

# UPDATE

an interim report on  
the oregon state university  
sea grant college program  
1977-1978

ORESU-Q-78-001



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and Company

SUBJECT: **introduction**

Here at Oregon State University, Sea Grant has worked hard with Oregonians for the past 11 years to promote the wise conservation and use of marine resources.

We have addressed problems that people face with our solid research talents at OSU and the University of Oregon. We have helped educate marine resource users, whether they be fishermen or lawyers. We have transmitted the results of our research to Oregonians and Oregonians have voiced their concerns about the ocean and coast to us through the Marine Advisory Program.

This annual report highlights accomplishments during the 1977-1978 fiscal year. It is an interim report, brief but concise. I think it will give you a good idea of why we have chosen the projects we have and our investigator's accomplishments.

**advisory**



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

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FROM: Bill Wick and company

SUBJECT: **getting it where it counts**

EXTENSION MARINE ADVISORY PROGRAM (A/EMAP-1)      K. Hilderbrand

The Marine Advisory Program connects Sea Grant directly to the public. MAP communicates Sea Grant research results to people, and people relay their marine problems to Sea Grant through MAP. The staff also helps people adjust to changes in their lives and communities.

Last year, the MAP staff had several accomplishments. A sampling of them shows that MAP:

--- conducted SEATAUQUA, a series of informal classes held at the Marine Science Center in the summer to increase public awareness of marine resources and management;

--- managed the aquarium-museum at the Marine Science Center which hosted 387,000 visitors;

--- guided classes of all grade levels on coastal field trips and tours through the Marine Science Center, and helped teachers develop marine education curricula,

--- instructed homemakers on buying and preparing seafoods

--- provided advisory service experiences for students enrolled in the Marine Resource Management program at OSU;

**advisory**

- disseminated research findings by the OSU Seafoods Laboratory and the Department of Agricultural Engineering on refrigerated seawater spray systems;
- steered the state and the oyster industry into appointing an advisory committee to help the state Health Division formulate a shellfish management plan so oysters can be certified for interstate commerce;
- helped establish an oyster seed hatchery operation at Netarts Bay;
- surveyed obstacles to developing commercial and recreational fisheries, and aquaculture, for the Oregon Department of Economic Development;
- lent leadership to the Port of Newport's assessment of its inadequate moorage facilities and waterfront access;
- served on an industry development committee of the Coos Bay Port Commission;
- helped coordinate a study of the economic impact that justified extension of the south Jetty at the entrance to Tillamook Bay;
- organized a conference for charterboat operators to help them identify problems and opportunities in the industry;
- mailed 1,500 bulletins on marine recreation topics to the public;
- negotiated with NASA to place receivers and printers for SEASAT satellite transmissions on local commercial fishing boats so fishers can monitor water temperatures to find fish schools;
- taught a course on coastal vegetation for planning staffs and biologists who work for state agencies;
- conducted tours of the fishing industry for state trade and economic development delegations, and for Chamber of Commerce groups; and
- held technical workshops for commercial fishers.



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FROM: Bill Wick and company

SUBJECT: **health insurance for fish**

DETECTION, PREVENTION AND CONTROL OF DISEASES IN FISH AND SHELLFISH (A/FSD-9)

J.L. Fryer/R. Olson

Diseases threaten the success of private aquaculture. Diagnosing pathogens and treating infected fish and shellfish reduces the threat of financial loss. Certifying fish and fish eggs free of diseases before transporting them prevents healthy hatchery and wild stocks from becoming infected.

John Fryer and Robert Olson head a team of fish disease specialists who provide a diagnostic and certification service for private salmon, trout and shellfish aquaculturists.

During this last year, the team:

- inspected diseased fish from several private fish farms and ranches, and recommended therapeutic treatments to restore the fishes' health;
- certified several lots of fish and eggs;
- helped the state develop a fish disease control policy;
- suggested a design of a saltwater capture and release facility for salmon ranchers that would reduce environmental stresses which cause fish diseases; and

**advisory**

--- sponsored a fish disease workshop for aquaculturists to acquaint them with diagnostic and certification procedures.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant Program

DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **from paper to practice**

SEAFOOD SCIENCE RESEARCH RESULT APPLICATIONS AND INFORMATION TRANSFER (A/PD-10)

D.L. Crawford/J. Babbit/D. Gordon/D. Law

Seafood scientists produce information at a rate that exceeds seafood processors' ability to put that knowledge to good use. It simply costs too much to apply all the new information. In an effort to solve the cost problem, Dave Crawford and his colleagues at the Seafoods Laboratory in Astoria developed new processing techniques and helped processors apply existing techniques.

Last year, the researchers concentrated on liquefying fish protein from fish processing wastes. The liquefied fish protein (LFP) can be used in manufacturing trout and salmon feeds. The investigators also showed seafood processors a way to peel shrimp more easily and increase meat yields.

Crawford and his associates:

--- evaluated ways of coarse grinding fish wastes which is the first stage in making LFP;

--- experimented with liquefying the ground carcass waste by enzymatic methods,

**advisory**



and studied ways to remove bones from the liquefied fish protein;

--- took results of a Sea Grant seafood processing project (R/PD-33) which found a method to more efficiently peel shrimp and conducted production trials in two seafood processing plants; and

--- concluded from the results of the production trials that the peeling method increases shrimp meat yields 3.9 percent which would have added five million pounds (worth \$15 million) to the amount of shrimp processed in Oregon, Washington, California, British Columbia and Alaska during 1978.



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FROM: Bill Wick and company

SUBJECT: **wave warnings**

OPERATIONAL MARINE DATA DISPLAY (A/CM-11)      W.H. Quinn/D. Zopf/C. Creech

Hazardous sea and fog conditions threaten boater's lives and property. In earlier projects, William Quinn, Dave Zopf and Clayton Creech developed a wave forecasting system, wave meter, and sea temperature sensor. The National Weather Service now uses this new technology.

During the past year, the scientists:

--- designed an improved version of the wave meter, the instrument used for obtaining wave height and period, for use with automatic weather data collection systems;

--- upgraded the wave forecasting method to include ebb current correction for harbor entrances;

--- provided refresher training on the wave forecasting method to National Weather Service forecasters at Portland, Oregon;

--- published a five year summary of wave data recorded at Newport, Oregon;

--- installed sea temperature sensors at the six Coast Guard stations where wave meters were previously installed;

**advisory**

- installed a wave meter and sea temperature sensor at the Humboldt Bay Coast Guard station;
- set up wave meters and sea temperature gauges in cable TV stations at Westport, Washington and Newport, Oregon so boaters can monitor sea conditions on TV before leaving port; and
- provided sea temperature data to the National Environmental Satellite Service and the State of Washington Department of Fisheries.



OREGON STATE UNIVERSITY  
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FROM: Bill Wick and company

SUBJECT: **small ports with big needs**

SMALL PORTS ADVISORY PROGRAM (A/CM-12)      W.E. Schmisser/B. Weber/H. Meier/C. Reeder

Twenty-two of Oregon's 23 ports are small. Small port commissioners, managers, and their staffs rarely have management training, or public investment experience to help them allocate the millions of tax dollars they spend each year.

Sea Grant economists working for this project provided management and investment training to small port personnel.

The economists:

--- developed a strong working relationship with the Oregon Public Port Association (OPPA);

--- held an administrative and management training session at the 1977 OPPA annual meeting;

--- wrote publications on laws that relate to port districts, how Columbia River ports finance their operations, how they operate and what facilities they have, how to become a port commissioner, the economic impact of smaller ports, and the role of port commissioners and staffs in managing a port; and

--- compiled a directory of port commissioners and staffs in Oregon.

**advisory**



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FROM: Bill Wick and company

SUBJECT: **from A to C**

LORAN-C MARINE ADVISORY PROJECT (A/CM-24)      D.A. Panshin/F.J. Smith/C. Calligan

The Coast Guard will turn off the Loran-A radionavigational signal soon, and turn on the more accurate Loran-C signal. Loran users who depend on the system must buy a new Loran-C receiver, acquire and learn new Loran-C nautical charts, dispose of their old Loran-A receivers, and write them off as a tax loss.

The switch to Loran-C confuses many users who know little about the new signal's advantages. The project supports and supplements the Coast Guard's Loran public information and education program and hopes to clear up user confusion.

Last year, Dan Panshin, Fred Smith and Chris Calligan:

--- consulted with the U.S. Coast Guard about that agency's Loran education program;

--- conducted a national training workshop for marine advisory agents who will help users convert to Loran-C;

--- summarized the reasons for switching to Loran-C for fishing industry representatives at Fish Expo 1977;

- held a workshop for Loran receiver dealers to educate them about the conversion and its impact on users;
- helped prepare Loran-C educational slide-tape and radio public service announcements; and
- provided technical support for Sea Grant programs about Loran in Hawaii, Texas and North Carolina.

**education**



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FROM: Bill Wick and company

SUBJECT: **read and see all about it**

MARITIME TRAINING MATERIALS DEVELOPMENT (T/T-5)      P.J. Killion/J. Flickinger

Commercial fishing and marine technology students won't find many texts, manuals, audio-visual materials or other educational aids to help them acquire skills in the vocation they have chosen. Experienced fishers wanting to brush up on skills, or learn new ones, also face a lack of materials.

This project at Clatsop Community College in Astoria develops these materials for commercial fishing and marine technology students as well as experienced fishers.

Last year, Pat Killion and Joe Flickinger produced:

- ten black and white video tapes on net mending;
- two black and white video tapes on fish filleting;
- a fish identification flip chart containing still color photographs of commonly caught fishes;
- a slide tape for students on fish identification;
- a bibliography of current commercial fishing and marine technology instructional materials available from other schools in the U.S.; and
- slide tapes on icing and dressing troll caught salmon.

**education**





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FROM: Bill Wick and company

SUBJECT: **bringing it all together**

MARINE AND MARITIME STUDIES PROGRAM (E/M-1) R. Astro/P. Komar/M. Sprinker/

A. Taylor/R. Ross/J. McCauley

People want a well-rounded understanding of the sea that an integrated group of humanists, artists, scientists and technologists can provide. This project helps create that understanding by gathering together faculty from ocean related disciplines, literature, social sciences and the arts to study the relationship between the world's oceans and the aesthetic and cultural life of humankind. Their views will be shared with students at the university and the public.

Last year, the investigators:

- offered new courses in oceanography for non-oceanography students, maritime history, literature and the sea, maritime art, and values and ocean technology;
- developed courses in prehistory and maritime adaptations, man and the sea in Latin America, and an interdisciplinary seminar in marine and maritime studies;
- held a conference entitled "Technology and Ocean Space: A Multidisciplinary View" in which scholars from various disciplines examined the effects of ocean technology on the social life of humankind;

**education**

--- conducted a four-day workshop on marine and maritime topics for the public at the OSU Marine Science Center that included talks on the history of the Northwest coast, the sea in literature and film, and maritime art;

--- planned a major conference for spring 1979 at the OSU Marine Science Center which will focus on the future of marine education; and

--- discussed the marine and maritime studies program with educators at other institutions to advance the cause of marine education.



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SUBJECT: **future fish farmers**

MANAGEMENT ORIENTED AQUACULTURE TRAINING (E/AQ-1)      C.E. Bond/J.E. Lannan/W.P. Breese

The relatively young salmon ranching industry and the well established oyster farming industry, both need trained aquaculturists. Aquaculture training at OSU in the Department of Fisheries and Wildlife prepares students for production aquaculture careers. Students can specialize in either fish culture or invertebrate culture and obtain a Master's of Agriculture degree upon successful completion of the program.

The program began last year. So far:

- several students have enrolled in the program;
- four students graduated, and all have jobs or firm job possibilities;
- a laboratory course was developed which illustrates principles of aquacultural production using aquaria in order to transfer classroom theory into practice on a small scale; and
- students participated in field experiences at private oyster farms and private and state-run fish hatcheries.



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SUBJECT: **extending extension**

GRADUATE CURRICULUM IN MARINE EXTENSION (E/Ex-1)      G. Klein

Up to now, marine advisory agents and specialists had few chances to acquire formal, classroom training in their professions. Students interested in marine advisory careers had even fewer opportunities.

Last year, Glenn Klein began developing and teaching courses in Extension education for students interested in marine advisory work, or those already working as marine advisors. Students can earn a master's or doctorate degree in a major field with marine Extension as a minor. So far, Klein and his colleagues have:

--- re-oriented the two core Extension methods courses which teach principles of adult education to accommodate marine advisory students;

--- developed a course to teach marine advisory students about Extension program planning and evaluation;

--- began a course which teaches the philosophy, content and methods of a marine advisory program; and

--- established marine advisory field experiences for students.

**food from the sea**



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SUBJECT: **taming the wild oyster**

SELECTIVE BREEDING OF OYSTERS (R/AQ-19) J.E. Lannan

Most oyster farmers import seed, or tiny larval oysters, that are harvested from wild beds in Japan or Puget sound. It is impossible to control breeding in these wild beds to produce oysters which have superior survival and growth characteristics.

In the experimental oyster seed hatchery at the OSU Marine Science Center, breeding can be controlled. Jim Lannan applied animal husbandry principles and separated specific lots of oysters. He rated them for the desired characteristics, and produced lines of improved oysters adapted to Yaquina Bay.

As the oyster industry builds seed hatcheries, it can use Lannan's findings.

Lannan:

- developed a record keeping system for identifying superior oysters;
- selectively bred 10 lines of oysters, adapted to Yaquina Bay, that have superior larval survival and yield 10 percent more shucked meats;
- concluded that breeding a "super oyster" adaptable to all bays and estuaries in the state is fruitless because environmental conditions vary considerably; and

--- demonstrated the advantages of managing oyster broodstock to oyster farmers, and helped oyster scientist Wilbur Breese assist a seed hatchery grower set up Oregon's first seed hatchery.



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SUBJECT: **housing project for oysters**

BIOLOGICAL FEASIBILITY OF INTENSIFIED OYSTER CULTURE (R/AQ-26)      W.P. Breese/  
J. Lannan/R. Sinnhuber/S. Small/A. Robinson

New technology to spawn oysters for seed in hatcheries could end a shortage of these tiny larval seed oysters, and boost production on Oregon oyster farms. Oysters must be spawned in hatcheries in Oregon because the introduced oysters that farmers grow cannot spawn in the chilly water here. In the seed hatchery, water temperatures can be controlled.

Currently, oyster farmers rely on an unpredictable supply of seed they import from Japan. Demand often exceeds supply. If a hatchery seed industry developed in the state, and farmers could be sure of an ample seed supply, farmers could try new techniques of growing more oysters from the limited amount of bay and estuarine area available for this industry.

Anticipating an adequate supply of seed from hatcheries in the future, Wilbur Breese, the scientist who developed the hatchery technology in an earlier Sea Grant project, assessed the feasibility of new oyster culture methods. In previous work



on this project, Breese studied rack, string and outbay oyster culture. He also found an oyster, *Crassostrea rivularis*, that remains firm during the summer months. Currently, oysters that farmers grow soften during summer, and limit the harvest season to nine months.

Last year, Breese:

--- experimented with growing single oysters that do not set on cultch, or old oyster shells, and this method could boost production as well as produce a more attractive oyster in the half shell for consumers;

--- successfully developed an inexpensive (or cost efficient) eyed larvae technique for rearing seed; and

--- developed a technique for rearing *Crassostrea rivularis* in the hatchery.



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FROM: Bill Wick and company

SUBJECT: **does it pay?**

FEASIBILITY OF THE PRODUCTION AND MARKETING OF SEAFOODS REARED BY AQUACULTURE (R/AQ-27)

R.S. Johnston/D. Langmo/F. Smith/K. Im

Oyster farming and salmon ranching could one day diminish the world's protein gap. Aquaculturists and researchers have shown that these operations are technically feasible, but the unanswered question is, "will they be economical?".

A team of economists has:

--- estimated the demand for Pacific oyster seed and concluded that demand is price-elastic;

--- calculated that as oyster seed hatchery capacity increased within the limits of their study, net returns also increased;

--- found that hatcheries that clean their own cultch have lower cultch costs than those that buy the pre-cleaned;

--- concluded that if a market exists, hatchery production of oyster seed by current practices in the Northwest is economically feasible;

--- conducted a market analysis for Pacific oysters which suggests that a relatively price-elastic demand exists for this seafood;

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--- researched producers' costs of raising market oysters and found that costs range from \$6.72 per gallon of oysters to \$19.84;

--- determined that a close substitutional relationship exists in demand for pan-size salmon and rainbow trout, which helps explain the withdrawal of some pan-size salmon producers from the market; and

--- conducted a managerial audit of an aquaculture firm to acquaint themselves with how such a firm operates.



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FROM: Bill Wick and company

SUBJECT: **fish eats cow**

INTERRELATIONSHIP OF DIETARY LIPID AND PROTEIN ON THE GROWTH, QUALITY AND PRODUCTION  
OF COLD WATER FISH (R/AQ-30)      R.O. Sinnhuber/T.C. Yu/J. Hendricks

Salmon ranchers, trout farmers and state and federal hatchery managers feel the brunt of high fish feed costs. In earlier Sea Grant work, Russell Sinnhuber and his colleagues found that hatchery fish can eat a cheaper diet. Pork lard can be substituted for about 50 percent of the expensive fish oil in trout and salmon feeds.

Last year, the food scientists' searched for ratios of pork lard to fish oil that would promote maximum fish growth. They had to put enough of the fish oil in the feed so that the fish's demand for an essential fatty acid called Omega 3, which promotes fish growth and survival, would be satisfied.

Last year, they:

- found the best ratios of lard to fish oil; and
- successfully substituted another readily available and inexpensive animal fat, beef tallow, for fish oil in trout and salmon rations.



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FROM: Bill Wick and company

SUBJECT: **meanwhile back at the ranch**

ENCHANCEMENT OF COASTAL CHUM SALMON RESOURCES (R/AQ-31)      J.E. Lannan

Private chum salmon ranchers face two problems in developing their industry: an egg shortage severely limits the number of young chum salmon they rear and release, and too few adult chum salmon return to the hatcheries each year.

Jim Lannan began this project to solve these problems. Last year, he:

--- redesigned the OSU Fish Culture Station's innovative gravel incubator hatchery system to permit short term rearing of chum salmon without altering the incubation concept;

--- held young chum salmon in the redesigned hatchery and staggered releases of small fish in hopes of increasing the number of young chum that survive in the estuary and ocean, and return as adults;

--- vaccinated 200,000 chum for vibrio last spring to assess the feasibility of using the vibrio vaccine in chum salmon aquaculture; and

--- took eggs from returning adults in November 1977 to bolster the egg supply that the Oregon Department of Fish and Wildlife distributes to private salmon ranchers, and to propagate future chum runs from the Fish Culture Station.

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FROM: Bill Wick and company

SUBJECT: **what bugs shellfish**

MICROSPORAN DISEASES OF SHRIMP AND CLAMS (R/FSD-3)      R.E. Olson/J. Lukas/L. Osis

A haplosporidan parasite infects clams and could reduce yields in both the recreational and commercial clam fishery. Another parasite, called a microsporidan, infects shrimp. The microsporidan ruined a small part of the 57 million pounds of shrimp that fishermen caught in 1978.

Shellfish biologists know little about the extent or intensity of the parasite problem off Oregon's coast and in Oregon's bays and estuaries. Robert Olson, Jerry Lukas and Laimons Osis studied the parasites to discover basic information about the pests. They:

- found the haplosporidan parasite that infects gaper clams in several Oregon bays, but found massive infection in only one place--Sally's Bend near Yaquina Bay;
- showed that the incidence and intensity of the infection in clams from Sally's Bend did not vary much over a three year period which indicates that stable conditions influence the rate of infection;
- studied massively infected clams, and found that some were emaciated and almost dead, but many of the infected clams appeared healthy;

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--- found that the infected, but healthy looking clams, killed the parasite and this indicated that the clam is not the normal host for the parasite;

--- searched for the normal parasite host, but could not find it;

--- concluded that because clams from areas other than Sally's Bend were not heavily infected with the parasite, the parasite does not pose a major threat to the emerging gaper clam fishery and the recreational fishery;

--- found that 0.25% of shrimp landed in Oregon and Washington were infected with the microsporidan parasite; and

--- determined that the parasite infects young shrimp and affects reproduction by castrating female shrimp.



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FROM: Bill Wick and company

SUBJECT: **saving salmon**

THE IMMUNE RESPONSE IN PACIFIC SALMONIDS (R/FSD-4)      J.L. Fryer/R. Olson

Fish diseases are a threat to salmon ranching in Oregon. In recent years, hatchery managers have had limited success treating sick fish with antibiotics. But newly developed vaccines offer hope for controlling salmon diseases. Earlier, John Fryer and his colleagues developed a vibrio vaccine that significantly reduces the number of fish contracting this disease in estuaries after being released from hatcheries. Despite this accomplishment, Fryer wants to know more about how the vaccine immunizes fish, the best ways of administering the vaccine, and conditions that encourage the spread of vibrio among salmon. This knowledge will help develop vaccines to combat other fish diseases.

Fryer and his colleagues have:

- found distinct types of Vibrio anguillarum that infect fish;
- found that as temperature increases Vibrio anguillarum kills more fish, and the average time from infection to death decreases;
- experimented with orally administering the vaccine in fish feeds, immersing the fish in a vaccine solution, injecting the vaccine into the fish, and spraying the

**food from the sea**



vaccine on fish.

--- determined that each method of administering the vaccine is effective, but that each method may stimulate different mechanisms which act to protect the fish from vibrio; and

--- studied one method of protection from disease in salmon, serum antibody production, and this may lead to greater progress in developing vaccines that immunize fish against other diseases.



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FROM: Bill Wick and company

SUBJECT: **pleuroWHATids?**

PLEURONECTID PRODUCTION SYSTEM AND ITS FISHERY (R/OPF-1)      A. Carey/W. Pearcy/  
S. Richardson/R. Demory/A. Tyler/C. Warren

More than half of the 20 million pounds of groundfish that trawl fishers landed in Oregon ports recently were flatfishes, or pleuronectids. Fishery managers and fishers are concerned that overfishing could reduce pleuronectid stocks.

The multispecies nature of the trawl fishery makes an understanding of the complex groundfish community, which pleuronectids belong to, necessary for good management. A team of ecologists began a large scale ecosystem analysis of groundfishes, and other animals associated with them, to provide this information. Last year, the team;

- studied the food habits of pleuronectids;
- mapped the pleuronectid larvae distribution, and developed numerical techniques that summarize data on distribution and abundance of larvae;
- correlated studies of pleuronectid year-class strength, or the numbers of fish of a species at a particular age, with oceanographic conditions, and found a positive relationship between conditions related to upwelling and year-class success;
- reviewed multispecies management problems of pleuronectids from the

**food from the sea**

perspective of the trawl fishery, and identified two approaches of managing the fishery;  
--- concluded that maximum sustainable yields, the maximum amount of a species that can be harvested, cannot occur simultaneously for all species in the groundfish community;

--- extended the theoretical framework developed for understanding the biological community that pleuronectids thrive in to include the economic aspects of the fishery;

--- developed a general theory of productivity and resource utilization regarding pleuronectids;

--- mapped the distribution and movements of English sole, a pleuronectid, based on commercial landing statistics from 1973, 1975 and 1976;

--- analyzed the role of English sole larvae in the food web as part of a larger study of invertebrate animals that prey on pleuronectids;

--- determined the abundance, distribution and size structure of English sole from the time of birth to one year of age, or the 0 age-class;

--- assessed the importance of estuaries, and areas in the ocean, as nursery areas for the English sole 0 age-class;

--- examined otoliths (ear bones) and scales of English sole by scale analysis to study aging and growth of the fish;

--- studied growth, survival, transport and settling of English sole larvae; and

--- began developing a simulation model of English sole recruitment, or entry into the commercial fishery, to gain insight into oceanographic processes that influence year-class strength.



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FROM: Bill Wick and company

SUBJECT: **shrimp take showers**

FISHING GEAR AND METHODS DEVELOPMENT (R/OPF-2) E.R. Kolbe

Most shrimp fishers refrigerate their catch with ice. But an ice shortage in Oregon often leads to expensive trip delays. Last year, Ed Kolbe, fisheries engineer, concentrated on refining a refrigerated sea water (RSW) system that will help shrimp fishers store their catches on boats without ice.

Kolbe conducted his RSW research in cooperation with Sea Grant food scientists Jong Lee and Dave Crawford. Lee looked at the microbial quality of shrimp kept in an RSW system while Crawford studied the processing quality and characteristics of RSW shrimp.

Kolbe:

- evaluated types of spray nozzles that could be used in RSW systems;
- computer simulated an onboard, closed cycle RSW system;
- wrote a series of RSW Design and Operation Notes that the Marine Advisory Program published and distributed to shrimp fishers and refrigeration contractors;
- ran at-sea tests of a completely sanitized RSW system with help from the National Marine Fisheries Service; and

**food from the sea**

--- supplied data and samples of shrimp kept in an RSW system to other Sea Grant investigators (Lee and Crawford).

In other fishing gear work, Kolbe and his assistant, Mike Mallon, wrote a technical report and a Marine Advisory Program Extension bulletin on corrosion and cathodic protection of boats. They conducted workshops on the topic for fishers as well. Kolbe also worked with a fisher who adapted Canadian plans for round, cambered trawl doors to his boat.



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SUBJECT: **cow eats fish**

ASSESSMENT OF THE NORTHERN ANCHOVY POPULATION OFF OREGON (R/OPF-4)      S.L. Richardson/  
J. LaRoche

Many commercial livestock rations contain anchovies. This makes the anchovy fishery one of the most important in the world.

A small stock of anchovies remains unfished off the Pacific Northwest coast. As demand increases, this northern stock could become commercially important for fishers. The stock will continue to be important for larger fishes, such as salmon, and marine birds that feed on it.

Fishery managers consider an estimate of stock size and basic life history information as prerequisites to good management. Already, the Pacific Fishery Management Council has begun developing long range plans for the northern anchovy stock.

Sally Richardson and Joanne LaRoche gathered basic biological information about anchovies that managers need. They:

--- estimated the average size of the anchovy stock at 439,000 metric tons in 1975 and 239,000 metric tons in 1976, based on egg production surveys;

--- estimated the average stock size at 757,000 metric tons in 1975 and 971,000 metric tons in 1976, based on larval surveys;

--- received an additional estimate of 800,000 metric tons as the average stock size in 1977 from the National Marine Fisheries Service which had conducted an acoustical survey;

--- concluded that estimates based on larvae and acoustical surveys are more reliable than estimates from egg surveys;

--- found a major anchovy spawning area off the Oregon and Washington coasts;

--- described seasonal patterns of anchovy distribution;

--- estimated the fecundity of female anchovies at 720 eggs per gram of female fish; and

--- accumulated age and growth information of northern anchovies.



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FROM: Bill Wick and company

SUBJECT: **industry insights**

SEAFOOD MARKET STRUCTURE AND PERFORMANCE(R/PD-24)      R.S. Johnston/F. Smith

Wide variations in price, quality and supplies characterize the seafood market. Some argue that a marketing structure similar to that found in agriculture should be developed for the seafood industry.

The number, size, vertical and horizontal integration, ownership and management of food marketing firms largely determine a market's performance. Richard Johnston and Fred Smith set out to describe the Northwest seafood marketing structure and measure its performance.

The pair have:

--- developed a computer model of a West Coast seafood processing plant using economic data that the industry provided;

--- used the model to determine the effects of changing prices that processors pay fishers, as well as changes in processing techniques, on what fishers choose to fish for;

--- identified market characteristics for chum and coho salmon, shrimp, oysters and some bottom fish species;

**food from the sea**



- developed a series of seminars on conflicts in using the world's oceans which identified biological, physical, legal, political, economic and social problems; and
- examined the role of uncertainty in fisher/processor marketing arrangements for Alaska pollock.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **progress for processors**

SEAFOOD UTILIZATION AND PROCESS CONCEPT DEVELOPMENT (R/PD-25)      J.K. Babbitt/  
D. Crawford/D. Gordon/D. Law

Seafood processors find that the quality of catches varies widely. Tuna processors, for example, throw out as much as 20 percent of the catch because the fish turns green. Shrimp processors must store shrimp two to three days before they can be peeled easily. Rockfish fillets brown rapidly and become unappealing to consumers. A machine separator that produces minced fish powder has increased the yield of meat from fish, but the quality of the powder remains low.

Jerry Babbitt, Dave Crawford, Dennis Gordon and Duncan Law, all seafood scientists at the OSU Seafoods Laboratory in Astoria, searched for solutions to these problems.

Last year, they:

- evaluated the protein, amino acid and mineral content of minced fish that was processed in a machine separator;
- studied the storage stability of dried minced fish powder;
- concluded that incorporating minced hake into jerky is too expensive;

- increased yields, or recovery, of hake put into frozen blocks;
- discovered that soaking shrimp in citric acid and sodium citrate considerably reduces the aging time of shrimp that is required for easy peeling;
- isolated a strong antioxidant which extends the storage life of frozen shrimp;
- found that browning in rockfish fillets can be reduced with new handling techniques; and
- discovered that treating tuna with a sodium erythrobate solution prevented them from turning green.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **finding out the yummy facts**

NUTRITIONAL QUALITY OF SEAFOODS (R/PD-26)      D.T. Gordon/D. Crawford

Consumers want to know the nutritional value of foods they buy. But little is known about the contents of Pacific Northwest seafoods. If these were determined, and consumers informed of their potential contribution to a well balanced diet, both consumers and the seafood industry would benefit.

Dennis Gordon and Dave Crawford calculated the mineral composition and caloric content of common Pacific Northwest seafoods with Sea Grant support in previous years.

This year, Gordon and Crawford;

- determined the riboflavin, thiamin, and niacin content of 16 seafoods;
- concluded that seafoods, in general, provide half of the vitamins that an equal portion of red meat offers, but only one-third of the calories;
- discovered that cooking and processing destroy few of the vitamins in seafoods;
- concluded that mineral and vitamin availability to the body from seafoods is high, but levels of vitamins and minerals in seafoods are low to moderate;

**food from the sea**

--- found that as the amount of unsaturated fats in the diet increases, the availability of iron decreases;

--- wrote an Extension publication for consumers about the nutritional value of seafoods; and

--- suggested that the seafood industry use a nutritional label for educational and promotional purposes that could be attached to seafood products.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **getting the bugs out**

MICROBIAL QUALITY OF IMPROVEMENTS OF SEAFOODS (R/PD-29)      J.S. Lee

Seafood can never be fresher than when hauled over the side of a fisher's boat. From that time on, seafood passes several critical stages: onboard the boat; in the processing plant; on the shelf of a retail store; and in the kitchen. Microbes could lower the quality of the seafood at any time.

Last year, Jong Lee studied ways to maintain seafood quality by improving existing handling techniques and developing new ones. Most of his time was spent studying the microbial quality of shrimp kept in refrigerated seawater spray (RSW) systems. Lee conducted this research in conjunction with Ed Kolbe, fisheries engineer, who refined this new and practical way of storing shrimp on fishers' boats.

Lee:

--- found that sanitizing RSW systems with a liquid laundry detergent and household bleach considerably reduces the microbial populations in RSW systems;

--- wrote part of the RSW Design and Operation notes with Kolbe on sanitizing RSW systems (published by the Marine Advisory Program for fishers);

--- conducted a controlled experiment with Kolbe in a completely sanitized RSW system, and found that microbial populations did not increase considerably after three days of continual operation; and

--- began identifying the types of microbes that grow in RSW systems.

In other work, Lee wrote a booklet for processors about the critical points in seafood plants where microbes could damage seafoods.

**coastal zone  
environment**





OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **reeling on the reefs**

BIOLOGY AND CONSERVATION OF NERITIC REEF FISHES (R/CM-18)      H. Horton

More fishers than ever angle for reef fish off the Oregon coast. Biologists know little about these fish populations, and can not accurately tell if angler effort is overfishing the stocks. Scientists need basic biological and ecological information to assess the health of reef fish populations.

In 1976, Howard Horton and his graduate students began studying the reef fish community on one of Oregon's more popular sportfishing reefs. They tagged reef fishes and surveyed party boat catches to calculate the relative abundance of each reef fish species' population. They studied sex, size and age characteristics to determine how fast each species grows. They also analyzed stomach contents.

Last year, Horton and his students continued their research.

They:

--- determined that reef fish populations remain strong except for the yellow-eye rockfish population in their study area;

--- found that various reef fish species generally do not compete for food;

--- concluded that on reefs where all species populations are strong, there is little competition for food. Each species can be managed singly, without regard to other species;

--- decided that fishing may have to be curtailed in select areas where yellow-eye rockfish and lingcod have been depleted;

--- found that shallow reefs close to the shore act as nursery areas for rockfish species.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **in the eye of the beholder**

AN ASSESSMENT OF SEA LIONS IN THE ROGUE RIVER AREA (R/CM-19)      B.R. Mate

The Marine Mammal Protection Act of 1972 has seriously affected seals, sea lions, and fishers. The pinnipeds have changed their habits; they are now protected and swim freely far up West Coast rivers to feed on salmon and other less valuable species. Commercial fishers believe seals and sea lions are a threat to their livelihood. Sport fishers object to the animals because they believe pinnipeds have eaten much of the salmon and steelhead out of many Oregon rivers.

The truth is, no hard data was available to tell us what really was happening until very recently. Bruce Mate began collecting that data on the Rogue River. He plans to use it to develop sound management strategies and options.

During the past year, Mate:

- examined stomach contents of seals and sea lions under federal permits and found that the diet consists of lampreys, salmon, steelhead and estuarine fish species;
- observed surface feeding behavior of seals and sea lions;
- identified food species from seal feces;

--- determined the numbers and species of seals and sea lions and correlated these to known salmon runs;

--- determined that sea lions in the Rogue are predominantly migrant, non-reproductive males and of a species that does not breed in Oregon.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **fungus amongus**

IMPROVING THE PERFORMANCE OF WOODEN WATERFRONT STRUCTURES AND BOATS (R/EM-3)

R. Graham/M. Corden

Decay-fungi and marine borers destroy \$500 million to \$1 billion worth of wood in waterfront structures every year. Pressure treating a thin layer of outer wood with creosote offers some protection, but if holes and cracks develop, fungi and borers can penetrate deep inside.

Earlier in this Sea Grant project, Robert Graham and his assistants poured liquid fumigants (which vaporize), down holes they drilled into piling. Once these holes were plugged, the gaseous fumigants diffused throughout the wood and stopped fungal attacks and controlled borers.

Last year, Graham and his assistants established a pile top farm to evaluate methods of protecting cut off ends from fungal decay. The tops of piles are exposed to moist air which is laden with fungal spores. These exposed ends are extremely susceptible to fungal decay.

The researcher and his assistants:

--- found that the fumigants can eliminate decay fungi in pressure creosoted

**coastal zone environment**

Douglas fir bulkhead piles for three years and greatly reduce decay fungi in non-pressure treated Douglas fir marina piles for two years;

--- experimented with fumigants to control marine borer attacks on green Douglas fir panels submerged in West Coast bays, and found that fumigants show promise in controlling shipworms, but do not offer significant protection from limnoria;

--- found that oil-type preservatives do not protect cut off pile tops unless a protective cap is also installed on the top;

--- showed that tops treated with fluorine-chlorine-arsenate-phenol or ammonium bifluoride remain free of decay fungi;

--- produced slide tapes and Extension bulletins to help people control fungi and borers in waterfront structures and boats; and

--- talked with port managers about proper designs for using wood in a harsh environment and preventing wood deterioration.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **prying into clams**

SUBTIDAL CLAM POPULATIONS: ECOLOGY, DISTRIBUTION, ABUNDANCE AND MANAGEMENT (R/EM-9)  
D. Hancock/R. Demory/L. Osis

Commercial and recreational demand for clams has increased. Clams in the hard to reach subtidal zone of bays and estuaries could boost clam supplies, especially for commercial clambers with mechanical harvesters. Subtidal clam populations could also contribute to clam populations in the more accessible intertidal zone where recreational clambers focus their efforts.

Oregon Department of Fish and Wildlife shellfish biologists need to know more about the abundance, distribution, biology and ecology of subtidal clams, and how subtidal clams influence tidal clam populations. With that information, the biologists can develop sound management plans for this fishery which faces increased demand.

Dan Hancock, an OSU oceanographer, and his colleagues have:

--- surveyed the distribution and abundance of subtidal and intertidal clam populations in 10 Oregon bays and estuaries;

- found clam beds which could be commercially harvested in Tillamook, Yaquina and Coos bays;
- made distributional maps of clam populations which will help shellfish biologists manage the clam fishery, and recreational clammers find clams;
- gathered biological and ecological data on the interaction between subtidal gaper clams and other shellfish and plant species in the estuarine community;
- formulated an equation which can estimate how subtidal clams contribute to intertidal clam populations;
- initiated a pilot commercial harvesting program in Yaquina Bay to study the effect of mechanical harvesting on subtidal clam populations;
- wrote a detailed report of results for the Oregon Department of Fish and Wildlife.





OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **an anemone close to your heart**

ASSESSMENT OF OREGON POPULATIONS OF THE GREEN SEA ANEMONE, *ANTHOPLEURA XANTHOGRAMMICA*,  
FOR HARVEST POTENTIAL (R/CP-1)      J.J. Gonor

Heart disease patients could benefit from a newly discovered stimulant. The drug was found in green sea anemones from Oregon's coast.

University of Hawaii scientists isolated the stimulant and found it to be 300 to 500 times stronger than the drug (digitalis) that doctors currently prescribe heart patients. Before commercial harvests could begin, someone had to assess the abundance and distribution of the animal. Jeff Gonor, an OSU oceanographer, took on the task.

Gonor:

--- found very few patches of green sea anemones dense enough to support a commercial harvest;

--- discovered that predicting how many anemones could be harvested from an abundant patch would be difficult because the animals' sizes vary greatly;

--- simulated a green sea anemone harvest and found that other green sea anemones very slowly replace the niche vacated by the harvested animals;

--- conducted a laboratory experiment and found that green sea anemones grow very slowly; and

--- concluded that the lack of abundant populations, slow growth and slow replacement of harvested anemones would make commercial harvesting infeasible.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **beach breach**

SEA CLIFF EROSION ON THE OREGON COAST (R/CP-2)      P. Komar

Erosion threatens coastal homes built on spits and at the edge of sea cliffs. Last year, the Oregon coast suffered through unusually intense winter storms. Extremely large waves smashed onto beaches.

Nestucca Spit breached.

Paul Komar took advantage of this unusual spit breaching, the first spit to be breached naturally on the coast, and redirected the focus of his research from sea cliff erosion to the spit.

He:

--- documented wave and tide conditions that breached Nestucca Spit in order to predict conditions which could cause considerable erosion at the coast in the future; and

--- compared the erosion processes with those that had occurred earlier on Siletz Spit.

Komar also continued his study of sea cliff erosion.

He:

--- found that removing driftwood from the base of cliffs accelerates erosion, but needs additional data to determine more accurately the effect of removing logs; and

--- determined that inexpensive log walls, and more expensive riprap walls stood up to high waves better than concrete sea walls.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **waves on a plate**

DESIGN CRITERIA FOR HORIZONTAL PLATE BREAKWATERS (R/CE-1)      T. Yamamoto/A. Yoshida

Port authorities and the Army Corps of Engineers have spent millions of dollars building breakwaters which protect small boats from wave damage. Breakwaters built by piling rubble in shallow water at harbor entrances and in estuaries are expensive and prevent sand transport. Sandbars form and waves can break over them. Floating breakwaters are cheaper to build and are best suited to deep water.

Tokuo Yamamoto and his assistants searched for an alternative breakwater structure that would not interfere with sand circulation and would be less expensive. They developed criteria to adapt floating breakwater designs to shallow water.

Yamamoto:

- developed numerical computer models capable of solving the problems of wave interactions with floating breakwaters that have varying shapes and porosities;
- found that by placing a plate in the water between an anchored floating plate and the bay bottom, the wave uplift force on the floating plate is reduced to 40 percent;

--- determined that floating breakwaters made of porous plates reduce the uplift force, transmission and reflection of waves; and

--- applied his results to the problems of floating pipelines and other coastal structures built to withstand the force of waves.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **outguessing a wave**

WAVE REFLECTION AND ATTENUATION AT PILE SUPPORTED HARBOR FACILITIES (R/CE-2)  
C.K. Sollitt

Waves reflecting in and around harbor structures interfere with vessel navigation, berthing and loading to the detriment of waterborne commerce and vessel safety. Wave activity around pile supported structures can be reduced by altering pile patterns and adding wave damping materials between piles. Designers require tools to predict the behavior of waves interacting with pile structures to improve new designs and modify existing structures.

Charles Sollitt, civil engineer and Sea Grant investigator:

- completed an analytical model that predicts the reflection and attenuation of waves for a variety of pile configurations;
- generated a computer program to efficiently apply the theory to practical design applications;
- validated the theory by comparison with existing experimental data; and
- began studying various pile configuration schemes with the intent of selecting optimum pile patterns.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **sand tracking**

WAVES AND CURRENTS ON A BEACH IN THE PRESENCE OF A JETTY (R/CE-4)      R. Hudspeth

Jetties stabilize harbor entrances and increase boating safety. But they also restrict water flow. Sand settles out and deposits, forming shoals which must be dredged. The restricted flow also prevents water from carrying sand out of the harbor and depositing it on nearby beaches. The beaches erode and are not replenished.

Knowing how waves and currents circulate sand suspended in water near jetties will provide estimates of sand deposition and beach erosion. Robert Hudspeth's primary goal in this Sea Grant project is developing a computer program to make these predictions.

Last year, Hudspeth:

- developed and began testing a computer program that determines wave-current interactions and the resulting circulation patterns around jetties;
- developed an analytical solution about how waves flow over a porous material such as sand; and
- concluded that the analytical solution will tell how waves modify as they approach a sandy beach.

**coastal zone environment**



**public policy analysis**



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **rights, rules and reasons**

CURRENT DEVELOPMENTS IN OCEAN LAW (R/PPA-6)      J.L. Jacobson/P. Swan

The Fishery Conservation and Management Act of 1976 (FCMA), the United Nations Law of the Sea Conference (LOS), ocean salmon ranching, oil exploration in the sea, Indian fishing rights and other issues raise legal questions about federal, state and international jurisdiction of marine resources. Jon Jacobson, Peter Swan and Richard Hildreth, professors at the University of Oregon School of Law, help answer these types of questions. They, and their students, provide information to the public and special interest audiences. The professors also counsel and teach students specializing in marine law.

The law professors and their students:

--- studied the activities of the North Pacific Fishery Management Council as a result of Jacobson's appointment to the Council's advisory panel;

--- researched and wrote a paper about the impact of the FCMA on state jurisdiction of fishery resources;

--- researched and began writing a paper on conflicts between the Fourth Amendment of the U.S. Constitution and the FCMA;

**public policy analysis**

- Wrote an Ocean Law Memo, a lay publication distributed by the Marine Advisory Program, about the sixth session of the Law of the Sea Conference;
- attended the seventh session of the Law of the Sea Conference;
- published an article in the University of Washington Law Review about conflicts between the potential LOS treaty and the existing FCMA;
- completed a legal study of managing the Oregon continental shelf for the Oregon Land Conservation and Development Commission;
- prepared a paper for potential salmon ranchers on the legal aspects of acquiring a license and getting started; and
- completed a manuscript for a book on legal aspects of offshore oil drilling platforms.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **optimizing the optimum**

REFINING CALCULATIONS IN FISHERY MANAGEMENT PLANS: CAPACITY AND OPTIMUM YIELD (R/PPA-7)

R.B. Rettig

The Fishery Management and Conservation Act of 1976 mandated that the Pacific Fishery Management Council (PFMC) use the concept of optimum yield to manage fisheries. Optimum yield considers economic and social considerations of management decisions as well as biological consequences. Capacity is the ability of U.S. fishers to annually harvest the optimum yield from a fishery.

Historically, the maximum sustained yield concept has been used to manage fisheries. This concept primarily considers biological information, and not the economic or social welfare of fishers.

Implementing the optimum yield concept challenges the PFMC. Bruce Rettig began this project to help the council develop methods for determining the optimum yield and capacity for northeastern Pacific fisheries.

Last year, Rettig:

--- began searching for a computer model to calculate capacity so that the PFMC

can predict how heavily fishers invest in a fishery, and when fishers switch from one fishery to another;

--- served on the PFMC's Scientific and Statistical Committee as the only economist, and helped PFMC fishery planning teams deal with the optimum yield concept; and

--- supervised a workshop and a national conference which considered limited entry as a management tool to attain optimum yield, and is currently editing the proceedings of that conference.



OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **what would happen if . . .**

A MODEL OF THE INTERACTIONS BETWEEN THE OREGON GROUND FISHERY AND THE COASTAL  
COMMUNITY (R/PPA-8)      C. Smith/J. Stander/A. Tyler

Changes in how biologists manage the Oregon groundfishery, and changes in how intensively fishers fish for groundfish, affect fish stocks, the fishing industry, and coastal communities. Court Smith, Jeff Stander and Al Tyler developed a predictive computer model, called NETS, to show people the consequences of change in the Oregon groundfishery.

NETS is primarily an educational tool for OSU anthropology and fishery students. But after adequately testing the model, the researchers will present it to the fishing industry and coastal communities for their use.

Smith, Stander and Tyler have:

--- developed and tested the model which analyzes biological interactions between one and four fisheries, up to 100 fishers, marketing parameters, community characteristics, and two decision making submodels that add or delete fishing effort;

--- incorporated into the model sociological characteristics of fishers such as innovativeness, experience, residence and fishing patterns;

**public policy analysis**

--- contributed two chapters based on output from the model to a Pacific Fishery Management Council report on the socio-economics of the commercial salmon fishery in Oregon, Washington and California;

--- presented a paper to the American Anthropological Association;

--- incorporated a fishing industry segment into a introductory cultural anthropology course; and

--- presented findings from the model at several National Marine Fisheries Service sponsored meetings.

**columbia region**





OREGON STATE UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

TO: National Sea Grant College Program      DATE: December 1978

FROM: Bill Wick and company

SUBJECT: **a western water gate**

SOCIO-ECONOMIC IMPACTS OF THE COLUMBIA (R/WSU-1)      L. Rogers

A recently completed slackwater navigation system on the Columbia and Snake Rivers opened a transportation water gate to the sea from Idaho, eastern Washington and eastern Oregon. The region can now ship valuable timber and agricultural products by barge from Lewiston, Idaho to the mouth at Astoria, Oregon, and beyond.

The slackwater navigation system will dramatically affect the economics of the region. Planners need information about the extent of that impact. To supply that information, a Columbia Regional Sea Grant Program project studied the impact of the river shipping industry on the region's entire economy as well as the region's transportation sector.

LeRoy Rogers, the Washington State University agricultural economist who led the project:

--- constructed an input/output model to establish how the regional economy functions;

--- concluded that agriculture and government sectors dwarf the transportation industry's economic impact on the region's income and employment;

**public policy analysis**

--- calculated that ports on the rivers generate \$20 to \$30 million annually; and  
--- concluded that the navigation system on the rivers is necessary, but not a sufficient condition for port growth.

#### THE COLUMBIA-SNAKE NAVIGATION SYSTEM'S ROLE IN INTERMODAL OCEAN TRANSPORTATION (R/UI-2)

J. Jones/R. Schermerhorn

Another Columbia Regional Sea Grant Program project studied the relationship between the container and other ocean shipping systems to barge transportation on the rivers.

Because of the captital intensive nature of container ships, they must call on ports where trade is concentrated (load centers). On the West Coast, San Francisco Bay and Puget Sound are load centers.

Columbia River and Snake River barges recently began carrying cargo in containers to service container ships that do stop at river ports. The challenge to the river shipping industry is making the river a load center, or establishing feeder systems to barge containers to ships in Puget Sound or San Francisco Bay. James Jones and Richard Schermerhorn, University of Idaho economists, studied the relationships.

They:

--- concluded that it is economically feasible to barge containers on the rivers, and that container barges will help counter the load center concept in Puget Sound and San Francisco Bay;

--- determined that Astoria, Oregon could benefit by establishing a container feeder system to Puget Sound and San Francisco Bay as well as upriver ports; and

--- concluded that the slackwater navigation system may have limited potential until the river becomes an established load center, or until a container feeder system is established to load centers.

# status of projects

N-New, C-Continuing, F-Finished, R-Redirected

Fiscal Year 75 76 77 78

## ADVISORY

A/EMAP-1	Extension Marine Advisory Program _____					N
A/G-1	Marine Advisory field program _____	C	C	C		R
A/Ec-2	Marine economics advisory education _____	C	C	C		R
A/S-3	Seafood technology advisory education _____	C	C	C		R
A/OE-4	Oceanography and engineering advisory education _____	C	C	C		R
A/C-6	Marine Advisory - Communication _____	C	C	C		R
A/Ed-7	Marine science publication education _____	C	C	C		R
A/PPA-2	Advisory services in ocean law _____	C	C	C		R
A/FSD-9	Detection, prevention and control of diseases in fish and shellfish _____				N	C C
A/PD-10	Seafood science research result applications and information transfer _____				N	C C
A/CM-11	Operational marine data display _____				N	C
A/CM-12	Small ports advisory program _____				N	C

## EDUCATION

T/T-2	Commercial fishing technician training _____	C	C	C		F
T/T-3	Marine technician training _____	C	C	C		F
T/T-5	Maritime training materials development _____					N
E/L-1	Professional training in ocean law _____	C	C	C		R
E/MRM-1	Professional training in marine resources _____	N	C	C		F
E/M-1	Marine and maritime studies program _____				N	C

E/AQ-1	Management-oriented aquaculture training (Master or Agriculture in Aquaculture) _____					N
E/Ex-1	Graduate curriculum in marine extension _____					N

## FOOD FROM THE SEA

## Aquaculture

R/AQ-6	Pilot chum salmon production _____	C	C	C	R
R/AQ-19	Selective breeding of oysters _____	C	C	C	C
R/AQ-21	Animal fats: an energy source in fish rations _____	N	C	C	F
R/AQ-26	Biological feasibility of intensified oyster culture _____		N	C	C
R/AQ-27	Feasibility of the production and marketing of seafoods reared by aquaculture _____		N	C	C
R/AQ-30	Interrelationships of dietary lipid and protein on the growth, quality and production of cold water cultured fish _____				N
R/AQ-31	Enhancement of coastal chum salmon resources _____				N

## Fish and shellfish diseases

R/FSD-3	Microsporan diseases of shrimp and clams _____		N	C	C
R/FSD-4	The immune response in Pacific salmonids _____			N	C

## Ocean productivity and fisheries program

R/ES-5	Cryogenic (freeze branding) and laser marking of Dungeness crab _____		N	C	C	F
R/OPF-1	Pleuronectid production system and its fishery _____			N	C	C
R/OPF-2	Fishing gear and methods development _____			N	C	C

R/OPF-3	Economic analysis of extended jurisdiction by the U.S. over coastal resources: fisheries from Washington to California _____	N	C	F
R/OPF-4	Assessment of the northern anchovy population off Oregon _____	N	C	C
Marine product development				
R/PD-21	Sanitation and microbial evaluation of Oregon seafoods processing _____	N	C	C
R/PD-24	Seafood market structure and performance _____	N	C	C
R/PD-25	Seafood utilization and process concept development _____	N	C	C
R/PD-26	Nutritional quality of seafoods _____	N	C	C
R/PD-27	Disposal of shellfish waste on agricultural lands _____	N	C	F
R/PD-29	Microbial quality improvements of seafoods _____			N

## COASTAL ZONE ENVIRONMENT

## Coastal processes

R/CM-15	Erosion of Netarts Spit, Oregon _____	N	C	F
R/CM-16	Applications of nonlinear random sea simulations for design of offshore structures _____	N	C	F
R/CM-18	Biology and conservation of neritic reef fishes _____	N	C	
R/CM-19	An assessment of sea lions in the Rogue River area _____	N	C	
R/CM-21	Developments in Northwest ocean law and coastal law _____	N		R
R/EM-3	Improving the performance of wooden waterfront structures and boats _____	N	C	C
R/EM-8	The demand for recreational boat moorage and storage _____	N	C	F

R/EM-9	Subtidal clam populations: ecology, distribution, abundance and management _____	N	C	C
R/EM-10	Hydraulic characteristics of marinas: a case study of Brookings, Oregon _____	N	C	F
R/EM-11	Plankton dynamics of Oregon estuaries _____	N	C	F
R/CP-1	Assessment of Oregon populations of the green anemone, <i>Anthropleura xanthrogrammica</i> , for harvest potential _____			N
R/CP-2	Sea cliff erosion on the Oregon coast _____			N
Coastal engineering				
R/CE-1	Design criteria for horizontal plate breakwaters _____			N
R/CE-2	Wave reflection and attenuation at pile supported harbor facilities _____			N
R/CE-4	Waves and currents on a beach in the presence of a jetty _____			N
PUBLIC POLICY ANALYSIS				
R/PPA-6	Current developments in ocean law: Pacific Northwest and Alaska _____			N
R/PPA-7	Refining calculations in fishery management plans: capacity and optimum _____			N
R/PPA-8	A model of the interactions between the Oregon ground fishery and the coastal community _____			N
PROGRAM MANAGEMENT				
M/A-1	Program administration _____	C	C	C C

M/A-2	Program development _____	C	C	C	C
M/A-5	Sea Grant Communications _____				N

## COLUMBIA REGIONAL SEA GRANT PROGRAM

R/UI-2	The Columbia-Snake navigation system's role in intermodal ocean transportation _____			N	C
R/WSU-1	Socioeconomic impacts of slack water navigation and access to Pacific ports in the Northwest _____			N	C

## budget summary

### RESEARCH

	<u>NOAA</u> <u>Grant Funds</u>	<u>University</u> <u>Matching Funds</u>
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Aquaculture	\$ 199,200	\$ 170,500
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Living Resources, other than

Aquaculture

	247,300	110,400
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Marine Biomedicinals & Extracts

	21,500	-0-
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Marine Law & Socio-Economics

	159,700	70,200
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Ocean Engineering

	105,800	36,200
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Resources Recovery & Utilization

	177,600	113,400
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Research & Studies in Direct

Support of Coastal

Management Decisions

	85,000	31,300
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Applied Oceanography

	15,500	10,500
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Marine Technology Research &

	45,000	22,500
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Development Transportation

Systems

### EDUCATION

College Level

	72,000	43,100
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Vocational Marine Technician

Training

	21,000	10,500
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### ADVISORY SERVICES

Extension Programs

	384,000	171,600
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Other Advisory Services

	205,200	100,200
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	NOAA <u>Grant Funds</u>	University <u>Matching Funds</u>
PROGRAM MANAGEMENT		
Program Administration	\$ 28,200	\$ 117,342
Program Logistic Support	11,400	33,300
Program Development	<u>43,600</u>	<u>41,800</u>
	\$ 1,822,000	\$ 1,082,842

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#### MARINE BIOLOGY AND ECOLOGY

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