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Overcapitalization in the U.S. Commercial Fishing Industry¹

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SUMMARY

Living marine resources -- fish and shellfish -- are among the economically dominant features of the world's oceans as well as vital sources of protein for the world's people. However, the sustainability of these essential resources is at risk. As a result of increased demands for fish products and expansion of fishing fleets, many traditional fisheries around the world are now depleted.

As with many nations, U.S. marine fisheries managers have struggled to maximize harvests while maintaining productive stocks. Early attempts at management were compromised by largely unregulated foreign and domestic fleets. By 1976, the overexploitation of several stocks in offshore U.S. waters led to the passage of the Magnuson Fishery Conservation and Management Act (MFCMA), with the prevention of overfishing acknowledged as the first of the Act's seven national standards for new fishery management plans.

Since 1976, increases of 40 percent in the number of fishing vessels and 60 percent in the number of fishermen employed in commercial fisheries have yielded an increase of 50 percent in catches. Such growth, largely attributable to higher levels of consumer demand, government encouragement and assistance, and technological advances, has given U.S. fishermen continued incentive to further expand their capacity to fish. Capital invested in this expansion, however, has not yielded the anticipated returns. By 1993, 65 of a total 231 U.S. marine fish stocks were classified as overfished with the livelihood of the Nation's fishermen becoming as threatened as the fish they seek. With too many fishermen vying for too few fish, the U.S. commercial fishing industry is becoming as overcapitalized as the resource is overfished.

Scientists, managers, and industry experts have begun re-evaluating traditional models and techniques for managing fishery resources. Under closest scrutiny is the traditional open access approach to fishery resource use. Some critics insist that, in the absence of some effective form of property rights, marine fish stocks will continue to diminish. A management regime that addresses open access concerns appears warranted, as does an overall reduction in fishing capacity. Nevertheless, significant questions remain. In particular, how and in what form should access be addressed?

In what sector(s) and by what means ought reductions in capital invested in the commercial fishing industry occur? And, what is the role of the Federal Government in such proceedings? These questions and several others await careful evaluation by scientists, conservationists, industry experts, and lawmakers alike, while the fates of fishermen and the fish they depend upon hang in the balance.

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INTRODUCTION

Since the 1600s, the principle of freedom of the seas has dominated use of the oceans and their resources. (2) Operating within this open access system, the growth of commercial fishing has led to declines in fish stocks compounded by excesses in capital investments. This growth is largely uncontrolled by current management systems and is fostered by continued enhancement of fishing methods as well as by government encouragement and assistance.

In some regions of the world, declines of commercially important fish stocks have become so severe that the welfare of coastal communities and regions, as well as that of certain ethnic groups, has become threatened. Perhaps the most dramatic depletions of fish stocks have been in the western Atlantic, where commercially viable quantities of cod have all but vanished from the fabled Grand Banks, triggering layoffs reportedly involving more than 30,000 people in the fishing communities of Eastern Canada. So serious have been the declines that in May 1994, in an unprecedented unilateral move, Canada granted itself authority to seize vessels found breaking fishery conservation rules within international waters of the Northwest Atlantic Fisheries Organization (NAFO) regulatory area, where conventional national maritime laws do not extend. Such action not only indicates the severity of the depletion of the oceans' resources, but also the absence of an effective international fisheries management system.

Managers of U.S. marine fisheries are struggling to "reverse the overfishing trends, improve economic performance, and strengthen the conservation of protected species," according to the National Marine Fisheries Service (NMFS). (3) The enactment of the Fishery Conservation and Management Act in 1976 (4) reduced foreign overharvesting of marine fish in U.S. waters. But in some areas, domestic overfishing replaced the foreign problem. Increases of 40 percent in the number of fishing vessels and 60 percent in the number of fishermen employed in commercial fisheries have resulted in a 50 percent increase in catch since 1976. (5) Such increases have been attributed to increases in consumer demand, government encouragement and assistance, and technological advances. (6) Capital invested for this expansion, though, has not led to the anticipated returns. With too many fishermen vying for too few fish, the U. S. marine industry has become as overcapitalized as it is overfished.

This report provides background describing the current situation faced by fishery managers and policymakers. As such, this report provides a basic framework for considering possible amendments to the MFCMA and other legislation that could affect the health of the industry and the welfare of the resource.

A GLOBAL DILEMMA

Only a generation ago, the supply of fish available from the world's oceans seemed plentiful. With advances in fishermen's ability to catch, preserve, transport, and sell products of ocean fishing, the wealth from ocean resources appeared vast. Millions of fish were hauled from the depths while fleets of trawlers and purse-seiners rapidly expanded and modernized. Worldwide commercial landings of fish nearly quintupled from 1950 to 1989, from 20 million metric tons to nearly 100 million. (7)

Rapid growth continued until the Peruvian anchoveta fishery collapsed in the early 1970s. After that setback, with some minor fluctuations, harvests continued to grow through the 1970s. By the end of that decade, commercial fishing fleets had become larger, while the abundance of major stocks and the catch per unit of fishing effort declined. According to the United Nations Food and Agriculture Organization (FAO), growth of global fish harvests slowed by the latter half of the 1970s. At the onset of the 1980s, commercial fishing fleets had become so large and efficient that fish abundance and average catch per day for major stocks declined to a level that threatened stock reproduction and was unprofitable without subsidies. FAO estimates that combined global commercial fishing fleets at that time cost taxpayers more than \$50 billion annually in direct and indirect subsidies. During the 1980s, world fish harvest increased slowly, with a peak harvest of nearly 100 million tons in 1989.

In 1990, for the first time since FAO began conducting annual assessments, catch declined (approximately 3 percent), and world harvest fell below 97 million tons. Recently released FAO figures show stable world harvest for 1991 and 1992. (8) Although overall catch has remained constant in recent years, the increased landings of low-value species (e.g., anchoveta, jack mackerel, and pilchards) used for fishmeal have masked the decline of more commercially valuable species. Species whose catches have been declining are, for the most part, high-valued.

Concerned by the apparent declines in world fisheries, the United Nations convened an international Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, with the first session in July 1993. The conference represented the first organized effort to regulate high-seas fishing since the United Nations Convention on the Law of the Sea was opened for signature in 1982. Scientists, industry experts, and government officials agreed upon evidence which linked overfishing and habitat destruction to declines in marine fish populations. FAO reported that, in some cases, heavily fished species were not only reaching commercial extinction, but were threatened with biological extinction. FAO asserted that the maximum sustainable yield for the world's fisheries had been surpassed, and showed that 13 of the 17 major global fisheries were depleted or in serious decline. (9)

FAO officials at the 1993 U.N. Conference underscored the paradoxical economics of global overfishing by releasing figures showing that the cost of operating the world's fishing vessels in 1989 was \$92 billion, while their catch was worth only \$72 billion. Admittedly, the accuracy of such figures remains uncertain, due to the difficulty of determining the size of the world's fleet; because there is no formal methodology by which to assess vessel "strength" (as a function of actual size and efficiency), an exact figure indicating the size of the world fleet and the magnitude of its impact does not exist.

The economic effect of overfishing and resultant higher consumer prices, in response to supply shortages, have led to shifts in both production and diet. The problem, as concluded by FAO officials, is worldwide, with substantial implications for the economic stability and future food production of the countries dependent on fishing. Because of rising costs and prices, more fish enter the commercial market, but are less available to low-income consumers and subsistence cultures. Once considered the poor person's protein, fish have become expensive -- even for consumers in industrial countries. In poorer countries, the export of seafood may help balance trade deficits, but it also may mean less food at home. This is especially a concern in those countries where diets lack protein and where traditionally fishermen have fed their families and supported their communities through the ages. In developing countries, where this diet pattern exists (the poorest two-thirds of the world's people), 40 percent of dietary protein comes from fish. Worldwide, fish and other marine products account for 16 percent of animal protein consumption -- more than either pork or beef -- and 5.6 percent of total protein intake. (10)

If product demand were stable and fish stocks underutilized, one would have expected the dramatic improvements in fishing technology over the last 40 years to reduce fish prices as supply increased. Yet, faced with increasing competition for a declining resource, technological capitalization within the industry has not alleviated supply shortages. Thus, increasing demands by a growing population have raised prices. However, technological capitalization, to maintain competitiveness in the face of resource scarcity, has not been matched by comparable increases in catch value, and subsidies have become necessary. The availability of subsidies has fueled further capitalization as fishermen searched for some competitive advantage. The United States has not been immune to this dilemma. As one of the world's major fishing nations, the United States claims one of the most heavily capitalized and industrialized fishing fleets in the world today.

THE U.S. DILEMMA

Since the early 1970s, fish products have become increasingly popular in the American diet. New items, including fast-food and convenience products, have been widely promoted, health experts have testified to the nutritional benefits of fish, farmers have found fish protein to be an excellent additive to livestock feeds, and improvements in food technology have allowed fish to be more widely distributed with better quality, all making seafood more appealing than ever before. Demand for seafood has provided substantial incentive for new entrants into the fishing industry.

Under the prevailing open access regime, many U.S. fishermen entered the industry through the 1970s and 1980s with the hope of substantial earnings from an apparently massive resource. Demand was so great and incentives so high that increasing numbers of fishermen entered the industry with greater amounts of capital invested in boats, instrumentation, and gear. As the number of fishermen increased, fish stocks began declining. Rather than promoting sustainability, the U.S. Government policy of open access appears to have encouraged expansion of the commercial industry by emphasizing short-term economic gains through competitive fishing rather than longer-term economic sustainability through conservation of the fish stocks and of marine ecosystems. An accurate assessment of U.S. fishing fleet size is problematic. What is certain, however, is that increasingly effective and efficient fishing effort was employed to harvest a limited, dynamic resource. The question, therefore, is not only how to determine where

excess exists, but whether, and if so how, to reduce it to ensure the sustainability of the resource as well as the short- and long-term economic well-being of those who harvest it.

Despite the increased capital input, fewer fish are now available to catch. By catching fish at rates above the capacity of natural stocks to replenish themselves through reproduction and growth, fishermen depleted stocks long ago. Increasing numbers of U.S. fishermen are vying for fewer fish, which results in smaller catch per unit of harvesting effort. More and more fishermen with technologically advanced instrumentation, gear, and boats fish less and less time to catch fewer and fewer fish. This has left the industry's infrastructure as overcapitalized as the ecosystems are overfished.

The cost of supporting this system must be paid by someone. Not surprisingly, demand increases coupled with fewer fish and higher harvesting costs have led to higher consumer prices. In some segments of the fishing industry, bargaining by harvester groups or associations has succeeded in passing along some costs to the processors, and ultimately to the American consumer. However, not all costs can be passed along, and thus profit margins for harvesters and processors are also squeezed.

The effect of overcapitalization cannot be measured on a financial scale alone. The ultimate effect bears most heavily on the health of fish populations and marine ecosystems. Under traditional fishery management regimes, managers seek to conserve the resource by making it more costly, in terms of effort, to harvest. This results in competitive pressure among fishermen to invest in improved gear and boats to maintain their harvests as each tries to make a living; overfishing thus persists in the face of regulation because of capital investments. The arguably ineffective regulations which govern fishing in U.S. waters have resulted in many devastated stocks with substantial financial loss and disruption to the economy, including: the demise of the haddock, cod, and yellowtail flounder off New England; precipitous king mackerel declines in the Gulf of Mexico; and the destruction of the Georges Bank herring fishery. Increased fishing pressure, pollution, and destruction of habitat in U.S. coastal and offshore waters contribute to stress on fish populations. Of 231 fish stocks in Federal waters, 65 (28 percent) are classified as overutilized -- that is, more fishing effort is expended than needed to harvest the potential yield -- and another 71 (31 percent) are classified as fully utilized; 68 stocks (29 percent) are classified as status unknown, while only 27 (12 percent) are classified as underutilized. (11)

Despite these conditions, some industry experts continue support for the present U.S. management regime, arguing that most marine fisheries resources within U.S. jurisdiction are in good shape and are being managed for sustained yield and full utilization. Even in the New England region, support for current management continues. (12) Figures from previous years lend some credibility to this continued support. The 1993 New England catch was 23.5 million pounds greater (4 percent increase) than it was in 1977, (13) while the value of the 1993 catch reportedly exceeded that of 1977 by nearly \$350 million (not adjusted for inflation). (14) In addition, recent revitalization of striped bass along the Atlantic coast as well as of Alaska salmon indicates that some U.S. fish stocks are well-managed.

NATURAL AND ANTHROPOGENIC EFFECTS ON FISH POPULATIONS

Increases in the amount and/or intensity of fishing are not solely responsible for stock declines. In evaluating fish populations, scientists examine anthropogenic effects as well as the effects of a host of natural occurrences. Natural environmental changes may affect biological productivity (*i.e.*, survival, growth, mortality) of a fishery resource in a largely unpredictable fashion, yielding wide fluctuations in annual production. Natural fluctuations in water temperature and salinity, for instance, can significantly affect populations of small pelagic species, such as sardines, anchovies, pilchard, and capelin. (15)

Equally important, and at times surpassing the effects of natural variation, are the effects of human activities. Such factors include the destruction of coastal spawning habitats, certain fishing practices that kill vast numbers of immature fish and "non-target" species, impoundments along migratory routes, harmful land use practices, pollution and sedimentation, and continually increasing fishing pressure.

Acting alone, natural and human factors can greatly alter the numbers of fish. Acting together, the effects can be devastating. During the early 1970s for instance, the Peruvian anchovy stock experienced a massive decline. Ocean temperature and salinity changes, caused by an *El Nino*, coupled with overfishing reduced the stock nearly to extinction. More recently, a 1993 *El Nino* moved warm, less fertile waters north to Southeast Alaska, extending the range of several Pacific species. Tuna, sunfish, and, most importantly, mackerel have been reported far outside their normal ranges, as far north as the Queen Charlotte Islands; mackerel were observed feeding heavily upon herring and juvenile salmon. As a result, both herring and salmon recruitment (16) figures have dropped and are predicted to continue dropping through 1996. (17) Fishery managers predict that the recent *El Nino* will have substantial residual effects upon salmon through at least 1997. Habitat degradation has worsened matters, attributable in part to policies allowing or encouraging development in environmentally sensitive areas, including hydroelectric dams and other barriers to migration, logging, and water withdrawals for irrigation as well as municipal and industrial use. Fisheries managers face a daunting task in distinguishing between natural fluctuations in growth and recruitment in fish populations and adverse trends caused by fishing mortality and other human activities.

OVERCAPITALIZATION: A WORKING DEFINITION

From within lecture halls and from aboard the decks of fishing boats alike, one word has been used to describe the condition of the U.S. fishing industry --overcapitalization. Because the state of U.S. fisheries has far-reaching influence upon the livelihood of many individuals and the well-being of a host of businesses and communities, overcapitalization merits a widely acceptable definition. However, agreement has been hampered by the many disciplines and interests involved -- economists, biologists, harvesters, conservationists, and others -- and the lack of a common language by which to discuss and define the term. Discrepancies in semantics, as well as conflicting interests and values, has led inevitably to inconsistencies in and confusion over the term "overcapitalization."

Some argue that overcapitalization is a term that may be applied to any industry where excessive capital investment exists. Many fisheries managed under open access have excess capital invested compared to that required to harvest the available resource efficiently, much more capital than is necessary. (18) Thus, in a purely static sense, overcapitalization explicitly refers to the existence of more capital applied in an industry than is necessary for the most efficient operation.

The fishing industry is not static, however. In reality, optimum fleet size to harvest the resource may necessitate certain "inefficiencies," such as the capacity of Alaska fishermen to adjust to wide fluctuations in anticipated salmon runs or the ability of marginal fishermen to shift among various seasonal fisheries. (19) The appropriate level of capital depends on a number of highly variable and unpredictable factors -- natural oceanic and atmospheric conditions that significantly affect the numbers of fish available and can fluctuate substantially between seasons. Consequently, current population assessments as well as future predictions are often problematic; they often are insufficient to craft effective management regimes and sound harvesting plans. Without accurate population data, it is difficult to assess industry efficiency at any given time and, therefore, to determine the extent of overcapitalization. Comparing the total amount of capital invested in gear, instrumentation, boats, and labor to total harvests oversimplifies a complex and highly intricate industry. Conversely, identifying where excess capital exists is also problematic because no methodology currently exists to measure individual components of the industry.

At least four interrelated forces contribute to overcapitalization: (20)

- (1) Open access motivates fishermen to invest excessively in capital and labor to compete in the "rush for fish." The latest and best technological equipment and machinery are seen as necessary to maintain a competitive edge within the fishery. In addition, fishermen want to be in the best competitive position to take advantage of the appearance of a dominant year class within the fishery.
- (2) Tax incentives (depreciation and operating costs) are given to owners regardless of how much fishing is done.
- (3) Government assistance programs lower the cost of capital and allow uneconomic investments to be profitable.
- (4) Fishermen anticipate that Federal, State or regional public bodies will eventually impose some sort of access controls. Such anticipation may motivate some individuals to enter the industry prematurely. Others may be deterred from leaving ailing fisheries and moving into more profitable new fisheries for fear of being denied significant quota shares if access control is adopted for their traditional fishery. (21)

With declines in fish populations, the phrase "too many fishermen chasing too few fish" has become a cliché. Stock depletion within the New England, Gulf Coast, and Pacific Northwest fisheries, matched by declines in profit, attests its accuracy. Yet, it is not just the number of fishermen which counts, but also the size of their nets, the number of their hooks, the sophistication of their electronics, and the girth of their boats -- in short, their capacity to fish. (22) Again, the extent to which excess capacity resides in the amount of capital invested in gear, instrumentation, and boats, or in the amount of labor, remains unclear. If the United States wishes to control overfishing, it will need to consider the problem of excess capacity in parts of the commercial fishing industry. The nature of an open access system, combined with a highly competitive industry, have limited the effectiveness of traditional control and management efforts. And subsequent to controlling access, further major questions will likely focus on how to move from limited access to controlled effort.

OPEN ACCESS AND THE "TRAGEDY OF THE COMMONS"

The number and variability of anthropogenic and natural factors influencing fish populations presents scientists and managers with the unenviable task of devising management regimes to ensure proper use of fishery resources. Open access into the fishing industry, for the most part, has rendered effective management regimes difficult to devise and nearly impossible to enforce. Federal management of the U.S. commercial fishing industry, directed by NMFS under the authority of the MFCMA, has generally not sustained fishing yields. (23) A central factor in the inability to manage fish stocks effectively has been open access and the ineffective allocation of fishing rights within domestic fisheries. This raises several questions. Foremost is: why are U.S. commercial fisheries dominated by open access regimes? Further, what alternative management regimes exist? Finally, if such alternative management systems do exist, what role might the Federal Government play in their acceptance, implementation, and enforcement?

Substantial literature, both popular and scientific, exists on open access to public resources. Two common perspectives are similar, but distinct. One was initially articulated in 1968 by Garrett Hardin in his work on the "tragedy of the commons." (24) According to this perspective, natural resources held in "common" are doomed to overexploitation. Users of these common resources do not have exclusive rights, and cannot prevent others from sharing in their exploitation. (25) From this perspective, such natural resources are inevitably overexploited because each user places self-interest above community interests. Individual users compete with each other to gain a larger share of the total, and it is unlikely that individuals would willingly restrain their efforts, because anything left will

certainly be taken by others.

It is argued that overutilization and overcapitalization result because individual users of the common resource do not bear all the costs. (26) Although fishermen invest in boats, gear, and instrumentation, they do not invest in the preservation and maintenance of the resource because they cannot be assured of reaping the rewards of that investment. Each fisherman, operating individually, seeks to maximize profits. Because there are no costs of resource protection or depletion, profits are "excessive" and attract additional fishermen. The added number of fishermen, then, results in an excessive amount of labor and capital applied to the industry. With the total harvestable resources being shared by more and more individuals, total costs rise and profits fall until total revenues equal total expenses (excluding the cost of depletion), profits disappear, and the resource is depleted.

A second perspective on open access fishing criticizes Hardin's model as making too many assumptions about the resource and about the selfishness of fishermen. Hardin's model equates common property with open access management. Others, however, distinguish between these terms. Under open access, anyone can use the resource. A common property resource, on the other hand, is owned collectively, either by society at large or by a specific community, and therefore is subject to the collective interest. Access to common property can be restricted, and case studies show that many users can and do cooperate to protect common property resources. (27) Communities that depend on common resources have occasionally implemented arrangements to manage those resources, with varying degrees of success. (28)

This second approach postulates that open access to a resource does not necessarily lead to overexploitation, and that sustainable resource management is not inherently associated with any particular property rights regime. It holds that the argument that self-destruction is inevitable, unless common property is converted into private property or strictly regulated, should be evaluated critically. Clearly, historical accounts of well-managed communal properties must be viewed within their social and economic contexts. In a late 20th Century world, locally cooperating participants might be unable to regulate use of common fisheries, because the dilemma is global. The economic interdependence and pressures of the global market, combined with perceived declines in the ability of social pressure to modify individual behaviors, are of a scale and nature unknown in the 18th and 19th Centuries. (29) Thus, a key continuing question is whether and how fishermen can develop voluntary, local cooperation in an industry where market pressures are increasingly global.

TRADITIONAL CONTROLS

Most U.S. fisheries operate under open access conditions for U.S. citizens. Currently only 5 of 43 fishery management plans, prepared under the authority of the MFCMA, control access to fishery resources. In open access marine fisheries, only management jurisdiction over fish is claimed; rights to the resource (in the "property" sense) do not exist until the moment of harvest, and are neither transferable nor enforceable until the fish are on the deck of the fishing vessel. (30) Present markets are not efficient in allocating the resources used to harvest fish, and intense competition in open access fisheries often leads to overcapitalization in the fishery, excessive fishing effort, and overfishing; *i.e.*, too many fishermen harvesting too few fish. In the Gulf of Mexico shrimp fishery, for example, the fishing fleet is allegedly three times the size necessary to harvest the present catch. (31)

The traditional approach to solving the problem of overexploitation has been to adopt fishery management regulations to treat the symptoms. Fishery managers have tried to reduce excessive fishing pressure through four types of programs designed to restrict the activities (32) of current participants: (1) establishing seasons in which particular species may be harvested, to limit when participants can fish; (2) closing areas, to limit where they can fish; (3) restricting gear, to limit how they can fish; and (4) mandating total allowable catches (total quotas), to limit

fish harvest. (33)

Governments often deal with the problem of overfishing first by limiting the overall catch of certain fish in their jurisdictions. Theoretically, such a limit (often referred to as total allowable catch or TAC) will provide for future catches by leaving enough mature fish to reproduce and replenish the natural stock. Yet, the incentives for competition created by imposing such limits can lead to other problems. Knowing that the season will end as soon as the harvest quota has been reached, fishermen often race to catch as many fish as possible. The result can be a hectic "fishing derby" that results in wasted fish, poor product quality, high processing and storage costs, loss of vessels, and frequent injury or occasional death of fishermen. For example, on September 12, 1994, the North Pacific halibut fishery opened to harvest an 18-million pound quota; by September 15, the U.S. Coast Guard reported one halibut fisherman dead and fifteen rescued after vessels sank or took on water in foul weather during the 48-hour "derby."

Such highly competitive harvests in an overcapitalized fishery may also dump more fresh product on the market than can be handled. Prices paid to the fishermen are forced lower by large landings. After the season closes, prices increase since no new product is being harvested. The fisherman must accept the lower price offered since catch quality deteriorates despite investments in refrigeration. If a fisherman hesitates to fish, others will quickly harvest the resource until filled quotas end the fishery. A recent article portrayed the reality of harvest quotas within the New England lobster fishery: fishermen reached quotas within two weeks of an anticipated month-long Massachusetts State lobster season; because quality deteriorates with storage, most product was immediately marketed; after a short period of lower prices, supply diminished and prices rose. (34)

In many ways, traditional fisheries management may be viewed as a constant battle between government management and private industry. For example, if management were to reduce season length by one-third, fishermen would likely increase effort during the shorter open season. In the short term, fishermen may not be able to respond quickly and harvests might temporarily fall. yet over time, they can build bigger boats equipped with more sophisticated gear and instrumentation. Because such competitive vessels are more expensive, they therefore increase the cost per unit of product harvested. (35) And, to the extent that the short-run reduction in effort is successful in increasing the size of the stock, each fisherman may justify the additional expenses by the anticipated increase in harvest. This is what some analysts refer to as a "social trap" -- what appears to be good for each individual is self-defeating when all individuals act similarly. The increase in the effectiveness of the fleet can send fish stocks into further decline. The managers then need to reduce seasons further to restrict harvesting, thus perpetuating this expensive and destructive phenomenon. In this case, any biological gains are lost, and the capacity and costs of the fleet are higher than before. In addition, vessels may sit idle for increasingly long periods (or move to other fisheries).

Similar events may unfold with closed areas or gear restrictions. If managers restrict the use of one gear to the extent that it helps stocks increase, fishermen will have incentive to increase the use or sophistication of other non-restricted gear. Closed areas, closed seasons, and restricted gear plans appear to all suffer the same potential weakness -- they may not be effective under open access in reducing long-term fishing mortality. At the same time, they encourage fishermen to fish in ways that result in higher harvest costs than would otherwise be the case. Total quotas can be effective biologically, to the extent that they can be enforced. However, they also encourage excess investment in the fishing fleet and hence higher costs because each fisherman must be competitive to take as much of the quota as possible before the fishery closes.

A management regime which insures that society makes reasoned use of communal fish stocks and the inputs used to harvest and process them has proven elusive. There is widespread agreement that reasoned use can not be achieved under complete open access. While quota management measures have proven successful in some cases, the frequency with which overfishing occurs indicates they are not universally successful. Total, vessel, or trip quotas;

gear restrictions, limitations, or prohibitions; and controls on total effort through moratoria, limited entry programs, or gear efficiency regulations have all been proposed to prevent overfishing.

As stocks recover due to well-enforced total quota regulation, catch per unit effort (CPUE) increases, leading to increased profits for individual fishermen. These profits create incentives for others to enter the fishery and for existing fishermen to expand their fishing power. The result is shorter fishing seasons and/or more complex management regulations. For example, the Gulf of Mexico shrimp and the South Atlantic and Gulf of Mexico coastal migratory pelagic fishery management plans have each been amended six times and the South Atlantic snapper-grouper management plan has four amendments. Arguably, the social costs of this management approach are the inefficient use of capital and labor in the harvesting and processing sectors that could have been used more productively in other sectors of the economy. While harvest levels increase under this management philosophy, harvesting costs increase as new fishermen enter the fishery and existing fishermen expand the fishing power of their vessels, while other sectors of the economy are denied the use of investment capital.

FEDERAL STATUTES AFFECTING FINANCIAL ASPECTS OF THE U.S. COMMERCIAL FISHING INDUSTRY

If, as is generally accepted, overcapitalization prevails within the U.S. commercial fishing industry, and if Federal action is deemed necessary, existing laws may need to be reviewed and provisions may need to be amended. A host of Federal statutory provisions affect the marine fishing industry. (36) For example, some laws relate to various financial opportunities within the industry, others are concerned with regulation, still others deal with financial assistance and loan opportunities, and some involve applicable tax provisions.

A review of these laws suggests that many may affect the financial well-being of the fishing industry. Scattered throughout the U.S. Code, administrative authority resides in numerous agencies within the Departments of Agriculture, Commerce, the Interior, Labor, and State, as well as within independent agencies, such as the Federal Maritime Commission and Small Business Administration, to name but a few. The subject matter of these statutes ranges from laws designed to protect fish, those created to protect fishermen and their vessels, those to regulate commerce and/or to protect consumers, and those to provide financial aid for both under- and unemployed fishermen. Despite their variety, each statute influences the allotment and management of capital. Only a careful, detailed study could determine in what way, if any, they have individually or collectively contributed to excess capital within the industry. Those laws which provide "direct financial assistance" (especially for vessels and gear) including tax incentives and access to "preferential loan rates," can significantly alter the level of capital investment in the fishing industry. Finally, agency regulations, Federal statutes, treaties and conventions, judicial decisions, and State laws also influence the economic structure of the industry and would need to be factored into such an assessment of the economic relationship between earnings and capital invested.

NMFS's fisheries financial services programs have provided long-term fisheries credit for more than two decades. NMFS became concerned about fisheries overcapitalization in the late 1970s, and began restricting its fisheries credit accordingly. Through its conditional fisheries rule, NMFS made financing unavailable for new vessel construction in fisheries where additional vessel capitalization was unwarranted. North Atlantic groundfish, for example, was declared a conditional fishery as early as 1979. Other conditional fisheries soon followed: Alaskan salmon, Alaskan king crab, Pacific Northwest and California salmon, yellowfin tuna in the Inter-American Tropical Tuna Commission regulatory area, lobster in the Gulf of Maine, and Atlantic surf clams. Further credit restriction occurred in 1992, when NMFS made financing unavailable for the construction, purchase, or reconditioning of fishing vessels under its Fisheries Obligation Guarantee Program.

THE ROLE OF GOVERNMENT IN RESOURCE MANAGEMENT

The U.S. economic system generally relies on transactions between producers and consumers in free markets to determine the outputs of goods and services. Prices established within this private exchange system are the basis for allocating land, labor, and capital among producers, and goods and services among consumers.

Two classical market failures are often used to justify government intervention in private markets. The first occurs when a private exchange affects third parties (those not involved in the exchange), and those effects are not taken into account in the exchange. These effects are external to the exchange, and are known as *externalities*. For example, commercial fishing is an exchange between fishery "owners" (*i.e.*, the community in open access fisheries) and fish harvesters, but the harvest can affect other people by altering fish habitats, animal populations (of both target and nontarget species), and other resource conditions. An externality of particular concern in resource management is the impact on future generations -- potential future shortages from current overuse or misuse of productive assets, leading to their destruction. Externalities are market failures, because the exchanges ignore some costs (or benefits) imposed on society, and thus may result in more (or less) production than is socially desirable.

The second classical market failure occurs when a good or service can be used or enjoyed simultaneously by several people, and the owner or producer has difficulty controlling (and therefore charging for) its use or enjoyment. Such goods and services are *called public goods*. Often, public goods include resources that exist over spacious areas and/or that are mobile. Commercial fisheries fit this description, since fish are mobile and fishing grounds can cover vast areas, both of which may prevent effective control on access. In addition, *nonuse values* -- good feelings resulting from the existence of the goods or services (*e.g.*, natural wonders and endangered species) or from the desire to leave them as a legacy for the future -- contribute to the "public-ness" of some goods and services; it is impossible to prevent people from having those good feelings, if the values exist, and thus it is impossible to make those people pay for their good feelings. Private transactions in public goods result in market failures, because the possibility of simultaneous use and the difficulty of controlling access make profitable private exchange ineffective, and thus, fewer public goods would probably be provided by private markets than are socially desirable.

As much as a century ago, many foresaw socially undesirable consequences, particularly possible resource shortages, from allowing market-based allocations of natural resources. Although market failures were not cited as the justification, Congress and the President used government ownership to protect certain lands and resources from the problems of market failures with private ownership, beginning with the establishment of Yellowstone National Park in 1872. States, rather than the Federal Government, have traditionally exercised direct control over most animal and water resources, although the Federal Government often heavily influences the management of these resources. Federal control and responsibility over fisheries in offshore U.S. waters were established by the MFCMA in 1976. Such control is similar to ownership, but differs because owners are able to extract rents from users; the MFCMA currently prohibits the Federal Government from charging a market fee for commercial fishing in U.S. waters.

In the past 30 years, government regulation of private activities has become a standard technique of market intervention for protecting the environment (as opposed to government ownership). In such situations, governments (usually Federal or State) specify permissible and/or prohibited activities or results for a particular resource or condition (*e.g.*, water quality effluent standards for discharges into navigable waters). Federal control over commercial fishing in U.S. waters is more similar to regulation than to ownership, because the control mechanisms used parallel the regulatory approaches used for environmental protection.

Finally, the Federal Government has long used an array of incentives and assistance to induce private resource owners to behave in socially desirable ways. Assistance can be technical or financial (or both), and is often made

available in conjunction with State programs. Tax incentives are also used to make it profitable for the private sector to alter behavior. However, as described above, many assistance and incentive programs were created without regard to their impact on natural resources, and may damage, rather than protect, the resources.

OPTIONS FOR CONGRESS (37)

Options available to Congress, should it choose to deal with overcapitalization in the commercial fishing industry, can address the causes of overcapitalization outlined on page 8. In addition, several options address the need for obtaining additional data to better characterize existing problems. Such options attempt to balance sustainability and a concern for private property rights of fishermen, while embodying a sense of the public trust in fisheries resources.

Necessary Data

More and better economic data are needed to determine what is happening within the U.S. commercial fishing industry. Managers need to quantify what they subjectively know to be a problem. Fishery managers, in many cases, lack adequate information on the number of commercial fishing vessels, much less on their value, fishing capacity, estimated operating costs, and other features. Some have suggested that a national registry of all fishing vessels should be developed. In addition, standardized ways for better measuring or estimating, in a comparable manner, the amount of capital invested in diverse fisheries as well as fishing effort regardless of gear and vessel configurations would assist in cross-fishery analyses.

Competitive Open Access

Competitive open access fishing makes it difficult for biologists to manage for sustainable fish stocks, may affect the efficiency of invested capital, and has often provided minimal profits for many fishermen. Thus, some have suggested that controlled access (limited entry) regimes for fisheries be more extensively implemented. These might include, where appropriate, the use of management tools such as license limitation, individual fishing quotas, individual transferrable quotas, or other measures. Consolidation of fishing fleet size has been achieved by limited access in several U.S. fisheries managed under the authority of the MFCMA. (38) Controlled access could be facilitated through further amendment of the MFCMA and other applicable law to encourage more development of regionally appropriate and acceptable limited access management programs. However, it remains difficult to measure the impact that any limited access program might have on fishery capitalization levels. Certainly, capitalization levels do decline as vessels retire from a fishery, and money previously spent for insurance, maintenance, depreciation, and interest expenses can be put to more productive use elsewhere. However, limited access would not be expected to solve the problem of overcapitalization without concurrent or subsequent control and reduction of fishing effort.

Short of implementing limited access programs, fishery managers could be required to review fishery regulations that manage fisheries by imposing harvesting inefficiencies (e.g., gear restrictions, area and season closures, vessel size or power restrictions) on fishermen. Many observers content that such regulations force fishermen to invest excessively to maintain their competitiveness, while draining the fishery of its profit potential. Some suggest such measures also encourage illegal activity. An alternative approach might be to require that fishery management plans and amendments, developed under the authority of the MFCMA, be reviewed to avoid or minimize unnecessary competition within each fishery.

Although some suggest that another possible option would be an orderly transition to corporate management through privatization of the fisheries resource, this is not currently a possibility under international law, which gives the coastal state the right to manage and exploit these resources to 200 miles but does not incorporate the concept of

ownership. Accordingly, the United States has never claimed ownership of the resource, but only extended management jurisdiction over fisheries in the 200-mile Exclusive Economic Zone. Such an approach, were it possible to create vested property rights to the fisheries resource, might be seen as a step beyond limited access management, where only the right to fish may be conveyed to fishermen.

Other possible alternatives include cooperative management at a more local level under the present Regional Councils. Entities which are locally based could be more responsive to local situations, but add more bureaucracy to already cumbersome management of marine fisheries. Such entities could manage both entry and effort in local fisheries. However, many fisheries are sufficiently large that benefits of such an approach may be minimal or contrary to sound biological management of fish stocks.

Tax Incentives

The impact of Federal and State tax incentives, including government loan programs, vessel depreciation schedules, and non-road fuel tax rebates, applicable to the U.S. commercial fishing industry has not been well quantified. Although the broad scope and magnitude of many of these provisions should be calculable, their differential effect on various fisheries has not been evaluated. Such information would be necessary to make sound decisions concerning the effects of any modifications on the flow of capital into or out of some or all segments of the U.S. commercial fishing industry.

Other Government Programs

It would similarly be useful to have a comprehensive study quantifying the impacts of other forms of direct and indirect Federal and State assistance provided to the U.S. commercial fishing industry. How much money has flowed to the commercial fishing industry from the various government programs over what time period? As above, such information would assist in making decisions concerning the effects of modifying inducements to capital flow into or out of some or all segments of the industry.

Some have suggested that Federal user fees or royalties could recover management costs and even reasonable economic rent from users of publicly owned resources; such returns are said to represent an equitable return to the public treasury. One means to accomplish this, some suggest, is that fishing rights be purchased from the Federal Government, rather than granted through political or administrative decisions -- e.g., the United States might establish a competitive bidding procedure similar to how offshore mineral resources are allocated. An important aspect of any fee or tax program is that such measures should, if possible, be imposed only when implementation of the new management programs begin. This is so that one does not change the assumptions on which investments have already been made in the commercial fishery. More realistic would be determining how to impose fees or taxes in a manner which minimizes effects on existing investment in the fishery (except when the explicit purpose is to reduce existing investment).

Limited Access Anticipation

Piecemeal implementation of limited access programs can easily displace fishing effort from one overcapitalized fishery to create new problems in other areas and fisheries. Thus, some argue that commercial fish harvesting should be coordinated among State, Federal, and international jurisdictions such that an entire fishery or group of related species can be managed throughout its range by a cooperative management regime. Similarly, some suggest the need to impose constraints on new entrants to any U.S. commercial fishery or some other scheme to prevent a "domino effect" from shifting overcapitalization from one overdeveloped fishery to adjacent areas or fisheries.

An alternative to a moratorium on new entrants to all fisheries might involve facilitation of movement of capital out of overcapitalized fisheries by enhancing the "transferability" of money and capital investment among different fisheries and/or out of the fishing industry entirely. One such approach might involve the creation of a fishing vessel and gear "bank" as a holding institution responsible for purchasing excess fishing vessels and gear and reallocating or selling purchased items such that new or additional fisheries problems would not be created; coordinated national licensing of fishing vessels and gear might be necessary to make such a bank feasible. Major concerns with such an approach would include how to facilitate the market to accomplish this task with minimal Federal intervention, and how such a venture might be funded. One option for funding might be to amend the Saltonstall-Kennedy Act of 1954 to fund efforts to remove vessels from the domestic fishery, rather than its current purpose of encouraging further development.

Endnotes

1. Damian V. Preziosi, Master's degree candidate at Bucknell University, researched and prepared a draft of this report under the supervision of Eugene H. Buck, Senior Analyst in Natural Resources Policy.
2. Christy, Francis T., Jr. "Fisheries Management and the Law of the Sea" in: *Economic Aspects of Fish Production*. International Symposium on Fisheries Economics, Paris, Nov. 29 -Dec. 3, 1971. Organization for Economic Cooperation and Development, 1972. p. 12.
3. Schmitten, Rolland A. "Foreword" in: *Our Living Oceans: Report on the Status of U.S. Living Marine Resources, 1993*. Washington, DC: U.S. Dept. of Commerce, National Marine Fisheries Service, Dec.. 1993.
4. Fishery Conservation and Management Act of 1976, Pub. L. 94-265, 90 *Stat.* 331, 16 U.S. *Code* 1801-1882.
5. The growth in landings is predominately due to the displacement, by domestic vessels, of foreign fleets operating in Alaskan waters.
6. Technological advances also increased fishing power and reduced fishing costs (when fish stocks were plentiful), helping U.S. fishers expand their capacity.
7. United Nations Food and Agricultural Organization. Fisheries Technical Paper 335. Rome, Italy: 1994. p. 23-29.
8. United Nations Food and Agriculture Organization. *Agriculture Towards the Year 2010*. 27th session. Rome, Italy Nov. 1993.
9. *Ibid.*
10. Weber, Peter. *Net Loss: Fish, Jobs, and the Environment*. Worldwatch Paper 120. Washington, DC: Worldwatch Institute, 1994. p.120-127.
11. U.S. Dept. of Commerce, National Marine Fisheries Service. *Our Living Oceans*. Washington, DC: Dec. 1993. p. 11.
12. Some critics argue that fishermen are likely to support current management as long as it continues to provide harvest opportunities, especially when the alternatives would prohibit or greatly reduce fishing.

13. Although total catches were greater in 1993 than in 1977, the catches of several mainstay species were less. For example, the combined catches of haddock, cod, and yellowtail flounder were about 130 million pounds in 1977 (55 percent cod), but only about 60 million pounds (80 percent cod) in 1993. (NMFS, *Status of Fishery Resources off the Northeastern United States for 1982*, Woods Hole, MA: NOAA Technical Memorandum NMFS-F/NEC-22, June 1983, and *Status of Fishery Resources off the Northeastern United States for 1993*, Woods Hole, MA: NOAA Technical Memorandum NMFS-F/NEC-101, October 1993.)
14. Weddig, Lee J. "Bounty of the Sea." Letters to the Editor, *Washington Post*, August 16, 1994, p. C12.
15. Environmental changes may alter the geographical and bathymetric distribution of marine species. By expanding or compressing species' ranges, or in some other way affecting the life history of marine fish, environmental changes can lead to a restructuring of an ecosystem and a redefining of the role, position, or occupation of its individual species. Any natural ecosystem, by virtue of its highly ordered and complex arrangement, represents an extremely responsive system. Thus, an ecosystem and the highly intricate and varied interactions of its species may be altered by subtle environmental changes.
16. Survival and maturation to harvestable size.
17. Doherty, T.J. "El Nino Threatens B.C. Herring, Salmon." *Pacific Fishing* 15(1994):17, 66.
18. Meyer, R. M. "Fisheries Resource Utilization and Policy." in: *The State of the World's Fisheries Resources, Proceedings of the World Fisheries Congress Plenary Sessions*. Clyde W. Voigtlander, ed. New Delhi: Oxford and IBH Publishing Co., 1994.
19. Serchuk, Fredric M., and Ronald J. Smolowitz. "Ensuring Fisheries Management Dysfunction: The Neglect of Science and Technology." *Fisheries* 15(2), 1990: 4-7.
20. Stadem, Norman. "Implication of Individual Fishing Quotas." m: *BioEconomic Research and Analysis Report*. Anchorage, AK: 1992.
21. New England scallop and groundfish vessels are believed to have aborted their attempts to pursue underutilized species out of fear that such action would reduce their records of participation in their respective traditional fisheries. (Personal communication, Pat Flanigan, Marine Fishery Consultants, Inc., Swarthmore, PA, November 16, 1994.)
22. "Capacity" is a concept that can be defined and measured in several different ways. Because of the way in which fisheries operate, it is extremely difficult to define with precision or in a purely static sense. Nevertheless, it is possible to derive some operational definitions on a "threshold" basis that expose excesses. See: C. L. Smith and S. S. Hanna. "Measuring Fleet Capacity and Capacity Utilization." *Canadian Journal of Fisheries and Aquatic Sciences*, 47 (1990): 2805-2901.
23. The chief objective of the Magnuson Fishery Conservation and Management Act, for instance, was to eliminate overexploitation of marine fish stocks off the U.S. coast by foreign fleets. Although the Act effectively removed that threat, it failed to anticipate that the same threat would quickly be posed by domestic fishers.
24. Hardin, Garrett. "The Tragedy of the Commons." *Science* 162 (1968): 1243-1248.

25. Christy, Francis T., Jr., and Anthony Scott. *The Common Wealth in Ocean Fisheries*. Baltimore, MD: The John Hopkins Press, 1965. 281 p.
26. Overcapitalization is rarely a concern in competitive industries where private property rights exist, because responsibility for the consequences of investment decisions can be fully internalized. With open access, however, investment incentives can be excessive because no one owns the resource to be exploited and therefore no one is responsible for undesirable results.
27. One author notes that the English commons was actually a highly regulated communal arrangement. See: Susan S. Hanna. "The Eighteenth Century Commons: A Model for Ocean Management." *Ocean and Shoreline Management*, 14(1990): 155-172.
28. Berkes, F.D., et al. "The Benefits of the Commons." *Nature* 340(1989): 91-93.
29. Scott, Anthony. "Obstacles to Fishery Self Government." *Marine Resource Economics* 8(Fall 1993): 187-199.
30. Rosenberg, Andrew A. "Background on U.S. Fisheries: Status and New Directions" : *Limiting Access to Marine Fisheries*. Karyn L. Gimbel, ed. Washington, DC: Center for Marine Conservation and the World Wildlife Fund, 1994. 316 p.
31. Ward, J.T. *Modeling Fleet Size in the Gulf of Mexico Shrimp Industry, 1988-1989*. NOAA Tech. Memo. NMFS-SEFC-999. St. Petersburg, FL: NMFS Southeast Regional Office, 1989.
32. In many cases, traditional management seeks to conserve the resource by making it more costly, in terms of effort, to fish.
33. Beddington, John R., and R. Bruce Rettig. *Approaches to the Regulation of Fishing Effort*. FAO Fisheries Technical Paper No. 243, 1984. 39 p.
34. McNeil, Thomas. "New England Lobster Fisheries." *Washington Post*, August 8, 1994, p.
35. However, in the short-term, as less-efficient operators leave the industry, cost per unit of product harvested can decrease.
36. For more details on Federal laws applicable to marine fisheries see: CRS, Report 95-174 ENR, *Living Aquatic Resource Laws and Treaties: Reference Guide*, January 19, 1995, 29 p.
37. The order of items in this list does not imply any priority of concern, nor is it intended to be a comprehensive list of options available to Congress. Some options may be mutually exclusive, but others might be compatible or even reinforcing.
38. Between 1990 and 1992, the number of vessels harvesting surf clams in the Mid-Atlantic region dropped from 128 to 59; between 1989 and 1992, the number of vessels harvesting ocean quahogs in this same region dropped from 69 to 43. In the wreckfish fishery in the South Atlantic region, the number of vessels fishing dropped from 44 in 1991-92 to only 14 in 1993-94.

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