellfish Protection Act mandated the formation of local Technical Advisory Committees to assist the Regional Water Boards in remediating water quality in impacted bays and estuaries and thus reducing the number of days closed to shellfish harvesting. With the exception of concerns related to the accumulation of biotoxins, changes in water quality do not present significant technical challenges in the culturing of scallops because of the tendency in that industry to site in offshore areas. Natural changes in water quality have also hampered shellfish production. Much of the recent decline in production can be attributed to El Niño related

impacts, particularly in the culturing of oysters, mussels and abalone. A broader discussion of these technical challenges can be found in the specific sections that follow this overview.

Development of a technical response to disease, and conforming to regulatory requirements related to disease control have both influenced production in the oyster and abalone industry and have influenced the success of white seabass enhancement efforts. Oyster production in Tomales Bay, for example, continues to be influenced by a significant complex summertime mortality syndrome influenced by environmental factors and a viral oyster pathogen. Abalone production has been influenced by mortality from withering syndrome and hampered by regulatory requirements intended to prevent the spread of an exotic parasitic worm. Through cooperative efforts between growers and regulators, the parasitic worm has been controlled and may be nearly eradicated from state waters. Large numbers of juvenile white seabass propagated for enhancement purposes have been destroyed to address disease concerns. In each instance, the industry made positive contributions to cooperative efforts among resource agency disease management researchers.

Many California shellfish growers, primarily oyster growers, are facing problems in obtaining adequate supplies of seed. In response, the industry is modifying grow out systems, looking at new sources of seed from outside of the state or bioeconomic region, and examining the feasibility of developing new hatchery facilities within the state.

Environmental laws and regulations have impacted the growth and expansion of established industries such as oysters and abalone but have also impacted developing industries such finfish culture. The recent passage of the California Sustainable Oceans Act of 2006 provided a framework for managing marine finfish aquaculture within state waters. However, passage of the federal National Offshore Aquaculture Act (2005, 2007) has been delayed and there is currently no comprehensive federal framework for regulating offshore aquaculture. California has begun to provide that framework by registering offshore farms in federal waters that will allow a period of experimentation and innovation to begin. The Sustainable Oceans Act also mandated that a Programmatic Environmental Impact Report (PEIR) be prepared. This document, which can be used for project level environmental documents, will provide a framework for managing finfish aquaculture in state waters and address siting and best management practices for existing shellfish culture and future finfish culture.

Taken as a whole, the industry has ardent entrepreneurial support, has great economic potential, and has been a source of significant positive societal benefit. The California legislature supports the development of aquaculture. However, there are numerous other stakeholders that use and enjoy California coastal and marine areas. The aquaculture industry must integrate into the multi-stakeholder arena that also includes an evolving system of national marine sanctuaries and state marine protected areas. The oyster industry, for example, is part of California's cultural heritage. Oyster growers can responsibly farm shellfish with minimal adverse environmental impacts and can even help improve coastal environments by providing ecosystem services such as

filtering water and by providing refuge and feeding areas for aquatic organisms. The beneficial roles aquaculture can play need to be highlighted and broadly publicized.

If not conducted in a resource-sensitive manner, aquaculture can also cause negative environmental impacts, by introducing exotic species, by introducing or contributing to the spread of disease, or by altering the natural systems within which production facilities are located. The key to achieving the positive aspects of aquaculture while minimizing negative ones rests in how effectively the industry, the research community and regulatory agencies can work together. Cooperation among these groups is bringing California closer to eradicating an abalone parasitic worm inadvertently introduced from South Africa. To further foster collaboration and communication, the California Department of Fish and Game has established the Aquaculture Development Committee and the Aquaculture Disease Committee with members from the industry, state and federal regulatory agencies and non-governmental organizations.

Industry leaders are now focusing on developing best management practices to ensure that shellfish culture does not impact the health of ecosystems upon which they depend. Marine finfish culture offshore is solving technical problems and has demonstrated encouraging projections on economic viability. A common goal will be to ensure that the industry achieves its successes with due regard for California's living resources in resource sensitive ways without having to do so under an undue regulatory burden. The State has the mechanisms in place to achieve that goal by developing partnerships and establishing trust through effective communication among the industry, the regulatory agencies and the general public.

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