

**A Report on the
Humboldt State University
Sea Grant Program
Sept. 1972 - Sept. 1973**

ANNUAL REPORT

**Submitted by
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SEA GRANT PROGRAM
1972 - 73

INTRODUCTION

The objective of the Coherent Area Sea Grant Program at Humboldt State University is, as the title states, the 'Development of the Living Marine Resources of Northern California.' This clearly indicates the emphasis that has been given to support the commercial and recreational fisheries of this region. To accomplish our objective, we are attempting to involve marine users and resource persons available in our area. We believe that through this cooperative involvement, the opportunity exists to identify, and solve, relevant problems.

The Sea Grant Program at Humboldt State University is coordinated by Dr. Richard L. Ridenhour who is responsible, in this capacity, to the President of the University. All financial activities are conducted in accordance with the policies of the Humboldt State University Foundation which is the actual recipient of the grant. Guidance to the program is provided by an Advisory Committee which includes individuals who represent the commercial fishing industry, the fish processing industry, marine-oriented recreation including fishing, the California Department of Fish and Game, the Bureau of Sport Fisheries and Wildlife, College of the Redwoods, and Humboldt State University. The programs submitted for funding are reviewed and supported by the Advisory Committee.

The orientation of the program at Humboldt State University reflects the interests and expertise of the staff at the University. The strong programs in the Natural Resources have been recognized by the Board of Trustees of the California State Universities and Colleges by giving this institution the mandate to emphasize and develop these programs. Comprehensive programs in Fisheries at the baccalaureate and masters degree levels and Oceanography at the baccalaureate level have been developed. The need for support for these programs from the biological sciences has led to the development of a substantial marine biology program. A variety of specialized instructional facilities including a marine laboratory at Trinidad and chartered ocean-going vessel capability are available. A special program in fisheries, the California Cooperative Fisheries Unit, is located on campus and serves as a significant augmentation to the graduate program in fisheries.

This report will describe the activities of the four research projects and Marine Advisory Program which received Sea Grant support during FY 72-73.

FUND ALLOCATION BY CATEGORY
1972 - 73

	<u>Sea Grant</u>	<u>Matching</u>
Program Management	7,700	5,400
Research	79,200	65,500
Advisory Services	43,000	3,600
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Totals	129,900	74,500

RESEARCH ACTIVITIES

The program to identify ways and means to rear salmon and trout, without artificial feeding, in brackish waters fertilized with sewage effluent has been continued under the direction of Dr. George Allen since 1969. The goal of the project is to develop a pilot facility that could be used to demonstrate the potential for making beneficial use of sewage effluents and to stimulate installation of similar facilities on a production basis at other locations. The ultimate practical application is to demonstrate how waste-water enriched fish ponds might be used productively to rear trout and salmon at a lower cost than standard fish cultural methods.

Several experiments have now been completed involving the introduction of salmon into the ponds to determine appropriate stocking densities and measure production potential. The results have been detailed in our 1973-74 proposal. Additional experiments are being conducted and planned to test other factors and to apply the results of the completed experiments. A report entitled "A Pilot Fish Pond System for the Utilization of Sewage Effluents, Humboldt Bay, Northern California," has been published.

Studies on the ecology of the red abalone, Haliotis rufescens, in northern California are being carried out by Dr. John DeMartini in cooperation with the California Department of Fish and Game, represented by Mr. Richard Burge. Exclusively a sport fishery in this area, the study is designed to provide biological information necessary for a determination of whether the population can support additional sport as well as commercial exploitation. Detailed studies are being made of growth, movement, recruitment, and reproduction. Accomplishments include the accumulation of information on the growth of adult, sub-adult, and juvenile abalones, recruitment, food supplies and food habits, reproduction, movement, predation, and mortality.

The objective of the radiometric study of amino acid and lipid nutrient requirements of three commercially important shellfish being conducted by Dr. William Allen is to generate basic information on the nutritional requirements of the Pacific oyster, red abalone, and Dungeness crab. The experimental approach is to inject ^{14}C -labeled precursors (e.g. $\text{U-}^{14}\text{C}$ -glucose, $1\text{-}^{14}\text{C}$ -acetate or $2\text{-}^{14}\text{C}$ -acetate) into the hemolymph of juvenile specimens and subsequently isolate and radioassay individual amino acids, fatty acids and sterols. This information is required for the development of commercial feeds for aquaculture programs. Work on the amino acid requirements of the red abalone has been completed.

Dr. William Allen's attempts to develop an artificial bait for the Dungeness crab fishery is continuing. The objective is to develop a bait which is competitive in cost and effectiveness with present baits and which will not require refrigeration. Polyacrylamide gels are used as a matrix for holding

chemattractants. Numerous potential chemattractants have been tested in the laboratory. Field testing of gel baits have been limited due to prevailing poor crab fishing conditions. Efforts are being made to experiment with the bait in fisheries for other species and in other areas.

The program to isolate and study the microbes which decompose complex molecules in kraft pulp mill effluents was initiated by Dr. William Lester in 1970. Current research activities have been directed in three major sub-project areas: (1) Bioassay, (2) Chemical (Photochemical and Chromotographic) assay, and (3) Anaerobic Bacteria Isolation, Aerobic and Facultative Bacteria Isolation.

Over 30 strains of anaerobic bacteria have been isolated in pure culture to date. These include members of the genus Peptostreptococcus, Vellonella, Bacteroides, Clostridium, Actinomyces and Streptomyces. Speciation and metabolic breakdown products will be carried on in the next phase of the project. Over 130 strains of aerobic bacteria have been isolated in pure culture including members of the genera Pseudomonas, Corynebacterium, Bacillus, Sarcina, Micrococcus and Proteus. Several strains of yeast have also been isolated.

The indications are that the aerobic process does not break down the basic lignin molecule so that the molecule can still produce chlorinated phenols and cresols at a later time. The anaerobic process attacks the basic structure of the lignin molecule but does not appreciably affect the phenol and cresol rings. Since neither process would appear to adequately detoxify the effluent, it would seem that an anaerobic process followed by an aerobic process may lead to complete detoxification. Initial studies have indicated that the larvae of Eurekus calpo can be used as very effective bioassay test animals.

The biological investigations of the chinook salmon (Oncorhynchus tshawytscha) and coho salmon (O. kitsuch) directed by Dr. Robert Van Kirk was designed to obtain growth and movement information for the management of the ocean fishery off northern California. Cooperators include Humboldt State University, California Department of Fish and Game, and the commercial fishing industry. The basic plan consisted of a tag and recovery program for coho salmon and age-length and species composition sampling of coho and chinook caught in the ocean troll fishery. Partially as a result of the data collected on this study, the California Department of Fish and Game has changed the regulations which pertain to silver salmon by changing the size limit and season. Initial results appear to indicate a significant economic benefit without an adverse impact on the resource.

ADVISORY SERVICES

The Marine Advisory-Extension Service (MAES) serves as the vital communications link between the University and people involved with the utilization of the marine resources. This service has been supported since 1970 and presently serves the northern California area, including the major fishing ports of Fort Bragg, Eureka, and Crescent City, in accordance with a position statement presented to the California Sea Grant Directors in January, 1973. The program is directed by Mr. Stan Ludwig, who is assisted by Mr. Fred Jurick. The service has directed its attention primarily to the commercial and sport marine fishing industries. This program is a member of the California Marine Advisory Program (CMAP) group which serves to coordinate advisory activities within the state and of the Pacific Sea Grant Advisory Program (PASGAP).

The MAES program uses whatever methods that are available to achieve the goal of effective transfer of information including person-to-person contact, planned workshops, and symposia. Talent-sharing is utilized under the auspices of the PASGAP program. In addition, a quarterly newsletter, Trident, is published as well as occasional information leaflets.

Accomplishments during the past year have included a financing workshop, collection and dissemination of information on fishery management by Limited Entry, participation in meetings of the California Seafood Institute, interaction with the California Coastal Zone Conservation Commission, and cooperative efforts with other state and federal agencies.