



Sea Grant key to resolving state's coastal dilemmas

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Like the land grant colleges a century before, the birth of California's Sea Grant College required farsighted individuals who understood that basic science could be applied to social and economic needs.

Three decades ago, that was unorthodox thinking at UC San Diego's Scripps Institution of Oceanography, an organization devoted to fundamental science. UCSD Chancellor John Galbraith wrote to the then-acting UC President,

Applied oceanography of the type envisaged in the Sea Grant College bill is not currently the thrust of Scripps research, although the Institution . . . possess[es] considerable talent which might be utilized for such a program.

But in 1968, Scripps did accept a federal Sea Grant award to initiate an interdepartmental curriculum in applied ocean sciences — and California's Sea Grant program was born. Other campuses and universities soon followed suit. In 1973, UC became the flagship of participating California universities when it was designated the nation's seventh Sea Grant College.

In this issue of *California Agriculture*, we take stock of California's Sea Grant College system and particularly its Extension arm on the eve of the program's 25th anniversary.

As is true of its land grant namesake, Sea Grant's mission includes extending research from the University to users through a network of advisors and specialists. In the beginning, California's marine advisors, who were appointed within the existing Cooperative Extension network, had very simple goals: to provide "pamphlets, advice and workshops to persons in marine industries, and others."

Today the goals of California's Sea Grant Extension Program are vastly more complex, ranging from reducing nonpoint-source pollution in coastal waters, to developing practices that ensure seafood safety, advance aquaculture, and assess and monitor sea life.

The people and industry Extension serves have also changed. California's population has increased 50% since 1973, and its ocean-dependent industries have grown. Today seven of the largest provide 370,000 jobs and \$17 billion in annual income, according to a 1992 California Research Bureau study.

The fishing industry has also grown in sophistication in the last quarter century. Present-day fishing vessels are equipped with echosounders, aerial spotters and satellite navigation systems to make them more efficient — sometimes too efficient. In California, overfishing has contributed to serious depletion of abalone, salmon, squid and sea urchins; white abalone may soon be the state's first marine species to become extinct (page 5).

In addition, population growth in the state, particularly in coastal counties where 80% of Californians live, has signifi-

cantly degraded nearshore ocean and coastal areas — the most biologically productive marine environments.

Worldwide, as in California, most commercial fisheries are fully exploited. Although they currently supply around 100 million metric tons of seafood annually, demand is projected to increase to 160 million metric tons by 2020.

One partial solution to this problem may be aquaculture. Traditionally, fish have been harvested but not managed. They were a natural resource, not an agricultural one. Now we know that we can do much more than harvest what nature provides.

For instance, with wild fish catch stagnating, farmed fish production has increased. In the United States, the production of farmed fish nearly doubled from 1984 to 1994. Today 40% of salmon consumed in the United States is farmed. Other products of aquaculture pouring into American supermarkets are catfish, trout, striped bass, sturgeon, tilapia, shrimp, mussels, scallops, oysters and clams.

But farming the sea, like farming the land, can have unexpected consequences. Introductions of farmed fish or shellfish, especially non-native species, can disrupt the natural balance and introduce parasites or disease. Concerns such as degradation of water quality through nutrient loading also need to be considered.

Sea Grant's two marine specialists and seven advisors are well-positioned to help resolve these and a host of other dilemmas. Their broad research base includes not only the DANR campuses and the statewide Cooperative Extension network, but also the other UC campuses, the California State Universities, and private institutions throughout the state.

In this issue we examine a few of Sea Grant's research and extension efforts, taking a look at improved methods of fisheries management (page 27), complex forces that influence ocean ecosystems (page 36), pharmaceuticals harvested from the sea (page 45) and practices that ensure seafood safety (page 50). We also highlight the work of marine advisors whose projects range from applying geographic information systems to coastal planning, to reducing coastal pollution by training boat owners, growers and others.

Like so many other programs, the good the Division could do with greater investment is almost limitless. Our understanding of the ocean and coastal resources is still in its infancy. The number of Sea Grant Extension staff serving California are too few for the state's thousand-mile coast, and resources are stretched. However, with help from our partners in government and industry, we can increase our understanding of the coastal and marine ecosystems on which we all depend. We can improve the effectiveness of marine resource management, and enhance Sea Grant's programs to protect our magnificent resources in the sea.