

tion, the helium research effort provides technical support to the production and sales and the acquisition and storage functions by solving non-routine problems in physical analysis and measurement of helium-gas mixtures.

FISH AND FISHERY PRODUCTS

AQUICULTURE

Aquatic farming or aquaculture is not a new idea. Roman oyster farms in the first century B.C. used methods similar to those used today. It is strange that private interest in commercial aquaculture has developed only recently on a large scale. Our fisheries bureaus receive inquiries for information and advice almost daily. The requests are from large companies with abundant capital and from individuals seeking ways to increase their income, and a few are from persons hunting methods of supplementing retirement income. About 20 companies are engaged in marine aquaculture.

Less than 10 years ago, farming of freshwater food and game fish was a burst bubble. Rice and soybean farmers of the Mississippi delta states, encouraged by a few scattered successes, had converted surplus acres to great pond and reservoir complexes. They built a processing plant, planted some young catfish, buffalo fish, black bass and other sunfish, and usually awaited a harvest in vain.

Rearing trout and salmon in Government-owned hatcheries for replenishing public fishing waters has a hundred years of history in this country. But large-scale privately owned fish farming (except for a few trout farmers) began when an Arkansas rice grower found that his rice-watering reservoir contained wild sunfish, buffalo fish, and catfish that were marketable for food or sport. The idea caught on quickly as a means of supplementing farm income and using surplus lands. Fish farmers' associations were organized, Arkansas law was changed to allow sale of farm-reared fish of any species, but the husbandry aspect of fish rearing was largely unrecognized.

Now in 1967, all the evidence points to fish as a profitable crop (catfish is the best) to diversify the farming practices of Arkansas, Alabama, Kansas, Louisiana, Mississippi, and Texas. A science of large-scale fish husbandry is developing and in 5 years has turned freshwater fish farming from a long-shot gamble to an enterprise with as much opportunity for success as other crop raising.

The Nation's coastal areas also have potential in aquaculture—the magnitude of which is yet to be fully realized. At about the same time the Arkansas rice grower was discovering his new cash crop, the Bureau of Commercial Fisheries was getting its aquacultural research started, emphasizing artificial spawning, feeding, and culture of oysters and clams. Results are already in use by oyster companies in operating hatcheries to produce seed oysters. In 1965 and 1966, three of these commercial hatcheries produced 40,000 bushels of seed oysters. In 3 years this seed could produce 120,000 bushels of market oysters valued at \$1,900,000—a value approximately equal to all Bureau funds spent on oyster aquaculture research in the past 9 years.

The Bureau of Commercial Fisheries conducts research on oyster, clam, pompano, and shrimp aquaculture at laboratories at Milford, Connecticut; Oxford, Maryland; St. Petersburg Beach, Florida; and Galveston, Texas. Life history, physiological, and behavior studies at other Bureau laboratories contribute to the development of aquaculture of lobsters, crabs, and other fish. The Bureau of Commercial Fisheries projected 5-year plan increases emphasis on aquacultural studies, particularly of genetics and selective breeding, foods, diseases, and development of culture methods from larvae to adults.

After enactment of the Fish Farming Act, P.L. 85-342, the Bureau of Sport Fisheries and Wildlife in 1961 established a Fish Farming Experimental Station at Stuttgart, Arkansas, and a demonstration area at Kelso, Arkansas; the latter awaits full development. The Bureau of Commercial Fisheries participates in the fish farming development program with gear development, technology of processing, and marketing promotional activities. Fish farming research is solidly based on the older warmwater fish-cultural research for the hatchery program of the Bureau of Sport Fisheries and Wildlife.

In the lower Mississippi River valley freshwater fish farming is now well enough established that it must be regarded as a basic part of its agriculture. Fish is the only crop developed in the past generation that offers an opportunity to diversify the agriculture of the area. While embodying principles of water and soil conservation as basic parts of the practice, fish farming produces a crop