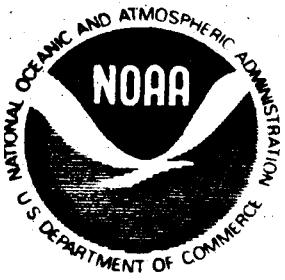
NOAA Technical Memorandum
NMFS-SEFC-86

Bureau of Commercial Fisheries Economic Working Papers Series Annotated Bibliography

John Ward
Industry Economist
National Marine Fisheries Service
Southeast Fisheries Center
Office of Fisheries Management
February 1, 1982

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Center
75 Virginia Beach Drive
Miami, Florida 33149



NOAA Technical Memorandum
NMFS-SEFC-86

Bureau of Commercial Fisheries Economic Working Papers Series Annotated Bibliography

John Ward
Industry Economist
National Marine Fisheries Service
Southeast Fisheries Center
Office of Fisheries Management
February 1, 1982

U.S. Department of Commerce
Malcolm Baldrige, Secretary
National Oceanic and Atmospheric Administration
John V. Byrne, Administrator
National Marine Fisheries Service
William G. Gordon, Assistant Administrator of Fisheries

Abstract

The economic staff of the Bureau of Commercial Fisheries and later the National Marine Fisheries Service compiled a series of approximately 177 economic working papers between 1969 and 1973. The papers deal with various subjects in the area of fisheries economics. Abstracts from 122 of these papers have been collected h re for the purpose of indicating those studies that may be utilized for further research or as reference by the Southeast Fisheries Center economic staff. This list will be expanded as more of the working papers become available.

Table of Contents

74. Insurance Coverage for U.S. Commercial Fishing Vesels--A Survey of Current Insurance Costs, Availability, and Other Special Problems - D. Nash, and M. Miller (December, 1970).....23

75. Insurance Coverage of U.S. Commercial Fishing Vessels--Problems and Recommendations (Issue Paper) - D. Nash (July, 1971).....23

76. Sport/Commercial Conflicts and the National Marine Fisheries Service's Role in Fishery Management - D. Cleary (February, 1971).....24

77. The Burden of a Tax on Fishery Products - F. Bell (1971).....24

78. Analysis of the Impact of the Vessel Safety, Mandatory Inspection, and Pollution Abatement Programs on Fishing Vessels and Processing Plants, with Recommendations for a Government Guaranteed Loan Program - B. Noetzel, D. Cleary, R. Fullenbaum (April, 1971).....24

79. Probable Economic Implications of the President's New Economic Policies on the U.S. Fishing Industry and Recommendations for Further Action - F. Bell, H. Bale, B. Noetzel, and D. Nash (September, 1971).....24

80. Report on the Economic Costs of Fishery Contaminants - H. Bale (November, 1971).....25

81. Assistance Programs in Overcapitalized Fisheries - D. Cleary (December, 1971).....25

82. The Current Status of the United States Fisheries - F. Bell, D. Cleary, D. Nash, and R. Kinoshita (November, 1971).....25

83. Socio-Economic Factors to be Considered in Implementing Limited Entry--A Cash Study, the Northern Lobster Fishery - A. Huq (December, 1971).....26

Introduction

The economic staff of the Bureau of Commercial Fisheries and later the National Marine Fisheries Service compiled a series of approximately 177 economic working papers between 1969 and 1973. The papers deal with various subjects in the area of fisheries economics. Abstracts from 122 of these papers have been collected here for the purpose of indicating those studies that may be utilized for further research or as reference by the Southeast Fisheries Center economic staff. This list will be expanded as more of the working papers become available.

Most of the reports deal with economic analysis of specific topics or are surveys conducted over limited time periods which do not provide historic data. Some of the working papers are dated in that further research has probably been done to improve the state of the art in these subject areas or there have been changes in the legislation or regulations analysed. However, there are a number of studies which could be useful as reference material or in comparison to the results of recent research to determine changes over time in economic variables.

Abstracts

Mange, F.A. and R.G. Thompson
"An Application of an Investment Model to Channel Catfish Farming," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 1, Feb., 1969.

A dynamic operations and investment simulation model was applied to catfish farming. The purpose was to identify some important aspects that should influence investment decisions in channel catfish farming enterprises. These results exhibited a number of economic relations: (1) When initial average profits were $.20 per pound and the initial price of land, buildings, and equipment was close to $800 per acre, the initial investment policy of the firm was one of continuous purchases of new capacity. (2) Higher initial average profits resulted in larger maximum capacities up to a limiting size, beyond which further increases in profits resulted in increases in net worth, but not in capacity. (3) The investment policy of the firm was found to be very sensitive to initial prices of capacity higher than $800 per unit, and no new capacity was added if prices of capacity reached $1500 per acre. (4) Profit accumulation and investment decisions were found to be sensitive to changes in the interest rate paid for financing new capacity.

Miller, M.M. and D.A. Nash
"The Development of Catfish as a Farm Crop and an Estimation of its Economic Adaptability to Radiation Processing," Bureau of Commercial Fisheries, Economic Research Working Papers

Series, No. 2, Feb., 1969.

Although there is little doubt that radiation processing can pay for itself in both the public and private sectors, frozen catfish products represent a feasible alternative. If it were possible to market the same amount of catfish in the frozen form as in the fresh form, net revenues generated for the industry with frozen would nearly equal the net revenues from irradiated catfish. Marketing in the frozen form adds less to the national income stream than irradiated. What is likely is that some combination of fresh and frozen catfish will make up the marketed forms. In this case, it is fully expected irradiation-pasteurization will provide substantial public and private benefits.

Sokoloski, A.A. (Project Monitor)
"Design Study: An Optimum Fishing Vessel for Georges Bank Groundfish Fishery," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 3, May, 1969.

A functional model of a fishing system on the Georges Bank was developed. Relationships among the functions were mathematically quantified and programed for computer usage. Return on investment (ROI) was determined for various operating conditions and techniques. An "optimum vessel" was designed based upon the design characteristics predicted by the computer output for maximum ROI. This article provides information on the capital expenditures associated with the optimal fishing vessel. It would be very useful in analysis of capital expenditures and expected rates of return on various fishing vessels.

Nash, D., A. Sokoloski, and F. Bell
"The Relation Between Vessel Subsidy Percentages and Rate of Return on Investment for Various Technologies and Scale Levels: The Haddock Fishery," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 4, Feb., 1969.

The financial performance of fishing enterprises have been shown to be highly sensitive to the subsidy applied to offset the higher U.S. construction cost. Subsidy programs aimed at promoting a prespecified rate of return are a costly method of achieving the objectives of the Bureau of Commercial Fisheries. Such programs require that disproportionately large volumes of subsidy funds be allocated to large, inefficient vessels. Given a fixed budget constraint, ROI and the total increase in U.S. catch is higher when the smaller vessels rather than the larger vessels are subsidized. No ideal optimal subsidy program was apparent from the research.

Bell, F., E. Carlson, D. Nash, and A.A. Sokoloski
"An Economic Justification for Recommended Legislative Changes in the 1964 Fishing Fleet Improvement Act," Bureau of Commercial Fisheries, Economic Working Papers Series, No. 5,

Feb., 1969.

Using the 1972 law which prohibits the domestic use of fishing vessels constructed outside the U.S. as a starting point, the paper delineates a systematic procedure for the optimal allocation of funds authorized by either a present or future Fishing Fleet Improvement Act. For certain fisheries the expenditure of these subsidy funds shows a clear excess of benefits over costs.

Crucial guidelines in this evaluation have been referenced as to whether the fishery was near MSY, domestic or international, and r gulated or unregulated. Using these identifying characteristics, five distinct groups of fisheries were formed. For each of these, the introduction of a subsidized vessel may generate different biological and economic results. The measurements of these results in dollar value will form the basis for establishing priorities for the use of subsidy monies in each fishery among the five groups.

Cleary, D.P.
"The Economic Impact of Current Fisheries Management Policy on the Commercial Fishing Industry of the Upper Great Lakes," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 6, Oct., 1968.

It is the long run objective of Michigan and Wisconsin conservation officials to reduce the number of fishing operations on the Great Lakes and thereby increase the overall income of fishermen. Given an equitable procedure for decreasing the number of operators, this is a desirable objective. The immediate problem in the upper Great Lakes centers on serious losses of income, but the uncertainty of future closures will result in a drastic reduction in the size of the industry anyway, including those individuals who would have constituted the industry under a limited entry fishery.

Noetzel, B.G.and V.J. Norton
"Cost and Earnings in the Boston Large Trawler Fleet," Bureau of Commercial Fisheries, Economic Working Papers Series, No. 7, June, 1969.

The study establishes the operational characteristics of the large offshore haddock trawler fleet based at the Boston port. The study is aimed at the determination of maintenance and operation costs and their relationship to such factors as gross tonnage of the vessel, horsepower of the main engine, number of crewmen, days absent, catch rate, and average fish price. Information on these relationships is useful in estimating costs and earnings for vessels operating under alternative conditions with respect to fishing effort, catch rate, and price of fish, and in making comparisons between vessels with different characteristics.

Sokoloski, A.A.

"Some Elements of an Evaluation of the Effects of Legal Factors on the Utilization of Fishing Resources," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 8, Feb., 1969.

The paper discusses the historical development of a fisheries management structure which includes the many social, economic, and political elements of the fisheries. The economist must take the non-economic elements as a given and estimate the costs and benefits that are derived from it. The public regulatory bodies must use these estimates of the effects of changes in social and political elements in their response process and clearly distinquish between short term welfate policies designed to ease transition and the long run goal of improving the competitive position of the commercial fishery, increasing the returns to fishermen, and providing a product of improved quality at a competitive price.

Noetzel, B.G.
"A Report on the Economics of Polish Factory Trawlers and Freezer Trawlers," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 9, Feb., 1969.

This paper is a translation of a polish study on the processing technology, fishing technique, and economics of the Polish deep sea fishing fleet.

Nash, D.A. and F.W. Bell
"An Inventory of Demand Equations for Fishery Products," Bureau of Commercial Fisheries,Economic Research Working Papers Series, No. 10, July, 1969.

This paper contains demand equations which were selected as the most representative of all those submitted to the conference on fishery product demand. The respective demand functions were chosen as the best function for each species so far developed in that area.

Nash, D.A. and M.M. Miller
"Industry Analysis of West Coast Flounder and Sole Products and an Estimation on its Economic Adaptability to Radiation Processing," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 11, Oct., 1969.

Low dosage irradiation preservation can add two weeks to the shelf life of Pacific sole, without altering the fresh quality of the fish. Weighted against the apparent costs of irradiation processing, the benefits from expanded markets do not appear sufficient to justify commercial investment in irradiation facilaties for irradiating Pacific sole.

Carlson, E.W.
"Bio-Economic Model of a Fishery," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 12, March, 1969.

The model presented in this paper is deterministic and static. The conception of goals for which fishery management must work will come clear from a clear understanding of a deterministic model, but implementation will have to take place within a stochastic model. The new model uses accepted economic theory to determine the outcome of changes in economic environments.

Bell, F.W.
"The Factors Behind the Different Growth Rates of U.S. Fisheries," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 13, Jan., 1969.

The purpose of this paper is to explore the differential growth rates of U.S. fisheries. It is based on the complex economics of harvesting a fishery resource involving biological yield, demand, and cost-effort functions. These functions interact to generate a path of expansion or decline for a fishery.

Sokoloski, A.A. and E.W. Carlson
"A Price Incentive Plan for Distressed Fisheries," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 14, April, 1969.

The authors propose a program of price incentives and high impact marketing incentives to encourage the transfer of effort from fisheries operating at less than full capacity to underutilized resources. The analysis includes the costs and benefits of a pilot project for New England and suggestions for the proper species of fish to divert capital resources to and problems associated with it. One suggested species for price supports is mackerel.

Cleary, D.P.
"Demand and Price Structure for Shrimp," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 15, June, 1969.

This study attempts to describe and quantitatively measure the forces determining the level of consumption of shrimp and the pric level of shrimp in the U.S. This is the first study concerned primarily with the nature of aggregate demand for shrimp. The paper presents the historical trends in consumption and supply of shrimp for the U.S. relative to the world. Then, it statistically analyses the demand and price structure of shrimp.

Miller, M.M., D.A. Nash, and F.M. Scheder
"Industry Analysis of Gulf Area Frozen Processed Shrimp and an

Estimation of its Economic Adaptability to Radiation Processing," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 16, Oct., 1969.

Perishability is a cost increasing factor common in the marketing of seafood products. Irradiation preservation is one of the new methods which appears to be specially suited to seafood products. This study explores the commercial feasibility of using irradiation as a preservation technique for processed shrimp products in the Gulf and South Atlantic states region. The study finds that the loss rate due to spoilage among processed shrimp products may be as high as six percent of total production. This represents a minimum annual economic loss to distributors in the neighborhood of $16 million. Consumers also face higher prices as spoilage decreases supply.

Assuming that irradiation processing could eliminate at least half the spoilage problem, commercial investments in shrimp irradiation processing appear highly attractive. The investment from a social point of view would generate a favorable cost-benefit ratio. Generally, the analysis serves a useful purpose in emphasizing the wisdom of even modest expenditures and efforts to improve the quality of high valued, high volume, seafood products.

Richards, J.R.
"An Economic Evaluation of Columbia River Anadromous Fish Programs," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 17, Feb., 1969.

Misallocation in public programs can result from failure to employ resources in high priority uses or to eliminate programs that have become obsolete. This study evaluates the benefits and costs of the continuing public program aimed at maintaining Columbia River anadromous fish runs. The hydroelectric power potential exceeds all other U.S. river basins. Irragation, flood control, navigation, and recreation are other important products that are complementary with dam construction. Anadromous fish compete with products that require construction of dams and the blockage of essential fish migration routes. Costly passage facilaties at dams prevent total blockage of the lower river and supplemental projects (fish hatcheries) partially replace lost productivity. While economic criteria would not justify the preservation of the Columbia River anadromous fish in the 1930's when major costs first began, the share of this program remaining in 1965 could be justified if traditional capital costs are used and when alternative investment possibilities are not considered.

Bell, F.W.
"Economic Projections of the World Demand and Supply of Tuna, 1970-1990," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 18, June, 1969.

Total world demand for tuna has increased rapidly over the 1956-66 period. These increases in demand are due to rising populations and expanding per capita income in the principal tuna consuming countries (U.S., Japan, and E.E.C. countries). This paper attempts to discover the relationship between per capita tuna consumption, tuna prices, and real per capita income for nine leading tuna consuming countries. On the basis of these relationships the world demand for tuna is projected to the year 1990. When projected increases in population and standards of living (per capita income) are accounted for over the next twenty years, it is estimated that tuna consumption will rise from 1.3 to 5.0 million metric tons between 1966 and 1990, assuming constant 1966 prices and available world supply. If MSY is 2.6 million metric tons and additional supplies are available from only the skipjack resource, it is likely that costs and prices will rise and demand will be reduced. The paper predicts world supply and demand equal by 1990 at $.38 per pound exvessel price and 2.1 million metric tons produced with existing technology. In this event, technological change through gear and biolgical research may result in an expansion of the world tuna fishery and reduced prices. This research and development must be accompanied by a fishery management plan to prevent the destruction of the resource.

Cleary, D.P.
"Economic Feasibility of a Seafood Processing Operation in the Inner City of Milwaukee," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 19, April, 1969.

This report deals with the economic feasibility of processing fish and shellfish harvested in the coastal areas of the U.S. within the inner city of Milwaukee. The report is specifically concerned with whether employment can be created within that city by generating locally a greater percentage of total value added to seafoods. Because there are so many variables and unknown factors, this report does not attempt to describe an optimal seafood processing operation in the inner city of Milwaukee. Rather, it discusses some of the most likely sources of supply, transportation and quality problems, plant equipment and labor considerations, and possible marketing difficulties.

Division of Economic Research
"The 1969 Fishing Fleet Improvement Act: Some Advantages of its Passage," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 20, July, 1969.

This paper presents the advantages derived directly from the 1969 Act and compares it with suggested alternatives, such as trade barriers. The effect of quotas on price and development of excess capacity resulting from the higher prices and the possibilities of exceeding MSY in already existing fisheries is used to support the case of the adoption of the 1969 Act.

Van Mier, L.W.
"An Economic Analysis of Policy Alternatives for Managing the Georges Bank Haddock Fishery," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 21, May, 1969.

This study has developed a bioeconomic model to evaluate the outcome of all policy alternatives in terms of fish landed, price of fish, volume of inputs and returns to management, capital, and labor. The model is a static model devised for comparing the results of equilibrium that would result from alternative policy proposals. This model was then applied to the Georges Bank haddock fishery as a case study to demonstrate the results of the policy alternatives.

Waugh, F.V. and V.J. Norton
"Some Analysis of Fish Price," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 22, May, 1969.

Prices and demand for fish vary from month to month. Seasonal demand varies greatly between species. Fish prices change year to year due to changes in supply, consumer income, and tastes. U.S. imports have increased greatly in recent years. Meat, poultry, etc. compete with fish in terms of price. The study suggests that fish prices and landings follow a recursive model (low landings yeild high prices). The demands for many fish species appear elastic (larger catch worth more than smaller catch) which contrasts with inelastic demand for stable farm products (wheat, corn, etc.).

Greenfield, J.E.
"Some Economic Characteristics of Pond-Raised Catfish Enterprises," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 23, June, 1969.

Catfish farming continues to grow because it offers farmers the potential for a higher rate of return than conventional crop and livestock enterprises. There is also a correspondingly higher business and biological risk associated with the higher profit potential. Under average management conditions, a 18 percent decline in price would erase all profit and reduce return on investment to zero. An equal increase in price would increase ROI to thirty percent. Since the industry is new and in a state of market development and change, price risk represents a major dimension to the investor's decision.

Nash, D.A., A.A. Sokoloski, and D.P. Cleary
"Elements Crucial to the Future of Alaskan Commercial Fisheries," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 24, August, 1969.

This paper presents an overview of the market for Alaskan established, developing, and latent fishery resources. Domestic and

foreign demand potentials are analysed in terms of competitive prices, volumes landed and potential future landings, and trends in utilization of processed forms. Lastly, factors affecting the economic potential for each species or group are analysed. The paper concludes that (1) a management program, (2) a vertically comprehensive incentive program to overcome the inertia of developing latent fisheries, (3) an economic evaluation of the costs at which certain fish products may be delivered to key markets in the U.S. and the demand at these prices, and (4) an evaluation of economic, social, and political legal barriers to any action deemed desirable, and the formulation of alternative institutional arrangements are critical to the development of the Alaskan fisheries. Cross referenced are Working Papers #8 and #5.

Nash, D.A. and M.M. Miller
"Effects on the Shrimp Processing Industry of Meeting the Requirements of Wholesale Fishery Products Legislation," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 25, June, 1969.

This paper analyses federal legislative proposals on fish inspection in the U.S. and how they might affect frozen shrimp processing plants. Costs are detailed for meeting minimum quality and sanitation standards likely to be enacted by the legislation. The added sales value and the added costs are used to compute the net cash flow for each year of the analysis which is discounted and expressed in current market terms. The rate of return on investment is computed which shows the earnings which would occur from these expenditures. The analysis showed that a two percent reduction in spoilage would result in a thirty percent rate of return. This is probably high enough to attract most firms to install sanitary practices without mandatory legislation. Therefore, frozen shrimp processors will not be greatly affected economically by mandatory inspections. However, since the initial investment to install sanitary equipment and practices is very large, consideration should be given to establishing a governmental loan fund to bring substandard plants up to minimum sanitation requirements.

Miller, M.M.
"Benefit Cost Analysis of a Proposed Trawl System Program," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 26, June, 1969.

The analysis gives an estimate of the benefits that would accrue from the investment of public funds to advance the technology of trawling. A proposed development program would require $504,235 per year over three years. The benefits have been calculated on the basis of five years of operation under the new technology. Since costs constitute the use of public funds, benefits are measured in t rms of contributions to national economic efficiency, i.e. increased output per unit of resource input. This analysis applies

specific values to the estimated gains in efficiency. Accured benefits may be considered increments to gross national product and the reallocation of manpower resources into more productive channels.

Bell, F.W.
"An Economic Analysis of Future Problems in Developing the World Tuna Resource: Recommendations for the Future Direction of the BCF Tuna Program," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 27, July, 1969.

This paper feels that the increased demand for the world tuna resource will require the development of the skipjack resource since other tuna species are presently at or beyond MSY. However, skipjack usually provide low yields from a widely dispersed resource. The paper recommends that more emphasis be placed on exploratory fishing in skipjack inhabited areas and on gear research in an attempt to improve the existing purse seine operations. Information from this research should be immediately communicated to the commercial fishing community.

Bromley, D.W.
"Economic Efficiency in Common Property Natural Resource Use: A Case Study of the Ocean Fishery," Bureau of Commercial Fisheries, Economic Research Working Papers, No. 28, July, 1969.

A mathematical model of productive interdependence among firms in a common pool situation was developed. The concept of rising supply price for an industry exhibiting productive interdependence was introduced and it was argued that the firm viewed a fishing-day as one of its variable inputs. These concepts are combined with the biological model presented and a bioeconomic model of the fishery was evolved. The model illustrated the impact on industry output from changes in technology, demand for the product, and fish population and the ramifications which result when current production is something other than the sustained yield of the fish stock.

Conclusions of the paper were (1) that the salvage value of commercial fishermen is lower than their acquisition costs and they may be receiving their opportunity cost. (2) Contrary to traditional thought, fisherman are more mobile than those occupational groups which stand to gain from long term asset (land) appreciation.

Sokoloski, A.A., E.W. Carlson, and B.G. Noetzel
"Costs, Earnings, and Borrowing Capacity for Selected U.S. Fisheries," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 29, Sept., 1969.

All industries always contain a portion that performs in a subnormal manner. The U.S. fishing industry is an exception to this pattern in that certain fisheries have larger distress segments than is normal for U.S. industries as a whole. This condition is emphasized by the condition of the landings market where there are essentially no funds available for repair loans. Measures of cash flows are contained in this report by fishery but the extent of other individual sources of funds to finance additional costs of operation cannot be estimated. Plans to initiate vessel safety programs must be elvaluated in terms of the costs of the program and the effect on the rate of return on investment given the state of the financial market, changes in resource supply, and product prices which could significantly affect profitability and the ability to absorb the costs of the new safety programs.

Waugh, F.V. and M.M. Miller
"Fish Cycles: A Harmonic Analysis," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 30, Sept., 1969.

The paper demonstrates the utility of harmonic analysis (cosine and sine functions) as applied to investigating cyclical patterns in fish landings and prices. The limited inquiry shows that the landings and prices of most species of fish exhibit strong seasonal fluctuations and tend to follow fairly definite longer cycles as well. The authors feel that this form of analysis is valuable in making short term forecasts and long term projections which are essential in making sound conservation programs and policies. However, it must be remembered that projections of past trends into the future which assume that the underlying independent variables remain unchanged will not take into account sudden or gradual changes in the structure of the industry which account for the cyclical nature of the price and quantity landed.

Bell, F.
"Benefit-Cost Analysis as Applied to Commercial Fisheries Programs," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 31, Oct., 1969.

This paper outlines the application of cost-benefit analysis to the development of fishery resources. Recommendations are made on what constitutes economic benefits, economic costs, and the discount rate for various fisheries and levels of industrial development. The paper seems to follow the accepted theory and makes exceptions only where data is insufficient to support estimates.

Perrin, W.F. and B.G. Noetzel
"Economic Study of San Pedro Wetfish Boats," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 32, Oct., 1969.

Because the San Pedro wetfish fleet is shrinking and not yielding good wag s for fishermen or good returns for investors, it needs to improve its economic state. The fleet is antiquated. It can be improved by constructing new, efficient vessels to replace and expand the fleet and to utilize under exploited stocks of jack mackerel and anchovies in the California current. This study found that at present rates of catch and prices of fish the construction of new vessels is not economically feasible even if construction is subsidized. The authors also found that the expansion of the fleet through acquisition of surplus vessels from other fisheries is feasible, given sufficient demand for wetfish at present prices.

Nash, D.A.
"A Survey of Fish Purchases by Socio-Economic Characteristics," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 33, Oct., 1969.

This paper presents the results of a statistical survey of the pattern of fish product purchases according to socio-economic characteristics of the households. The participants replicate the U.S. population by geographic region and cover a wide range of incomes, family sizes, occupations, ages, races, and religions. The survey will assist in determinations of how the various characteristics of the population cause shifts in demand. The report summarizes the first of four quarters of the year long survey and covers february, march, and april of 1969. See Working Papers numbers 34, 41, 46, and 49 for subsequent quarters and the year long summary.

Nash, D.A.
"A Survey of Fish Purchases by Socio-Economic Characteristics, Second Quarterly Report," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 34, Oct., 1969.

This report summaries the second of four quarters of a year long survey to obtain the patterns of fish product purchases according to socio-economic characteristics of households. The data include: (1) the number of times the purchase was made, (2) number of persons for which the item was purchased, (3) number of pounds purchased, (4) total dollars spent on the item, (5) price per pound, (6) pounds purchased per household, and (7) pounds per capita. Purchases are classified by month and by two week periods. See Working Papers numbered 33, 41, 46, and 49 for subsequent quarters and the year long summary.

Bell, F.W.
"A Guide to Benefit-Cost Analysis for Bureau of Commercial Fisheries Programs," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 35.

The purpose of this paper is to explain the usefulness and

limitations of benefit-cost analysis and to inform the reader on how these procedures are applied to fisheries programs. This is in response to Senate Document No. 97 which is the most recent statement on government benefit-cost analysis.

Bell, F.W.
"Estimation of the Economic Benefits to Fishermen, Vessels, and Society from Limited Entry to the Inshore U.S. Northern Lobster Fishery," Bureau of Commercial Fisheries, Economic Working Papers Series, No. 36, March, 1970.

Because unlimited entry to a common property resource produces exess capacity, it is the purpose of this paper to present a theoritical and empirical basis for the conservation of capital and labor in exploiting inshore northern lobster resources. Conservation is defined to include the efficient and economic use of capital, labor, and the lobster resources. The economic benefits to fishermen, vessel, and society from a policy of limited entry to the fishery will be estimated. The mechanics of limited entry are also disscussed.

Kinoshita, R.K. and F.W. Bell
"Major Economic Trends in Selected U.S. Master Plan Fisheries: A Graphical Survey," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 37, Dec., 1969.

A graphical presentation provides the major economic trends for selected U.S. Master Plan fisheries and can serve as a quide to managers. The fiqures illustrate the trends in landings, imports, per capita consumption, exvessel price index, fishermen, and vessels and boats. The supporting data appears in the appendix. The species included are: total fish, atlantic groundfish, pacific groundfish, halibut, northern lobsters, sea scallops, clams, oysters, shrimp, crabs, menhaden and fish meal, tuna, and salmon.

Nash, D.A.
"Market Potential of the San Pedro Wetfish Fishery: A Demand Analysis Approach," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 38, Dec., 1969.

It has been demonstrated in Working Paper number 32 that there can be profits in the wetfish fishery given a sufficient volume of landings. This paper shows that increasing catch, contrary to what happens when increasing the supply of many food products, will increase total revenue to the fleet and revenue to any vessel which increases catch by the same or higher percentage than total catch is increased. Therefore, there is considerable hope for a profitable fishery. Rising population and income on the other hand probably will not cause any growth in the market.

Micuta, J.E.

"Pertinent U.S. Trade Barrier Information by "Master Plan" Fisheries," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 39, Jan., 1970.

Tariff, trade, and legal investigations data has been assembled in this paper by master plan fisheries in order to facilate the understanding and further work in the area of international trade and competitiveness in fishery products. The accompanying tariff schedule list the fishery products, the pre-Kenndy Round tariffs, the January 1970 tariffs, and the final concession step of the Kenndy Round tariffs.

Arnold, V.
"An Analysis to Determine Optimum Shrimp Fishing Effort by Area," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 40, Jan., 1970.

In this study, vessels from thirteen major shrimp ports were surveyed to determine the cost and earnings structure for Gulf shrimp vessels. This information was combined with effort data for a sample of vessels spending fifty percent or more of their time on the Tortugas shrimp grounds. A linear programming model was developed to determine the optimal distribution of vessels between ports based upon the effort patterns, the distribution of species, and the cost components of vessel operations. Using constraints based on various assumptions, results were derived which suggested considerable differences from current port use patterns. Social benefits derived from their application demonstrate the value of this technique.

Nash, D.
"A Survey of Fish Purchases by Socio-Economic Characteristics, Third Quarterly Report," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 41, Jan., 1970.

This paper summarizes the third of four quarterly reports of a year long survey to obtain the patterns of fish product purchases according to socio-economic characteristics of the households. It is a continuation of working papers number 33 and 34. The year long summary is located in working paper number 46 and the fourth quarterly report is in working paper number 49.

Nash, D.
"Investigation of Fish Landing Patterns at Stonington, Connecticut with a View to Development of New Markets," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 42, Feb., 1970.

Annual landings have been declining at the Stonington fishing port. The port has not developed processing or marketing facilaties comparable to many other New England ports. A substantial fish ry

can be supported within one or two days of shore and therefore a very fresh product is landed. There remains to be developed a suitable processing/marketing mechanism to deliver this quality product to final markets. This project evaluates the potential of the existing fleet, the fishery resources that could be utilized, and the earning possibilities of an established fishery there. This shows the products available to a potential buyer and the requirements in terms of earnings to maintain a fleet at the port.

Fullenbaum, R.F.
"A survey of Maximum Sustainable Yield Estimates on a World Basis for Selected Fisheries," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 43, Feb., 1970.

This report attempts an exhaustive survey of the biological literature on MSY. The objective of this study is to quantify to the largest possible extent the biological research in this area. For each species a world estimate and a regional breakdown is given. In addition, because of the emphasis on resource conservation, information on landings relative to MSY is also presented. For the world and for all species, the ratio of landings to MSY is equal to 46.9 percent. Species covered include: lobsters, crabs, shrimp, scallops, clams, cod, flounder, haddock, hake, ocean perch, pollock, tuna, salmon, halibut, sardines, mackerels, jack mackerels, other flatfish, miscellaneous, and Great Lakes fisheries.

Erickson, S.E.
"Methods for Calculating Civilian Per Capita Consumption of Fresh and Frozen Shellfish," Bureau of Commercial Fisheries, Economic Working Papers Series, No. 44, Feb., 1970.

This working paper describes in detail the procedures to derive total and per capita consumption of the major commercial shellfish of the U.S. It is an expansion of the computational formats appearing in Statistical Procedure Report No. 6 and incorporates pertinent information from other related procedural reports. The conversion factors used in this report are obtainable from the annual Statistical Digests. This paper should be used in conjunction with E.A. Power's Statistical Procedural Reports which describe the use of fishery statistics and the methods for deriving information which is not readily available from the Statistics Digest or other published sources.

Marasco, R.
"The Organization of the California Tuna Industry: An Economic Analysis of the Relations Between Market Performance and Conservation in the Fisheries," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 45, March, 1970.

California's most important fishery is based in the eastern tropical Pacific ocean. The quantity of yellowfin, skipjack, and bluefin taken from this area represent virtually the entire domestic catch of light meat tuna. Evidence indicates that MSY of yellowfin has been surpassed. This study is an evaluation of the California tuna fishing industry. Attention is focused on yellowfin, the most valuable species to the California tuna fishermen. The results indicate that there is a low degree of concentration on the seller's side and a high degree of concentration on the buyer's side of the tuna market. Also, tuna fishing costs are characterized by high fixed costs and relatively low variable costs. Average variable costs were found to be fairly stable. Total average costs, given the preceding characteristics of fixed and variable costs, decline over a large range of outputs. This declining nature of average total costs encourage fishermen to fish intensively. It is in this manner that fishermen are able to take full advantage of decreasing costs. In this case, costs accelerate the intensive behavior encouraged by the fugitive tuna resource. This maximum fishing activity engaged in collectively by the entire fleet was determined to be an influencial factor in the surpassing of MSY.

Cost-benefit analysis indicates that exceeding MSY in the short run does not require implimentation of regulatory measures. Long run considerations are more difficult to determine. The possibility exists that the impact brought about by exceeding MSY is of a lagged nature. However, sufficient economic evidence is required showing adverse effects occurring to both fishermen and consumers before regulation is economically justifiable especially if irreversibilities are nonexistent.

Nash, D.
"Preliminary Analysis of a Survey of Buying Patterns for Fresh and Frozen Fish and Shellfish by Household Characteristics," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 46, Aug., 1970.

This report summarizes the purchase patterns for fresh and frozen fish and shellfish from a one year survey of 1,500 participants theoretically representative of all U.S. households. Previous studies from this survey are Working Papers number 33, 34, and 41. The more distinct differences in purchases among households are due to race, religion, region, and age of the head of the household. Purchases of fish meals in resturants were difinitely related to income level in addition to the above factors.

Nash, D.
"Projections of Certain Fishery Products of Commercial Importance in Louisiana," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 47, April, 1970.

Demand for fish products in th U.S. is increasing as population and consumer income expands. Further consumption increases are projected resulting from these same factors. This is particularly true of the highly valued fish and shellfish as well as for fish meal, in which case the demand is derived from the expansion in broiler production. Fish products landed in Louisiana (shrimp, crabs, oysters, and menhaden) will make contributions to this national market and it is therefore important to maintain these fisheries. Other finfish species landed in Louisiana will experience increasing demand if they are offered to the consumer in the highly processed forms similar to the fish products now experiencing significant demand increases.

Bell, F.W. and E.W. Carlson
"The Productivity of the Sea and Malthusian Scarcity," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 48, April, 1970.

The increasing pressure of world population on natural resources has again given rise to the specter of Malthusian stagnation. The purpose of this paper is to examin the Malthusian doctrine of diminishing returns to natural resources using the fisheries as a case study. It was found, for the ten stocks of fish studied, that Malthusian scarcity is quite prevalent. That is, fishing productivity declines with expansions in effort. This hypothesis was verified for both the steady state and stock adjustment models. Without major discoveries in controlling ocean environment, it is quite apparent that the sea will be subject to Malthusian scarcity as the pressure of population increases.

Nash, D.A.
"A Survey of Fish Purchases by Socio-Economic Characteristics, Fourth Quarterly Report," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 49, April, 1970.

This paper summarizes the fourth of four quarterly reports of a year long survey to obtain the pattern of fish product purchases according to socio-economic characteristics of the households. It is a continuation of Working Papers numbers 33, 34, 41, and 46.

Nash, D.A.
"A Survey of Fish Purchases by Socio-Economic Characteristics, Annual Report," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 50, April, 1970.

This report covers the complete one year survey period designed to obtain the pattern of fish product purchases according to socio-economic characteristics of households. Working Papers numbers 33, 34, 41, 46, and 49 contain the four quarterly reports and a preliminary summary of the results of the survey.

Kinoshita, R.K., K.E. Koller, and B.G. Noetzel
"Basic Economic Indicators; Atlantic Groundfish," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 51, April, 1970.

The purpose of this series is to consolidate pertinent economic, technological, and biological data for each master plan fishery. The report is divided into (1) Industry Performance Indicators, (2) Demand Indicators, (3) Demand Projections, (4) Domestic Production, (5) Domestic Employment, Vessels, and Effort, (6) Biological Stock Assessment, (7) International Trade, (8) Foreign Production, (9) Foreign Consumption, (10) U.S. Trade Barriers, and (11) Government Programs. The Tables provide historical data for each of these headings, nation-wide. Little regional data is provided. These reports could be updated for use in economic analysis. The usefulness of the individual reports will vary depending upon the subject.

Kinoshita, R.K., K.E. Koller, and B.G. Noetzel
"Basic Economic Indicators; Halibut," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 52, April, 1970.

This is a continuation of the "Basic Economic Indicators" series (see Working Paper NO. 51) concerned with the halibut fishery.

Kinoshita, R.K., K.E. Koller, and B.G. Noetzel
"Basic Economic Indicators; Northern Lobsters," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 53, April, 1970.

This is a continuation of the "Basic Economic Indicators" series (see Working Paper No. 51) concerned with the northern lobster fishery.

Kinoshita, R.K., K.E. Koller, and B.G. Noetzel
"Basic Economic Indicators; Sea Scallops," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 54, April, 1970.

This is a continuation of the "Basic Economic Indicators" series (see Working Paper No. 51) concerned with the sea scallop fishery.

Kinoshita, R.K., K.E. Koller, and B.G. Noetzel
"Basic Economic Indicators; Clams," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 55, April, 1970.

This is a continuation of the "Basic Economic Indicators" series (see Working Paper No. 51) concerned with the clam fishery.

Kinoshita, R.K., K.E. Koller, and B.G. Noetzel
"Basic Economic Indicators; Oysters," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 56, May, 1970.

This is a continuation of the "Basic Economic Indicators" series (see Working Paper No. 51) concerned with the Oyster fishery.

Kinoshita, R.K., K.E. Koller, B.G. Noetzel
"Basic Economic Indicators; Shrimp (Atlantic and Gulf)," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 57, May, 1970.

This is a continuation of the "Basic Economic Indicators" series (see Working Paper No. 51) concerned with the Shrimp fishery.

Kinoshita, R.K., K.E. Koller, B.G. Noetzel
"Basic Economic Indicators; Blue Crab," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 58, May, 1970.

This is a continuation of the "Basic Economic Indicators" series (s e Working Paper No. 51) concerned with the blue crab fishery.

Kinoshita, R.K., K.E. Koller, and B.G. Noetzel
"Basic Economic Indicators; King and Dungeness Crab," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 59, May, 1970.

This is a continuation of the "Basic Economic Indicators" series (s e Working Paper No. 51) concerned with the King and Dungeness crab fishery.

Kinoshita, R.K., K.E. Koller, and B.G. Noetzel
"Basic Economic Indicators; Menhaden," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 60, May, 1970.

This is a continuation of the "Basic Economic Indicators" series (see Working Paper No. 51) concerned with the menhaden fishery.

Kinoshita, R.K., K.E. Koller, and B.G. Noetzel
"Basic Economic Indicators; Tuna," Bureau of Commercial Fisheries, Economic Research Working Papers Series, No. 61, May, 1970.

This is a continuation of the "Basic Economic Indicators" series (see Working Paper No. 51) concerned with the Tuna fishery.

Kinoshita, R.K., K.E. Koller, B.G. Noetzel
"Basic Economic Indicators; Salmon," Bureau of Commercial

Fisheries, Economic Research Working Papers Series, No. 62, May, 1970.

This is a continuation of the "Basic Economic Indicators" series (see Working Paper No. 51) concerned with the salmon fishery.

Kinoshita, R.K., B.G. Noetzel, and D.J. Sweeney
"Basic Economic Indicators; Pacific Groundfish," National Marine Fisheries Service, Economic Research Working Papers Series, No. 63, Dec., 1970.

This report is a continuation of the "Economic Indicators" series (see Working Paper No. 51) concerned with the pacific ground fish industry.

Kinoshita, R.K., B.G. Noetzel, and K.E. Koller
"Basic Economic Indicators; Pacific Shrimp," National Marine Fisheries Service, Economic Research Working Papers Series, No. 64, Dec., 1970.

This report is a continuation of the "Economic Indicators" series (see Working Paper No. 51) concerned with the Pacific Shrimp industry.

Bell, R.W., D.A. Nash, E.W. Carlson, F.W. Waugh, R.K. Kinoshita, and R.F. Fullenbaum
"The Future of the World's Fishery Resources: Forecasts of Demand, Supply, and Prices to the Year 2000 with a Discussion of Implications for Public Policy," National Marine Fisheries Service, Economic Research Working Papers Series, No. 65-1, April, 1970.

This paper is a comprehensive economic report on the present utilization of the world's fishery resources. The principal thrust is to forecast demand, supply, and price for the major fish species for various countries to the year 2000. Recommendations regarding public policy and resource use are made based on these forecasts. See working paper 65-2 for the appendix.

Bell, F.W., D.A. Nash, E.W. Carlson, F.W. Waugh, R.K. Kinoshita, and R.F. Fullenbaum
"Appendix to the Future of the World's Fishery Resources: Forecasts of Demand, Supply, and Prices to the Year 2000 with a Discussion of Implications for Public Policy," National Marine Fisheries Service, Economic Research Working Papers Series, No. 65-2, Dec., 1970.

This paper contains tables used in Working Paper No. 65-1.

Carlson, E.W.
"An Economic Theory of Common Property Fishery Resources,"

National Marine Fisheries Service, Economic Research Working Papers Series, No. 66, July, 1970.

A model of an economic theory of commercial fisheries is developed. The model integrates a biological growth model and a production function into a yield function for commercial fisheries. This function lays the basis for a supply function of commercial fishery products. A demand function is introduced and equilibrium conditions are discussed. In addition, schemes for management of a commercial fishery are discussed.

Cleary, D.P.
"The Determinants of Actual and Subsidized Competitive Strengths and Weaknesses of U.S. and Canadian Groundfish Fisheries," National Marine Fisheries Service, Economic Research Working Papers Series, No. 67, August, 1970.

The physical and economic efficiency of the Canadian and New England North Atlantic groundfish fleets were compared. Productivity, costs, and returns to capital and labor were related to vessel size and other characteristics. Although the Canadian fleet continues to have a greater productivity than the New England groundfish fleet, the financial performance of the Canadian fleet is slightly better than the New England fleet. The primary financial advantage of the Canadian fleet continues to be significantly lower labor costs. Canadian subsidy programs have been a prime factor in expansion of harvesting capacity in the Atlantic provinces (New Brunswick, Prince Edward Island, Nova Scotia, Quabec, and Newfoundland) fisheries.

Miller, M.M. and D. Nash
"Regional and Other Related Aspects of Shellfish Consumption--Some Preliminary Findings from the 1969 Consumer Panel Survey," National Marine Fisheries Service, Economic Research Working Papers Series, No. 68, Sept., 1970.

A consumer survey panel, consisting of representative households throughout the U.S. recorded their fishery product purchases for a 12 month period begining in February 1969. This study deals mainly with the study findings respecting the consumption of major species of shellfish. Findings marked regional preferences for individual sh llfish items. The study also indicated an association between high income households and age of consumer with shellfish consumption.

Carlson, E.W.
"Cross Section Production Functions for North Atlantic Groundfish and Tropical Tuna Seine Fisheries--Measures of Fishing Power and Their Use in the Measurement of Fishing Effort," National Marine Fisheries Service, Economic Research Working Papers Series, No. 69, Sept., 1970.

This paper explores the use of cross section production functions to estimate the fishing power of individual vessels. The problems addressed are: The proper measurement of output; the measurement of fishing time; important vessel characteristics; crew size; the effect of location; and the measurement of technological change. R gression analysis indicated that there are better measures of output then total pounds; fishing time is better measured using days absent rather than days fishing; the use of more vessel characteristics improves explanatory power; crew size can be an important variable; the effects of location can be measured; and that technological change can be measured. The study provides a simple way to build effort indices for many fleets and points the way to rationalized data collection.

Corrigan, T.D.
"An Economic Analysis of the Major Shellfisheries of the Chesapeake Bay," National Marine Fisheries Service, Economic Research Working Papers Series, No. 70, Feb., 1971.

The objectives of this study are to establish and quantify the economic and biological relationships in the major shellfisheries in the Chesapeake Bay and to forcast selected variables into the future under existing and alternative institutional structures. After developing a theoritical model, simulations were employed to estimate landings, employment levels, prices, and net incomes into the future and the affects on these from changes in market structure, laws, and regulations.

Doll, J.P.
"An Econometric Analysis of the U.S. Shrimp Market," National Marine Fisheries Service, Economic Research Working Papers Series, No. 71, Feb., 1971.

The purpose of this report is to increase the understanding of the determinants of prices and supplies. There have been times when supplies seemed to be out of balance with price conditions. The frequency of these occurrences can be reduced if decision makers hav better means to forcast prices and supplies. The study generally confirms that the identification problem is not serious and permits a number of new inferences to be made including the effects of imports and the nature of lagged influences in the market.

Penn, E.S.
"Price Spreads and Cost Analyses for Finfish and Shellfish Products at Different Marketing Levels," National Marine Fisheries Service, Economic Research Working Papers Series, No. 72, July, 1971.

The rapid increase in fish prices has caused public conc rn. Consumers and fishermen attribute rises in retail fish prices to

increases in marketing costs. To find the cause of the differenc between the price the fisherman receives for his product and the price paid by the consumer, the distribution of the consumer's dollar paid to the retailer, wholesaler, processor, and fisherman is analysed. In addition, the costs and profits incurred by each marketing function are analysed and the major influences on the margin differences are discussed.

Cleary, D.P. and J. Vondruska
"Economic Criteria to be Used in the Administration of the National Marine Fisheries Service Financial Assistance Program," National Marine Fisheries Service, Economic Research Working Papers Series, No. 73, Jan., 1971.

The purpose of this report is to evaluate the Service's financial assistance programs in terms of the goals of fishery management and to suggest criteria for the administration of the program. Even though the financial programs have preserved the fleet during times of financial crises, they have also resulted in overcapitalization in the fishery. Thus, financial programs should view the level of capital development as one factor in the loan process.

Nash, D.A. and M.M. Miller
"Insurance Coverage for U.S. Commercial Fishing Vessels--A Survey of Current Insurance Costs, Availability, and Other Special Problems," National Marine Fisheries Service, Economic Research Working Papers Series, No. 74, Dec., 1970.

This report provides interested branches of the government with a current view of problems faced by operators of commercial fishing vessels in obtaining adequate insurance coverage at a reasonable cost. Recommended solutions to these problems include expanded safety programs, providing an actuarial base for fishing operations, establishing reinsurance authority, and promoting 1 gislative changes that will promote the equitable disposition of claims arising from injury and illness of crewmen aboard fishing vessels.

Nash, D.A.
"Insurance Coverage of U.S. Commercial Fishing Vessels--Problems and Recommendations," National Marine Fisheries Service, Economic Research Working Papers Series, No. 75, July, 1971.

The fishing industry is faced with a declining vessel insurance market because of the high degree of physical risk associated with commercial fishing operations and limited existing actuarial experience and knowledge. The paper recommends (1) reducing physical risks by instituting a safety program, (2) providing loan quarantees to vessel owners to institute safety programs and to associations designed for mutual insurance purposes, (3)

establishing a reinsuranc system and federal sponsorship of risk evaluation, and (4) a study of means of promoting more equitable disposition of claims arising from injuries and illness of crewmen aboard fishing vessels.

Cleary, D.P.
"Sport/Commercial Conflicts and the National Marine Fishery Service's Role in Fishery Management," National Marine Fisheries Service, Economic Research Working Papers Series, No. 76, Feb., 1971.

Conflicts between sport and commercial fishermen occur due to (1) ignorance or misunderstanding, (2) irrational behavior, and (3) economic or biological problems. The NMFS has a responsibility to eliminate conflicts (1) and (3) by disseminating information and setting up joint sport/commercial fishery models, respectively. Conflicts in catagory (2) as a result should clear up themselves.

Bell, F.W.
"Burden of a Tax on Fishery Products," National Marine Fishery Service, Economic Research Working Papers Series, No. 77, 1971.

The suggestion that government research, development, and regulations be financed by a direct tax on fishery products would result in (1) producers of relatively elastic demand fishery products being forced out of business, (2) a regressive food tax, and (3) the cost of the research would exceed the revenue raised because a flat tax is not a user's tax. Instead, the paper suggests that financing from the general treasury would eliminate the discriminatory effects by utilizing progressive personal income tax, preventing harm to elastic demand curve producers, and, since the general fund is raised partially by corporate income taxes, benefit the fishing industry because it is composed of smaller firms paying a lower corporate tax rate.

Noetzel, B.G., D.P. Cleary, and R.F. Fullenbaum
"Analysis of the Impact of the Vessel Safety, Mandatory Inspection, and Pollution Abatement Programs on Fishing Vessels and Processing Plants, with Recommendations for a Government Guaranteed Loan Program," National Marine Fisheries Service, Economic Research Working Papers Series, No. 78, April, 1971.

This paper analyses the impact of new vessel safety, mandatory inspection, and polution abatement programs on the fishing industry. It suggests the use of government guaranted loans to offset initial credit difficulties and the creation of more favorable and available credit in the future.

Bell, F.W., H.E. Bale, B.G. Noetzel, and D.A. Nash

"Probable Economic Implications of th President's New Economic Policies on the U.S. Fishing Industry and Recommendations for Further Action," National Marine Fisheries Service, Economic Research Working Papers Series, No. 79, Sept., 1971.

The paper analyses the impact of the President's wage and price freeze on fishermen and processors. Since raw fish is exempt under the freeze and processed fish products are not, there should be an conomic impact on the system. Fishermen and processors can expect to experience some losses due to either reduced demand for fish or lower profit margins, respectively. The President's program could lead to overcapitalization of the fisheries and reduce the size of the resource.

Bale, H.E.
"Report of the Economic Costs of Fishery Contaminants," National Marine Fisheries Service, Economic Research Working Papers Series, No. 80, Nov., 1971.

This report presents estimates of the economic losses that industrial, municipal, and agricultural activities impose on the commercial fishing industry. Background discussion concentrates on the widespread contaminants (DDT, mercury, and pathogenic organisms) that are of major concern to the fishing industry. Current annual cost estimates of water contamination are in the range of $13.5 million. In the near future, these costs could increase to approximately $100 million if river, estuarine, and ocean pollution continues unabated.

Cleary, D.P.
"Assistance Programs in Overcapitalized Areas," National Marine Fisheries Service, Economic Research Working Papers Series, No. 81, Dec., 1971.

Most domestic and international fisheries pursued by U.S. fishermen are fully or overcapitalized. Fishery management programs should be aimed at balancing the use of human and capital resources with available fishery resources, which may involve the elimination of redundant fishing effort. There is also considerable pressure for the federal government to provide assistance programs to help vessel owners meet obstacles to economic well-being and mandatory product inspection. This paper examines the conflict between financial assistance which would maintain or expand capacity and fishery management which would reduce the number of vessels in overcapitalized fisheries.

Bell, F.W., D.P. Cleary, D. Nash, and R. Kinoshita
"The Current Status of the United States Fisheries," National Marine Fisheries Service, Economic Research Working Papers Series, No. 82, Nov., 1971.

Many U.S. fisheries are presently suffering from archaic laws and regulations, overcapacity, and relatively low returns to labor and capital. Because of the common property nature of the resource, open access, and rising demand, the problems are likely to continue unless rational management schemes are instituted. It is to this latter objective that NMFS is dedicated.

Huq, A.M.
"Socio-Economic Factors to be Considered in Implimenting Limited Entry-A Case Study, The Northern Lobster Fishery," National Marine Fisheries Service, Economic Research Working Papers Series, No. 83, Dec., 1971.

This paper discusses the importance of the social factors involved in implimenting regulatory schemes which control the number of fishermen in the fishery. It identifies the conditions in the northern lobster fishery and demonstrates how socio-economic conditions may dictate the methods by which limited entry management schemes must be approached to prevent social costs from negating the efficiencies to be gained. Particular emphasis is placed upon factors from which insight may be gained regarding the mobility of labor. Attention is also focused upon alternative uses of labor in a particular region.

Sokoloski, A.A.
"Discussions and Research on Ocean Fishery Management: A Summary of U.S. Workshop," National Marine Fisheries Service, Economic Research Working Papers Series, No. 84, Dec., 1971.

This paper summarizes the key issues in the sixteen papers presented at the NMFS workshop of November, 1970 and the discussions that resulted. Research topics ranged from production economics and bioeconomic models to general discussions of management for both conservation and economic purposes, the political framework for management, and the multiple social problems that might be involved. The highlights of these issues are presented here in the form of suggested critical problems which must urgently be faced by the professionals in this field.

Sokoloski, A.A. and J.A. Crutchfield
"The Domain of Population Dynamics and Production Economics in Fisheries Management Research," National Marine Fisheries Service, Economic Research Working Papers Series, No. 85, Dec., 1971.

With growing conceptual acceptability of fishery management t chniques which advocate the reduction in the number of units of effort applied to over exploited and/or overcapitalized fisheries, it is increasingly necessary that some readily useable measures be developed which may serve all thos involved in fishery management and supporting research. Towards this end, this paper examines the

foundations of measures of fishing effort and fishing power as conceived within the domains of population dynamics and production economics. The degree to which each discipline generates different and mutually exclusive measures is examined, along with an attempt to delineate a separate and distinct role for each discipline within the overall process of generating supporting information needed in all generalized fishery management plans.

Penn, E.S.
"Economic Impact of Northern Lobster Fishery in Maine," National Marine Fisheries Service, Economic Research Working Papers Series, No. 86, June, 1971.

The northern lobster fishery is one of the major economic activities in Maine. The following analysis is presented to show the estimated effects on the state economy based on the income generated by this industry. This industry contributed about $54.3 million to personal income of the residents of Maine in 1970 in addition to other forms of economic and social benefits. The lobster fishery includes fishing operations, processing, exports to other states, and tourists attracted to the state as a result of the lobster fishery. This primary economic activity provides income to its own sector which in return buys goods and services from other sectors to generate income throughout the economy.

Bell, F.W., E.W. Carlson, and F.V. Waugh
"Production from the Sea," National Marine Fisheries Service, Economic Research Working Papers Series, No. 87, Nov., 1970.

In the wake of increasing difficulties producing food from land areas in the world, attention is being given to the sea as a source of food. Because the sea constitutes a common property resource, factor productivity is heavily influenced by technological externalities. The sea is also subject to Malthusian scarcity since man cannot manipulate the ocean environment. The parameters of the dynamic Schaefer production model of the intervention of man into th ocean ecosystem were estimated using ordinary least squares. A second production model for the sea specifing diminishing returns to capital and labor for any fixed biomass was developed. The parameters of the latter model were estimated by a computer search technique. The results indicate that the industry production function for marine life is subject to diminishing physical returns to capital and labor. For the cases considered in this study, it also appears that the parabolic yield function developed by Schaefer, assuming constant returns to factor inputs, is not as realistic as a production function with diminishing returns to inputs with a given biomass.

Economic Research Laboratory
"Market Failures Related to Fishery Products and the Role of Government," National Marine Fisheries Service, Economic

Research Working Papers Series, No. 88, March, 1970.

It is the purpose of this paper to identify the principal areas where the private market failed or is not completely adequate to achi ve economic efficiency. The identification of a market failure will be supplemented by listing all the possible causes underlying a given situation and the economic effects which accompany or might be brought about by that situation. Finally, in each case an outline of some general BCF programs, either ongoing or which might be proposed in connection with that particular market failure, will follow.

Bell, F.W. and E.W. Carlson
"The Haddock Disaster Program: Analysis and Accomplishments," National Marine Fisheries Service, Economic Research Working Papers Series, No. 89, June, 1971.

This report summarizes the main elements of the Haddock Disaster Program. It discusses the economic and conservation benefits achieved by the expenditure of federal dollars by Massachusetts to preserve haddock stocks by developing a fishery for an alternative species (pollock) for commercial exploitation. This could be useful in developing alternative fisheries for vessels forced out of traditional fisheries by limited entry programs.

Sokoloski, A.A.
"International Trade Policy and the Role of Imports: Briefing Materials Prepared for the Office of the Assistant Director for Economics," National Marine Fisheries Service, Economic Research Working Papers Series, No. 90, August, 1970.

This paper summarizes fishery policy and international trade from the viewpoint of existing legislation affecting imports and exports of fishery products, future development of the world fisheries and the need for international management, and the economic impacts and n eds of the domestic import based fishing industry.

Economic Research Laboratory
"Role of the National Oceanic and Atmospheric Agency in Fishery Management," National Marine Fisheries Service, Economic Research Working Papers Series, No. 91, Oct., 1970.

The private market forces have failed to produce the most efficient allocation of capital and labor in the harvesting sector of the U.S. fishing industry because of the common property nature of the fishery resource. This paper urges the creation of a federal-state partnership to manage the fishery resources of the U.S. in terms of investments of capital and labor, effort, fishery research, limited entry, international exploitation of U.S. resources, etc.

Cleary, D.P.

"Assistance Programs in Fully Capitalized or Overcapitalized Fisheries," National Marine Fisheries Service, Economic Research Working Papers Series, No. 92, Dec., 1972.

This paper examines the conflict between financial assistance which would maintain or expand capacity in fully or overcapitalized fisheries and fishery management which would reduce the number of vessels in overcapitalized fisheries. Even though federal financial assistance programs have affected only a portion of the net addition of vessels in various fleets, these programs are being considered in light of the fishery management problem.

Sokoloski, A.A.
"Historical Analysis of the U.S. Oyster Market with Emphasis on the Role of Imports," National Marine Fisheries Service, Economic Research Working Papers Series, No. 93, Dec., 1970.

The U.S. oyster supply has experienced a substantial change in its composition. Since 1950, total oyster imports have tripled and now account for 23 percent of total supply. This is a result of declining domestic harvest from 18 to 2 million pounds since 1950 due to antiquated regulatory structure, competition for the resource base, pollution, MSX disease, stagnant technology, declining consumption, and imports. The increased imports have had a measurable impact in the Gulf and Pacific region independent of these other problems. Most of the data provided in the report is annual and only imports are separated out by region.

Schary, P.B., R.E. Shirley, and B. Linn Soule
"Distribution of Fresh and Frozen Salmon: Analysis and Simulation," National Marine Fisheries Service, Economic Research Working Papers Series, No. 94, Sept., 1971.

This study describes and analyses the distribution system for the marketing of fresh and frozen Pacific Salmon as it existed from 1968 to 1970. The system is composed of two channels: one for negotiation and exchange and the other for the physical distribution of the product itself. The industry returns appear to be low or negative with the result that capital is not being replaced. A computer simulation model was developed to test for the impact of proposed changes on system operation in either channel.

Schary, P.B., R.E. Shirley, and B. Linn Soule
"Analysis of the Distribution System for Northwest-Originated Fresh and Frozen Salmon, Vol. 1," National Marine Fisheries Service, Economic Research Working Papers Series, No. 95-1, Sept., 1971.

This study discusses the description and analysis of the distribution system for fresh and frozen Pacific salmon. First, the analysis identifi s the size and the trends of the catch of the

species entering the fresh and frozen product market. Secondly, the actual distribution process is described: volume of product flow, structure of the distribution channel, and analysis of the price making behavior. Third, the channel arrangements for the physical movement of salmon to market are described. Fourth, the specific inputs necessary for the development of a simulation model are described and the model is developed and tested.

Schary, P.B., R.E. Shirley, and B. Linn Soule
"Analysis of the Distribution System for Northwest-Originated Fresh and Frozen Salmon, Volume II," National Marine Fisheries Service, Economic Research Working Papers Series, No. 95-2, Sept., 1971.

Volume II is a continuation of Volume I and contains chapters V through IX and an appendix. See Working Paper 95-1 for an abstract of the report.

Nash, D.A.
"Effects of Fishery Product Inspection Fee Increases on the Utilization of NMFS Voluntary Inspection Services by Fishery Product Processors," National Marine Fisheries Service, Economic Research Working Papers Series, No. 96, Jan., 1972.

This report analyses the effects of various levels of fee increases on the users of the fishery product inspection service regarding the estimated number which would discontinue the service and the change in revenue from various rate increases.

Cleary, D.P. and J. Vondruska
"The Potential Impact of the Capital Construction Fund Provision of the Merchant Marine Act of 1970 on the Fisheries of the United States," National Marine Fisheries Service, Economic Research Working Papers Series, No. 97, July, 1971.

The objectives of this study are: (1) To describe and discuss financial usage as explained in the act. (2) To show the potential benefits and usefulness to individual vessel operators. (3) To estimate the impact of fund usage on the capacity of U.S. fishing fleets. And (4) to recommend administrative quidelines that would be consistent with other NMFS financial programs with the objectives of fishery management policy and with NMFS policy.

Vondruska, J.
"Estimated Economic Impact on Fishermen due to Eliminating the U.S. Import Duties on Fishing Gear, Nets, and Electronic Equipment," National Marine Fisheries Service, Economic Research Working Papers Series, No. 98, April, 1972.

Import duty removal is estimated to reduce the prices paid by fishermen by about 5 to 33 percent for duties ranging from 5 to 50

percent, ad valorem equivalent. This would reduce costs by 2 to 3 percent of gross receipts. Rather than eliminating the import duty, other government policies could be adopted to offset the tariff charges, such as subsidies.

Vondruska, J.
"Comparison of Government Assistance for U.S. and Foreign Fisherman, with Special Reference to New England and the ICNAF Convention Area," National Marine Fisheries Service, Economic Research Working Papers Series, No. 99, March, 1972.

This report compares subsidy programs provided by foreign governments to U.S. government subsidy programs weighted by the value of the landings. The report concentrates on those foreign fishing fleets that compete with the U.S. fishing fleet in the New England and Northwest Atlantic fishing area.

Vondruska, J.
"Estimates Pertaining to the Use of the Capital Construction Funds," National Marine Fisheries Service, Economic Research Working Papers Series, No. 100, Feb., 1972.

This report is a synopsis of the background information related to investment in fishing vessels and the use of capital construction funds by fishermen.

Vondruska, J.
"The Tariff Situation for Fish Nets and Netting," National Marine Fisheries Service, Economic Research Working Papers Series, No. 101, Nov., 1971.

This report is intended to provide a factual background for valuation of the effects that import duties on fish nets and netting have on domestic fishing operations and the domestic fish net and netting industry. The result is a brief, but fairly well-rounded presentation of the facts to be considered in evaluating the impact of existing fish net and netting tariffs.

Olson, F.L.
"Farm Credit Act of 1971 questions and answers," National Marine Fisheries Service, Economic Research Working Papers Series, No. 102, May, 1972.

This report answers most of the many questions raised by the U.S. fishing industry about the Farm Credit Act of 1971 and the Farm Credit System. It is in a question and answer format.

Noetzel, B.G.
"Estimated Impact on Productivity and Earnings in the Lobster Fishery from the Addition of New Vessels to the Existing Fl et," National Marine Fisheries Service, Economic Research

Working Papers Series, No. 103, Jan., 1972.

The purpose of this analysis is to estimate the impact that the addition of seven new lobster vessels might have on the productivity and earnings of vessels already engaged in the offshore lobster fishery.

Noetzel, B.G.
"Limited Entry Program in the Canadian Salmon Fishery," National Marine Fisheries Service, Economic Research Working Papers Series, No. 104, June, 1972.

This report reviews the Canadian limited entry program and the vessel buy-back scheme which has lead to increased use of vessels, build in Canada and purchased by Americans, in the southeast Alaskan fisheries. The purpose of the report is to analyse the impact of the Canadian buy-back program on U.S. fisheries.

Noetzel, B.G.
"New England Trawlerman's Struggle for Survival," National Marine Fisheries Service, Economic Research Working Papers Series, No. 105, July, 1972.

The sharp drop in landings by the otter trawler fleet has caused much economic hardship. The purpose of this article is to analyse the current economic situation of vessel owners and fishermen who are engaged in this fishery. Since about two-thirds of the New England trawler fleet operates from Massachusetts ports, the economic analysis was based on a representative analysis of these vessels. Financial data on vessel operations were obtained from the files of the Financial Assistance Division, National Marine Fish ries Service.

Bell, F.W. and R. Kinoshita
"The Measurement and Analysis of Labor Productivity Changes in U.S. Fisheries," National Marine Fisheries Service, Economic Research Working Papers Series, No. 106, July, 1971.

The study has been able to identify the quantitative impact of each productivity factor in determining the time trend and oscillation of observed labor productivity in the fisheries. It was concluded that: (1) Many fisheries are able to compete with foreign increases in productivity; (2) the fishing industry's rate of productivity advance is respectable enough to say it does not contribute to inflationary pressures; (3) productivity gains in many fisheries are rapid enough to insure raising wages and profits; and (4) the U.S. fishery sector has made a contribution, even though faced with a fixed natural resource, in delivering a relatively low cost protein product to the American consumer.

Olson, F.L. (ed.)

"Productivity in the Seafood Sector of all Food Commodities," National Marin Fisheries Service, Economic R search Working Papers Series, No. 107, August, 1972.

The purpose of this working paper is to identify what has been the growth in the labor productivity in the seafood industry, barriers against and opportunities for future growth, practical aspects of achieving this growth in the short and long run, and indicate studies needed and how to accomplish this growth.

Bell, F.W. and R.F. Fullenbaum
"Economic Impact of Alternative Management Strategies for the Northern Lobster Fishery," National Marine Fisheries Service, Economic Research Working Papers Series, No. 108, August, 1972.

This paper develops a bioeconomic model of marine resource exploitation which can be used to assess the economic impact of alternative management strategies for the U.S. inshore northern lobster fishery. This analysis is intended to predict the effects of alternative actions without recommending any specific policy.

Vondruska, J. and J. Commander
"Impact of Proposed (1972) Fair Labor Standard Act Amendments on the Fishing Industry," National Marine Fisheries Service, Economic Research Working Papers Series, No. 109, August, 1972.

This report describes the Fair Labor Standards Act (1972) and the impact on the fishing industry. Only the onshore part of the fishing industry would be affected since offshore activity is exempt in both bills. Proposed minimum wage increases and the discontinued exemption from overtime pay requirements should have little direct impact on labor costs to fish processors using union employees. Small, nonunionized, labor intensive, processing operators would be adversely affected.

Huq, A.M.
"A Study of the Socio-Economic Impact of Changes in the Harvesting Labor Force in the Maine Lobster Industry," National Marine Fisheries Service, Economic Research Working Papers Series, No. 110, Sept., 1972.

The study focuses on the possible socio-economic impact of a hypothetical reduction in the harvesting labor force in the Maine lobster fishery and the development of indicators to measure this impact in order to consider alternative management strategies. The study utilizes data from a survey of 131 fishermen from three selected communities. The objectives of the study are (1) to make an appraisal of the employability and alternative income earning possibilities of displaced labor and (2) to derive some measure of

social impacts in terms of income ffects and the income maintanence burden associated with displacement because of limited entry.

Bell, F.W.
"Some Notes on the Basic Elements of Dynamic Pool Models used to Access the Impact of Fishing on Yield," National Marine Fisheries Service, Economic Research Working Papers Series, No. 111, Oct., 1972.

The author analyses the impact of the dynamic pool model on fishing yield. This model is basically a simulation type approach. It is critically based on the estimate of the crucial parameters such as F (fishing mortality), M (natural mortality), and K (growth rate). The model is especially useful in dealing with circumstances where the initial population deviates from steady state results and one wishes to obtain long run steady state implications of holding fishing mortality constant.

Sokoloski, A.A.
"A Digest of State Commercial Fishery Laws in the United States, 1969," National Marine Fisheries Service, Economic Research Working Papers Series, No. 112, Nov., 1970.

The digest is organized by state, fish species, size regulation, penalty, dates, method of catch, gear, licenses, size of catch, seasons, registration fees, etc. This information is probably somewhat dated.

Bell, F.W. and R. Kinoshita
"Productivity Gains in U.S. Fisheries," National Marine Fisheries Service, Economic Research Working Papers Series, No. 113, Oct., 1972.

This article surveys the gains in productivity experienced by various U.S. fishing fleets over the last two decades. Comparisons are made between gains in fish productivity and that in competing sectors. Also explored, are some of the reasons behind the gains in productivity for selected fisheries.

Vondurska, J.
"Estmated Economic Impact of Declaring Shrimp and Lobsters to be Creatures of the Continental Shelf," National Marine Fisheries Service, Economic Research Working Papers Series, No. 114, May, 1972.

Declaring lobsters and shrimp to be creatures of the continental shelf and the resulting restriction from foreign harvest operations could create a net change in value to the U.S. economy of up to $16 or $20 million depending upon foreign reaction to U.S. policy and their subsequent policies on U.S. fishing in their continental

shelf areas.

Vondruska, J.
"Conditions and Recent Changes in the New England Fishing Industry," National Marine Fisheries Service, Economic Research Working Papers Series, No. 115, July, 1972.

This report discusses recent changes in New England fisheries using graphical and tabular presentations of data. Areas investigated include fish landings and value, unavailable and incomplete data, size of fishing fleet and fishermen population, real output per fisherman, the New England processing industry, ICNAF quotas, composition of the fleet, individual fisheries, and fish markets. General conclusions about the fishery are presented in a summary section.

Fullenbaum, R.F.
"A General Equilibrium Demand Model for Living Marine Resources: An Application of General Equilibrium and Common Property Resource Theory to the U.S. Seafood Sector," National Marine Fisheries Service, Economic Research Working Papers Series, No. 116, August, 1971.

The purpose of this study is to extend the traditional model of common property resource exploitation to a more general equilibrium frame of reference and to examin policy implications in the light of the extended analysis. The conclusions reached indicate that the rate of price increase due to the imposition of supply constraints is considerably dampened within a general equilibrium framework. Only slight modifications of the market mechanism are needed in order to prevent excessive entry of capital and labor into fisheries which are being exploited at MSY.

Bell, F.W.
"The Capitalization Problem in Fisheries and Federal Financial Assistance (Policy Position Paper 2: Financial Assistance)," National Marine Fisheries Service, Economic Research Working Papers Series, No. 120, Dec., 1972.

Because the Federal Government administers financial assistance programs available to the U.S. fishing industry that may add to existing fishing capacity, it has become necessary to evaluate the administration of these programs. The number one problem is to formulate a policy to deal with the relationship between federal financial assistance and the increasing overcapitalization of many of our fisheries. See Working Paper No. 128 for the analysis of the extent of capitalization in U.S. fisheries.

Bell, F.W., W.E. Schaaf, E.W. Carlson, and G. Hirschhorn
"The Extent of Capitalization in United States Fisheries," National Marine Fisheries Service, Economic Research Working

Papers Series, No. 128, August, 1972.

This report contains the results of an evaluation of the extent of the capitalization of the major U.S. fisheries. The results are used (Working Paper No. 120) as one of the inputs for planning financial assistance programs and the State-Federal Parternship program. This report does not recommend specific policies, it represents background information on which policy decisions may be based. The report covers species of fish representing 84% by quantity and 87% by value of the total catch at dockside in the U.S. by region.

Vondruska, J. and J. Commander
"Background Factors Relating to the Potential of Crab Picking Machines," National Marine Fisheries Service, Economic Research Working Papers Series, No. 134, Nov., 1972.

This paper analyses the commercial feasibility of a mechanical crab meat picking machine based on cost per unit of output, retail crab meat market price, market demand for crab meat, employment, and the revitalization of an industry. The report concludes that government support for such a machine is justifiable.

Noetzel, B.G.
"Fishermen's Guarantee Fund: An Analysis of the Effect of Increased Fees on Earnings from Vessel Operations," National Marine Fisheries Service, Economic Research Working Papers Series, No. 135, March, 1973.

This analysis was requested to assist the Office of Resource Utilization in deciding upon a solution to the insolvency problem of the Fishermen's Protection Act's Guarantee Fund.

Dow, R.L., F.W. Bell, and D.M. Harriman
"Bio-Economic Relationships for the Maine American Lobster Fishery with Consideration of Alternative Management Schemes," National Marine Fisheries Service, Economic Research Working Papers Series, No. 149, April, 1973.

Because unlimited entry to a common property resource produces excess capacity, it is the purpose of this report to present a theoritical and empirical basis for the conservation of capital and labor in exploiting inshore northern lobster resources. Conservation is defined as the efficient and economic use of capital, labor, and the American lobster resource. The objectives of the study are: (1) To measure the biological factors that d termine the trend and fluctuations in abundence and production of the Maine American lobster; (2) to analyse the impact of such economic forces as the demand for lobster and the cost of operations on the production of lobster from the biological resource; (3) to measure the returns to lobster boat owners

operating in the fishery; (4) to establish a model for evaluating the economic biological interrelationships so important to fisheries management; (5) to analyse the impact on fishermen and th lobster resource of alternative management schemes designed to prevent excessive capitalization of the fishery; and (6) to determine if the economy and fishing industry will be improved by better fishery management.