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*PART 1:  
BACKGROUND  
AND  
CONCEPTUAL BASIS*



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# Chapter I: Introduction

## *Legislative Charge*

In 1996, Congress enacted the Sustainable Fisheries Act, P.L. 104-297, (SFA) which contained the most sweeping revisions of federal fisheries law since 1976. For the most part, SFA amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) attempted to bring a stronger conservation orientation to the development and implementation of national fisheries policy. However, a number of these amendments dealt with issues other than the biological status of marine fishery resources. For example, a prohibition was placed on using individual fishing quotas in fisheries for five years, until the implications of this type of management regime could be studied further. (MSFCMA §303 (d)). Another example is the new authority given to the Secretary of Commerce to conduct fishing capacity reduction programs. (MSFCMA §312 (b)).

During the debates leading to passage of the SFA, a common catch-phrase referred to “too many fishermen chasing too few fish.” Traditional approaches to fisheries conservation and management could perhaps address the questions of “too few fish,” but what of the perception that there were “too many fishermen?” This assumes that United States fishermen have the capability to catch fish in excess of the available fishery resources, regardless of whether or not those resources need rebuilding. The result includes economic waste, social problems and a disproportionate impact from regulatory reduction. Government

programs may have contributed to this capability.

In addition to its other provisions, the SFA included a provision for a Task Force to study the role of the federal government in investment in fisheries managed under the MSFCMA. The law provided as follows:

***STUDY OF FEDERAL INVESTMENT.*** -- *The Secretary of Commerce shall establish a task force comprised of interested parties to study and report to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Resources of the House of Representatives within 2 years of the date of enactment of this Act on the role of the federal Government in*

*(1) subsidizing the expansion and contraction of fishing capacity in fishing fleets managed under the Magnuson Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.); and*

*(2) otherwise influencing the aggregate capital investments in fisheries.*

(SFA §116 (b); MSFCMA §312, note)

The Task Force continually referred to this charge to make sure that it was addressing precisely the problems articulated in the law. Many discussions were held over the breadth of the statutory charge. In the end, the Task Force believed it should interpret the charge broadly. The law not only addresses programs

of the National Marine Fisheries Service (NMFS), but of the “federal government” at large. Further, the law seemed to include any policies or other actions by the federal government. The Task Force decided that it would be constrained by time and available resources; and so it exercised its judgement to limit what would otherwise be a formidable scope of activity by focusing on those roles of the federal government that, in the judgement of the Task Force, had most directly contributed to investment.

It is also important to note that the statutory charge does not refer to “over-” capitalization, nor presume that government influence on capitalization is either good or bad. The charge to the Task Force is to investigate all aspects of the issue.

The statutory language did not clearly indicate to the Task Force what it was to do about these “roles.” The law only calls for a “report” to Congress. The obvious question this poses is whether the Task Force was expected to make recommendations, or only analyze and comment on these roles. The Task Force took the view that it was constituted from a broad base across both the nation and the many policy interests concerned with the effective conservation and management of marine fisheries; and that wherever this group could come to some agreement it should make recommendations, in addition to setting forth and analyzing the various programs and policies of the federal government that are relevant to its charge.

### *Description of Task Force*

The law directed the Secretary of Commerce to establish the Task Force, with no guidance concerning its size or makeup.

NMFS concluded that the Task Force should be made up of private individuals concerned about U.S. marine fisheries, rather than federal employees; that it should include individuals from across the country; and that it should include individuals from commercial and recreational fisheries, the environmental and academic communities; and others experienced in the development and implementation of U.S. fisheries policy. NMFS published a notice in the **Federal Register** on August 28, 1997 (62 FR 45628) containing an open solicitation for nominations to the Task Force. The deadline for submitting nominations was extended to October 1, 1997 (62 FR 48058). Many nominations were received from across the country and from across a broad range of interest groups. In the end, the Assistant Administrator For Fisheries for the National Oceanic and atmospheric Administration (NOAA) appointed the following to be members of the Task Force:

Gordon Blue, Sitka, AK  
Theo Brainerd, Charleston, SC  
Priscilla Brooks, Boston, MA  
Ralph Brown, Brookings, OR  
Scott Burns, Washington, DC  
Ed Ebisui, Wahiawa, HI  
Tom Hill, Gloucester, MA  
Robert Jones, Tallahassee, FL  
Walter Keithley, Baton Rouge, LA  
Jim Kendall, New Bedford, MA  
James Kirkley, Gloucester Point, VA  
Peter Leipzig, Eureka, CA  
Vishwanie Maharaj, Alexandria, VA  
Bryce Morgan, Seattle, WA  
Bob Palmer, Tallahassee, FL  
R. Bruce Rettig, Corvallis, OR  
Ricks Savage, Berlin, MD  
William E. Schrank, St. John’s, NF  
Barbara Stevenson, Portland, ME  
Borden Wallace, Empire, LA  
Michael Weber, Redondo Beach, CA  
Donald Woodworth, Washington, DC

In order to efficiently address the work of the Task Force, NMFS contracted with the Atlantic States Marine Fisheries Commission (ASMFC) to provide staff support to the Task Force. Throughout the progress in preparing this report, ASMFC staff worked directly with the Task Force, in consultation with NMFS.

## Meetings

The Task Force decided early that it would attempt to operate proactively, with Task Force members contributing significantly to its work. Staff provided support, and the Task Force operated primarily through a series of six meetings, along with writing assignments and informal consultations between the meetings. The Task Force's meetings were held as follows:

January 6-8, 1998, Silver Spring, MD  
 March 5-7, 1998, Tampa, FL  
 May 7-9, 1998, Seattle, WA  
 June 26-29, 1998, Portland, ME  
 August 31-Sept. 2, 1998, Baltimore, MD  
 October 23-26, 1998, New Orleans, LA

The Task Force concluded that it would be important to let the public know what it was doing and invite participation. Thus, a public hearing was held at each of its meetings, except the last, which was devoted solely to the preparation of the report. Public hearings were held as follows:

January 6, 1998, Silver Spring, MD  
 March 5, 1998, Tampa, FL  
 May 7, 1998, Seattle, WA  
 June 28, 1998, Portland, ME  
 August 31, 1998, Baltimore, MD

## International and Domestic Context

Subsidies and capacity are issues receiving increasing global attention. It is impossible to discuss the public policy implications of overcapacity and the roles that government has played without considering the international context of the problems. The multinational scope of overcapacity pervade all aspects of the issue.

A number of studies in recent years have been issued from international governmental organizations (e.g., the U.N. Food and Agriculture Organization (FAO), the Organization for Economic Cooperation and Development (OECD), the World Bank Group) and from non-governmental organizations (e.g., the World Wildlife Fund (WWF)) concerning subsidies and capacity in world fisheries. The consistent conclusion is that there is overcapacity worldwide, that government subsidies have contributed to this overcapacity, and that overcapacity has contributed to the decline of many marine fishery resources. Government assistance takes all forms, including state-owned enterprises, direct capital infusion, financing assistance and preferential tax treatment, market promotion, government management and research, and negotiating access agreements for distant water fishing. (The Task Force's definition of a subsidy and catalogue of the types of governmental assistance programs is found in Chapter IV.)

The gross value of direct U.S. subsidies has been estimated at approximately \$25 million, or slightly more than 0.5% of the gross ex-vessel value of commercial landings (Milazzo 1998). In contrast, the world-wide estimate of subsidies is 22% of the commercial landings value. Japan is estimated to provide subsidies

of \$750 million (4% of ex-vessel value) and the European Union \$500 million. Members of the Task Force were generally aware of massive ship construction subsidies, market development and other forms of assistance that are readily apparent in developed and developing fishing industries around the world. (See generally, Milazzo 1998, WWF 1997.) However, the fact that the United States may not pursue the same types of subsidies, or to the same extent as other countries, does not mean that there are not problems in this country that deserve attention. It is important, however, to keep these inquiries in perspective. The Task Force does not believe that the United States influences capitalization to the same degree that some other fishing nations do. It is important to examine whether this country's programs make sense in the overall policy context that guides fisheries today.

Subsidies have long been considered in the context of their trade-distorting characteristics, most notably with respect to trade forums such as the World Trade Organization (WTO) and the North American Free Trade Agreement (NAFTA). However, subsidies have also in recent years become the focus of concern regarding their environmental effects. Relevant to the Task Force's inquiry is the effect of subsidies on overfishing and world-wide marine fishery resource depletion. Particularly during 1998 and 1999, the United States has been a leader in focusing international attention on the need for governments to address capacity issues. In 1995, the FAO approved the Code of Conduct for Responsible Fisheries. The Code set forth standards for responsible fishing practices. The United States has adopted the Code, and NMFS has prepared a U.S. implementation plan. The Code provides that governments should prevent excess fishing capacity and should implement management measures to insure that fishing effort is commensurate with the productive capacity of

the fishery resources and their sustainable utilization. (Sec. 6.3.) States should take measures to prevent or eliminate excess fishing capacity and should ensure that levels of fishing effort are commensurate with the sustainable use of fishery resources as a means of ensuring the effectiveness of conservation and management measures. (Sec. 7.1.8.)

In 1997, the FAO Committee on Fisheries turned specific attention to problems of capacity. In February, 1999, the FAO adopted The International Plan of Action for the Management of Fishing Capacity. Under the Plan, governments are urged to assess capacity, prepare national plans to effectively manage fishing capacity, take immediate action for coastal fisheries requiring urgent measures, strengthen regional fisheries organizations to improve management of capacity, and take immediate action where necessary for transboundary stocks. The Plan of Action requires governments to:

*assess the possible impact of all factors, including subsidies, contributing to overcapacity, . . . and those which produce a positive effect or are neutral. . . . [and] eliminate all factors, including subsidies and economic incentives . . . which contribute, directly or indirectly, to the build-up of excessive fishing capacity thereby undermining the sustainability of marine living resources . . .*

The United States was a strong proponent of the adoption of the Plan of Action, and may be expected to aggressively pursue its implementation.

In March, 1999, the World Trade Organization conducted a symposium on trade and the environment. The United States argued at the symposium that trade liberalization could

yield environmental benefits; and that WTO should pay attention to the question of subsidies and the contribution that they make to overfishing; and that such programs subsidize unsustainability in fisheries.

One of the recent rallying cries of resource conservation has been: “Think globally; act locally.” In contrast, fisheries businesses often find that they operate in markets for product and capital that are international in scope; and that this often affects U.S. fisheries policy. These effects are particularly important for U.S. fisheries policy given the status of capacity growth and subsidies that occur worldwide.

Perhaps paradoxically, fisheries industries in general have become more international in the era of coastal nation jurisdiction and preferences for local fishermen. Commercial fisheries are driven by markets, and these are global. The United States produces only half of the fish that its people consume. Much of the expansion in West Coast fleets has been in response to Asian markets. Some of the overcapitalization in the Gulf of Mexico came from U.S. distant water fleets returning to U.S. grounds as they were closed out of other nations’ exclusive economic zones (EEZs).

Shifts in the relative values of international currencies create opportunities that businesses nimbly seek to fill, often requiring capital investments. Capital flows are largely unregulated in the world economy, and multinational investments tie fishing industries together across national borders. In these and many other ways, international circumstances create pressures for capitalization.

## ***Organization of Report***

In order to provide an orientation for the Task Force’s analysis, the next section of the report deals with the historical background of the development of government fisheries policy, including efforts to promote the development of fishing activity and efforts to conserve fishery resources (Chapter II). Over the past thirty years there have been changes in the perceived roles that government could and should play in marine fisheries. In order to flesh out the statutory charge given to the Task Force, this is followed by two broad concept papers discussing issues of “capacity and capitalization” (Chapter III) and “subsidies” (Chapter IV) as they apply to fisheries.

### **PERSPECTIVES: FISHERY MANAGEMENT AND FISHING CAPACITY**

The Task Force discussed many instances in which fishery management decisions profoundly affected the capacity of U.S. fishing fleets. An excellent resource here is a report prepared by the Organization for Economic Cooperation and Development entitled *Toward Sustainable Fisheries: Economic Aspects of the Management of Living Marine Resources*. Often the effect on capacity of management action is neither understood nor considered by fishery managers. Unfortunately, these influences are so frequent and so complex that the Task Force did not have time to fully consider all of the different management actions and systems of management in use in the United States. The Task Force recommends that, in the future, managers consider the effect of their actions on fishing capacity when they make decisions. To support informed decisions, the Task Force also recommends that studies of these alternatives focus on the effect of management actions on capacity.

These are followed by a series of analyses of the various roles played by the federal government that might affect capitalization in U.S. fisheries. Many of these sections contain consensus recommendations of the Task Force. These recommendations are summarized in Part 3 of this report.

Throughout the report special sections present perspectives on the problems of investment and capitalization in various regions of the country. In addition, the report as a whole should be taken as the best judgement of the Task Force as a whole. The Task Force's discussions were lively. Each Task Force member was afforded the opportunity to express any independent views on any matter; and these are presented throughout the report.

Throughout its proceedings, and running as a theme through this report, the Task Force has constantly come up against data limitations. The available data are simply not adequate to permit proper empirical analysis of the various government programs that affect capacity in the fishing industry. The Task Force recommends that when legislation establishes or funds programs affecting the fishing industry, part of the mandate and budget authorization shall place proper emphasis on the generation of adequate data to permit the quantitative evaluation of the capacity and subsidy effects of the programs.

**PERSPECTIVES:  
INTERNATIONAL**

The internationalization of fisheries is well-highlighted by the example of sablefish. Much of the fish that is caught by fishing vessels in the United States is exported. International market conditions and exchange rates, therefore, can have a major influence on the expansion and contraction of capacity in a fishery. The sablefish fishery between 1976 and 1982 is an example of a fishery in which capacity was largely influenced by conditions in foreign markets and changes in currency exchange rates.

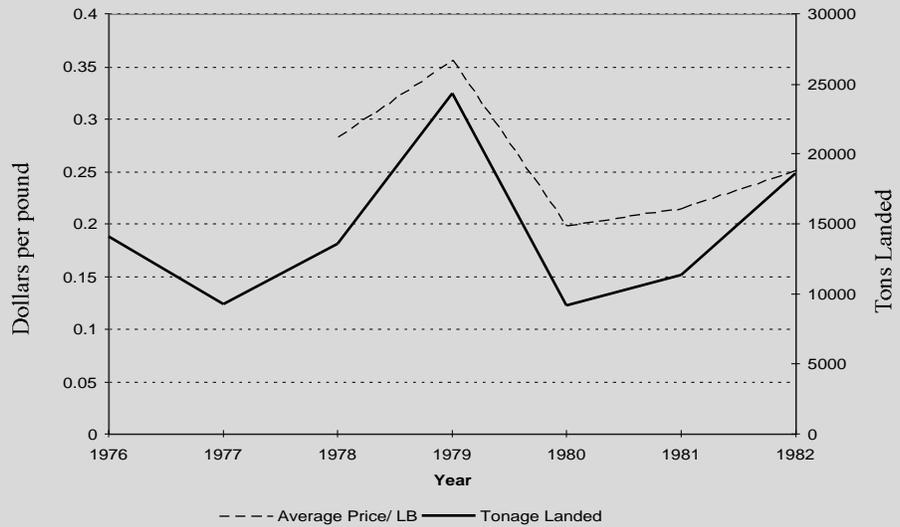
Sablefish have been landed into ports along the Pacific Coast of the United States since the late 1800s. Catches remained at levels below 5,000 mt until 1969, then climbed to 9,250 MT in 1977 peaking in 1979 at 24,518 tons. Much of the sablefish harvest during this period of expansion was by foreign fishermen. Since 1979, as a result of the Magnuson-Stevens Fishery Conservation and Management Act, all of the sablefish caught off of the West Coast has been caught by domestic fishermen.

The period from 1977, when the fishery became fully domestic, until 1982 when management of the fishery under the MSFCMA became active, represented a unique period in the sablefish fishery. Because most of the market for sablefish is in Asia, the exchange rate between the Japanese yen and the U.S. dollar is extremely important. Because it was the year that the fishery became fully domestic, 1977 is a useful benchmark for analysis. In that year, the domestic fleet that fished for sablefish included 346 trawl and fishpot vessels. Longliners also fished in 1977, but

the number of boats in this segment of the fleet is not available. The fleet caught 9250 metric tons (MT) of sablefish in 1977.

Fleet size, average price per pound, and total tonnage grew in 1978 and peaked in 1979. In 1979, 679 trawl and pot boats were in the fishery. The average price per pound was \$0.356; and 24,373 mt of fish were landed.

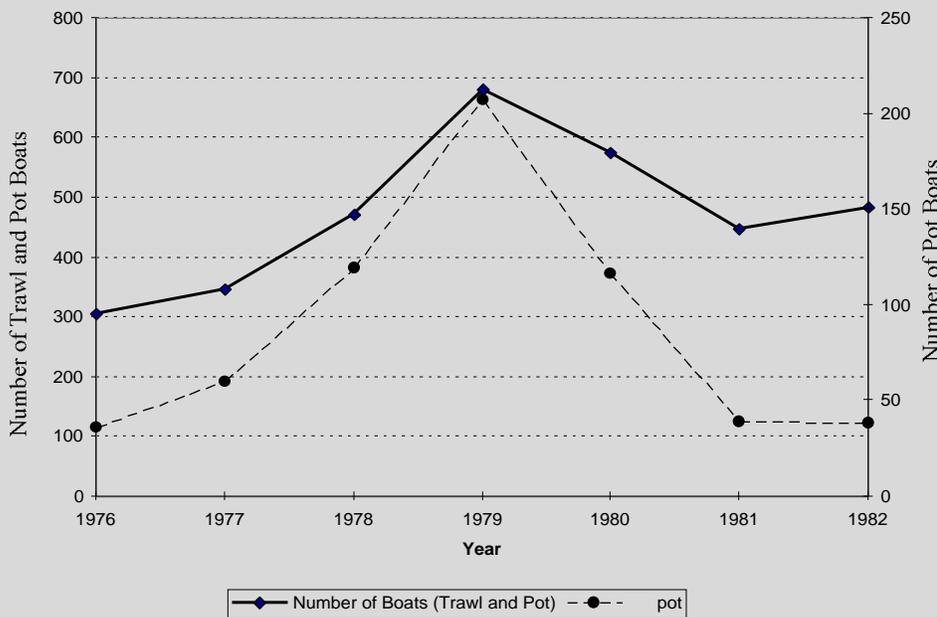
**Price Per Pound and Tonnage Landed of Sablefish 1976-1982**



The Japanese yen, at approximately USD \$0.0033 per yen in 1976, rose in value relative to the dollar during 1977, but peaked in 1978 and then started to slide. After peaking in 1978 at USD \$0.0054 per yen, the value decreased during 1979 and early 1980 until it reached a value of USD \$0.004 per yen. Thus, in relative terms, the dollar became much more valuable than the yen; i.e., fewer dollars were needed to buy yen; and the lower value of the yen lowered profits to U.S. exporters.

This change in the exchange rate caused a market collapse for sablefish. Per pound prices paid to the boat dropped from \$0.356 during

**Vessels Involved in the Sablefish Fishery 1976-1982**



1979 to \$0.199 during 1980. Prices remained low until after 1982. Landings in 1980 fell to 9,146 MT, and boats started leaving the fishery: 574 trawl and pot boats operated in the fishery in 1980, 447 in 1981 and 482 in 1982.



The boom and bust of this cycle is even more dramatic if only the number of pot vessels is examined. The fleet of vessels that used pots to catch sable fish was extremely specialized. While trawl vessels could supplement decreases in income from sablefish during this period with other species of fish, the pot fleet could not. Only 36 pot vessels were in the fishery in 1976. The pot fleet grew to 60 in 1977, 119 in 1978 and peaked at 207 vessels by 1979. But the numbers of boats decreased to 116 in 1980, 39 in 1981 and 38 in 1982.

All of this resulted from market conditions outside the United States.

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# Chapter II: Historical Background

## *Pre - 1977*

Prior to the enactment of the Fishery Conservation and Management Act of 1976, P.L. 94-26, (Magnuson Act), there was no comprehensive, coherent federal policy for marine fisheries. Different policies governed or led to government activities that influenced investment and capitalization in marine fisheries. For example, United States laws concerning vessel documentation and licensing required from early times that U.S. fishing vessels be constructed in the United States. Foreign vessels have not been allowed to carry cargo from one U.S. port to another. The Nicholson Act prohibited foreign vessels from landing their high seas catch in the United States. All of these activities were geared to some extent toward protecting U.S. industries from foreign competition.

The government's fisheries programs over the years were characterized not so much by a concern for stewardship of the public trust, as by a desire to assist fishing industries. Thus, the stated reason for the federal government to survey fishery resources has only recently focused on the need to assess the public interest; and previously stemmed from a desire to discover opportunities for U.S. fishermen. Resources needed to be characterized so that fishermen would know what species of fish were available in sufficient quantity that they could be caught profitably. In the 1960s, many activities of this type were carried out under the rubric of "exploratory fishing." In a broader sense, it was commonly accepted that the

proper role for the United States government was to assist its fishing industry. Until the early 1970s, the federal government had virtually no regulatory authority for conserving and managing the nation's marine fishery resources.

This began to change when massive foreign fishing effort developed off U.S. coasts during the 1960s. U.S. jurisdiction had, under accepted principles of international law, been limited to its three-mile territorial sea. In 1958, international law began to recognize the right of a coastal nation to control resource utilization within a nine-mile belt adjacent to the territorial sea off its coasts. Thus, outside of twelve miles, coastal nations could not limit fishing or other marine resource exploitation by other countries. The devastation brought by unregulated foreign fishing highlighted the interests of coastal nations in having priority access to relatively near-shore waters. During the 1970s, these concepts were developed in the United States and throughout the world in a policy context that considered the scope of these legitimate interests, the reasons why governments would want to take action, and the appropriate policy priorities for the conservation, management and utilization. Resource "utilization" was a dominant interest in developing and implementing policy for nonrenewable resources; and the fact that these were much more economically significant than fisheries may have created a policy mind set for marine resources that focused on opportunities for utilization and development.

## **Asserting Federal Fisheries Jurisdiction**

In 1976, Congress first set a comprehensive and cohesive policy for the conservation and management of U.S. marine fishery resources. Seafood imports had doubled during the previous decade and earlier efforts to control foreign fishing fleets had failed. The original Fishery Conservation and Management Act, now commonly referred to as the Magnuson-Stevens Act, was enacted in response to the need to address overfishing by foreign fleets and establish the priority access rights of U.S. fishermen to resources in this nation's waters. Congress found that fish off the coasts of the United States are valuable renewable resources that contribute to the food supply, economy and health of the United States, but that these resources had diminished due to overfishing and inadequate fishery management. International fishing agreements were deemed ineffective. Therefore, Congress found, a national program for conservation and management of marine fishery resources was needed, along with a national program for the development of fisheries that were underutilized or not utilized by the United States fishing industry.

Based on these findings, Congress declared its intention to take immediate action to conserve and manage marine fishery resources, to support international agreements for highly migratory species, to promote domestic commercial and recreational fishing, to provide for fishery management plans through Regional Fishery Management Councils, to achieve optimum yield, and to encourage development of underutilized fisheries. Thus, in both its findings and its stated purposes, Congress, from the very beginning of federal fisheries management, pursued the dual focus of conserving and managing marine fishery

resources, and promoting U.S. fisheries and development of underutilized fisheries. The early amendments to the law clearly emphasized fisheries promotion and Americanization while fisheries management was not a major issue.

Over the two decades since the original enactment of the Magnuson Act, the law has been amended and renamed a number of times. These amendments have dealt with many policy and administrative issues. Most relevant to the Task Force's inquiry, the American Fisheries Promotion Act (AFPA) was enacted at the end of 1980, and emphasized the need to capture the benefits of extended jurisdiction for American fishermen and processors, and to develop bottomfish off of Alaska. The AFPA also required that foreign fishing allocations be based, *inter alia*, on the extent to which foreign nations cooperated in advancing existing and new opportunities for U.S. fishery exports. This law codified efforts already underway at NMFS to aggressively pursue a policy, often referred to as "fish and chips," that sought to use access to U.S. fisheries by foreign fishermen as a tool to leverage market access for the U.S. fishing industry. Thus, to a greater or lesser extent among regimes around the country, there continued a strong emphasis in U.S. fisheries policy for developing the domestic fishing industry, for an "Americanization" of the industry.

## **Sustainable Fisheries Act**

The most extensive and fundamental revisions that have been made to the law came in the Sustainable Fisheries Act, P.L. 104-297 (SFA). Interestingly enough, the findings, purposes and policies expressed by Congress were not changed significantly. However, in the substantive provisions of the statute, far

stronger emphasis was placed on the conservation and management policies of the law. Perhaps the most telling example of the revisions made by the SFA is in the definitions of “optimum yield,” “overfishing,” and “overfished.” Previously, optimum yield was defined as maximum sustainable yield (MSY) as “modified” by any relevant economic, social and ecological factor; the latter two terms were not defined at all. Under the SFA, optimum yield is defined as MSY as “reduced” by any relevant economic, social and ecological factor. The SFA also states that an overfished fishery must provide for rebuilding to a level consistent with MSY. Thus, optimum yield cannot exceed MSY and MSY must be the target of any rebuilding program. The new definitions of “overfishing” and “overfished” are similarly tied to MSY. Thus, MSY, a biological reference point, has become a stronger construct in the goals of fishery conservation and management under MSFCMA. Elsewhere throughout the SFA, stronger measures are included to address overfishing, recovering depleted stocks and reducing bycatch.

On the other hand, the basic policies of the statute as they relate to fishery development and promotion were not revised. Congress has left unchanged its finding that a national program for the development of underutilized fisheries is necessary; and it is still the policy of the United States to promote commercial and recreational fishing and to encourage the development by the United States fishing industry of underutilized fisheries. Nevertheless, the SFA amendments were so extensive, and their implementation so pervasive, that they can reasonably be said to have occasioned a major shift in the fundamental policy that guides U.S. fisheries. The emphasis now is more heavily tilted toward conservation and management than before. This overall policy context is extremely important for the Task Force’s analysis of the roles played by the government that may have influenced levels of capitalization. Government roles that are perfectly appropriate when the emphasis is on development become untenable when the emphasis shifts to conservation, or the rationalization of capital utilization.



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# Chapter III: Concepts of Capacity and Capitalization

## Abstract

*Excess capacity of fishing fleets is one of the most pressing problems confronting U.S. fishery managers. Excess capacity causes economic waste and over harvesting of resource stocks. Considerable confusion, however, persists over the definition and measurement of capacity and capacity utilization in fishing. This chapter provides two orientations for defining and assessing capacity and excess capacity in fisheries. One orientation is the physical level of landings of fish. Based on the production or landings orientation, capacity is defined to be the maximum potential output or level of landings that could be realized if only the fixed factors (e.g., vessel size, engine horsepower, and size of gear) limited production. The second orientation for defining capacity is economic. An economic definition of capacity is the level of landings consistent with some underlying economic goal or objective (e.g., maximum profit or minimum cost). This chapter also provides definitions of capitalization and overcapitalization; this latter discussion is offered to clarify confusion about overcapitalization and excess capacity.*

## ***Introduction***

Excess harvesting capacity has long been recognized as a major problem for fisheries. In the absence of any property rights or controls on entry, vessels and capital will enter a fishery until resource rent is driven to zero. Alternatively, expansion of capital and fishing effort occurs until revenue or gross receipts equal cost, and any profit, other than a normal return, is driven to zero. Even with controlled access schemes, there is a tendency for vessel owners to engage in capital stuffing or expand the use of unregulated inputs (e.g., bigger engines, smaller mesh nets, more electronics, etc.). In a keynote address to the World Conference on Fisheries, Mace (1997) identified overcapacity as the key problem afflicting marine capture fishery resources.

Although there is international recognition by resource managers that capacity in fisheries must be reduced, the term, "capacity," remains vague, ill-defined, and often ambiguous (Prochaska, 1978). As noted by the Department of Fisheries and Oceans Canada (Anon, n.d., p. 9), "Within the fishery, capacity-related concepts are defined and employed by biologists, resource managers, and economists. Each group defines capacity in terms which are useful for addressing their own particular needs and concerns." Moreover, the concept of capacity, particularly excess harvesting capacity, is often interchangeably used with the concept of capital, particularly overcapitalization. Last, the notion of harvesting capacity is often confused with the concepts of capital utilization and factor utilization.

Recently, the United Nations' Food and Agriculture Organization (FAO) sponsored a consultation on the management of fishing capacity. A technical working group convened

in La Jolla, California between April 15 and 18, 1998. More than forty individuals from around the world attended the meeting. The issues discussed were: (1) how to define fishing capacity; (2) the causes and consequences of overcapacity; and (3) effective methods for reducing fishing capacity. NMFS has recently formed a national task force to develop definitions of capacity and appropriate procedures to assess capacity.

Two documents produced for the FAO consultation which may offer guidance for defining and measuring capacity and capacity utilization are Kirkley and Squires (1998) "Defining and Measuring Capacity and Capacity Utilization in Fisheries," and Greboval and Munro (1998) "Overcapitalization and Excess Capacity in World Fisheries: Underlying Economics and Methods of Control." The two documents should be available as Technical Working Documents from FAO in late 1999.

Most often, managers refer to excess capacity and overcapitalization relative to commercial fisheries. Recreational anglers, however, may also contribute to excess harvesting capacity. An excessive level of recreational activity may prevent anglers from realizing the maximum aggregate net benefits from recreational fishing. Unfortunately, developing measures of capacity, capacity utilization, and capitalization for recreational fisheries will be extremely complicated because of extreme data limitations. The data necessary for developing such measures are not available, and the concept of capacity relative to recreational fisheries is not well understood.

In order to examine the role of federal subsidies in affecting exploitation levels, it is imperative to develop definitions of capacity, capital, capital utilization, and factor utilization. In this brief report, various definitions of capacity, capitalization, and capacity utilization

which are consistent with prevalent economic theory and principles and which are familiar to fishery researchers and managers are presented. Two basic frameworks or orientations for defining capacity and capacity utilization are initially introduced: (1) a primal or physical measure, and (2) an economic-based measure. Next, more practical measures of capacity and capacity utilization are introduced. These practical measures appear to be more consistent with the views on capacity held by resource managers and public administrators.

The terms capital and capitalization are also defined relative to economic principles, but later modified to indicate how resource managers typically view the terms.

The concepts of capacity, capacity utilization, and capitalization are also discussed relative to total allowable catches (TAC) and the recently implemented Sustainable Fisheries Act (SFA). TACs and the SFA have important ramifications for assessing capacity, capacity utilization, and capital utilization since they will impose upper limits or thresholds on allowable harvest levels, fishing mortality rates, and very likely, the number of operating units and how those vessels will operate.

In addition, capacity and related concepts are discussed relative to recreational fisheries. Given the increasing number of recreational anglers, apparent user conflicts, and increasing demands by anglers for allocation of resources, there is a need to consider capacity and capacity utilization by recreational anglers.

## ***Capacity: Two Basic Concepts***

There are numerous possible definitions

and measures of capacity. The term has been widely used in many different contexts to convey different meanings. Its measurement is also quite difficult. The FAO Consultation on capacity concluded or agreed to four basic definitions of capacity: (1) *fishing capacity* is the maximum amount of fish over a period of time (e.g., year or season) that can be produced by a fishing fleet if fully-utilized, given the biomass and age structure of the fish stock and the present state of the technology. Fishing capacity is the ability of a vessel or fleet of vessels to catch fish; (2) *target fishing capacity* is the maximum amount of fish over a period of time (year, season) that can be produced by a fishing fleet if fully utilized while satisfying fishery management objectives designed to ensure sustainable fisheries; (3) *excess capacity* (i.e., overcapacity) is the difference between current fishing capacity and target capacity; and (4) *limit capacity* is the capacity necessary to achieve maximum sustainable yield (MSY).

All of the above definitions are physical or technological/biological definitions. There is, however, a need for an economic or socio-economic definition and measurement of capacity. Because of time constraints, the FAO expert consultancy was unable to address economic concepts of capacity. The following sections consider two basic orientations for defining and measuring capacity and capacity utilization in fisheries: (1) primal or physical-based definition, and (2) an economic based definition.

### **The Primal or Physical-based Concept**

One widely or commonly used definition of capacity is the maximum output attainable given full utilization of all factors of production (e.g., fuel, labor, other energy, materials, and

other inputs) subject to the available fixed capital (e.g., plant size and number of machines) and traditional or customary operating practices. This is equivalent to the definition offered by Johansen (1968). "The maximum amount that can be produced per unit of time with existing plant and equipment, provided the availability of variable factors of production is not restricted." Webster defines capacity to be the maximum production or output. The primal or physical-based measure is perhaps the prevalent definition considered in fisheries.

The term "primal or physical based measure" may be misleading. Although the general notion is to determine the maximum potential output, the maximum is not without respect to customary and usual operating practices nor without respect to input and output prices. The term instead refers to how the measure is calculated and explained. More important, the primal based concept is a short to intermediate-run concept. It is defined relative to existing technology and full utilization of the variable and fixed factors of production.

We may think of primal capacity the same way we consider the capacity of a fuel tank for an automobile. A car may hold 16 gallons of fuel. That is the capacity of the tank. If we put less than 16 gallons into the tank, we are filling below capacity or not using all the capacity of the fuel tank. We cannot put in more than 16 gallons; if we tried to do so, we would not have sufficient capacity. The same reasoning may be applied to a refinery which stores fuel in tanks; the capacity of a 10,000 gallon fuel tank is 10,000 gallons.

Measuring even a primal or production-based concept of capacity may be complicated for fisheries. Typically, the only data regularly available on fisheries are number of vessels and

total landings. In some cases, however, there may also be data on days at sea, crew size, and vessel and gear characteristics. Even if very limited data are all that are available, it is possible to construct a primal-based measure of capacity.

Ballard and Roberts (1977) defined capacity, relative to fisheries, as the short-run ability of the fishing industry to produce regardless of economic constraints. The Report of the Group of Independent Experts to Advise the European Commission on the Fourth Generation of Multi Annual Guidance Programmes defined capacity in terms of an upper limit on effective fishing effort. Prochaska (1978) defined physical capacity as the amount of production which could be produced given full and efficient utilization of inputs subject to customary and normal operating procedures.

Hannesson (1987) offers still another definition of physical or primal-based capacity. Capacity is the ability of a fleet or industry to generate fishing effort per unit of time while harvesting the maximum potential output. Kenchington and Charles (1989) define capacity to be the level of fishing mortality that a boat or fleet may exert under specified conditions; their definition relates fishing mortality to catch or output, fishing effort, fishing power, and capital invested in a fishery.

### **An Economic-based Concept**

The economic-based concept of capacity is the more widely considered notion of capacity in the academic literature. It is not the concept, however, most widely considered by government agencies and various international/national consulting firms (e.g., McGraw-Hill). Most U.S. government

agencies (e.g., Federal Reserve Board and Bureau of Economic Analysis, U.S. Department of Commerce) assess capacity in terms of the maximum potential level of production.

There are several economic definitions and measures of capacity. In general, economic capacity may be defined as the output consistent with achieving some underlying economic goal or objective, e.g., the output level corresponding to maximum profit or minimum cost (Cassels 1937).

A widely used economic definition of capacity is the output level coinciding with the tangency between the short-run and long-run average total cost curves (Klein 1960; Morrison 1985). Another widely used definition of capacity is the level of output that coincides with the point of minimum value of the short-run average total cost curve (Morrison 1985; Nelson 1989). The latter definition pertains to the short-run.

As illustrated by Berndt and Fuss (1989), however, the conventional economic definition may have an indeterminacy problem if there are multiple products and more than one fixed factor (e.g., vessel engine, gear, electronics, on-board freezers). That is, how does one derive the appropriate cost curve and determine the fixed factor which limits production. Fisheries typically have more than one output and fixed factor. The indeterminacy problem may be avoided, however, if the outputs and quasi-fixed inputs can be combined or aggregated (e.g., vessel engine plus gear plus electronics plus on-board freezers equals productive capital).

The economic concept, unlike the primal or physical-based concept of capacity, will explicitly reflect behavioral changes in response to economic changes (e.g., increase

output in response to an increase in the price of the output). It also may be determined relative to the long-run scale of operation.

A similar, but more empirically tractable definition, was recently offered by Färe and Grosskopf (1998). They define economic capacity as the largest feasible output when input prices and cost (a budget) are given. Under the Färe and Grosskopf definition, the maximum output is determined according to the maximal level of inputs which do not cost more than a total fixed budget available. The Färe and Grosskopf approach partially avoids the indeterminacy problem identified by Berndt and Fuss (1989).

Returning to the example of the oil refinery, an economic concept of capacity would be the amount of fuel that would be stored by the refinery in order to optimize some underlying economic objective. Alternatively, we may consider the individual who owns a car and the fact that because of the way they operate the vehicle and respond to economic conditions, it is advantageous to them to always fill the car to a certain level other than the maximum. This is their long-run optimum scale of operation.

For the purposes of considering capacity relative to subsidies, an economic concept of capacity may be defined as the output corresponding to the tangency between the long and short-run average cost curves. The point of tangency also corresponds to the optimal scale of operation given different behavioral objectives of firms. This definition is the most flexible economic definition in that it accommodates various market structures and behavioral objectives (Morrison 1985).

## A Proposed Definition of Capacity

Members of the Task Force spent considerable time attempting to develop a useful and practical definition of capacity. By consensus of the members, the following definitions are proposed: (1) *primal capacity* is the maximum potential catch which can be landed per unit of time given existing plant and equipment and no limitations on the availability of the variable factors of production; and (2) *economic capacity* is the output corresponding to the long-run optimum scale of operation (e.g., maximum profit). The primal definition is also the traditional definition of capacity and nearly identical to that proposed by Johansen (1968, p. 52) and more formally developed by Färe et al. (1989). The economic definition is consistent with the definition offered in the literature (Cassels 1937; Morrison 1985; and Nelson 1989).

With the above primal definition, it is possible to develop measures of capacity that reflect the potential for excess capacity. That is, by knowing the potential harvest of a fleet in the absence of variable factor constraints (e.g. stock biomass), it is possible to determine the level of capacity which is necessary to harvest desired levels of the resource consistent with biological and/or economic goals and objectives (i.e., the level of excess capacity relative to desired target or allowable catch levels).

## Capacity Utilization

Capacity utilization (CU) is also as difficult to define as capacity. In a strict sense, capacity utilization is defined as the ratio of observed production to optimum production. From a primal approach, the ratio of observed to maximum potential output would equal

capacity utilization. From an economic perspective, the ratio of observed output to the economic optimum level would equal capacity utilization.

Färe et al. (1989) and Färe and Grosskopf (1998) offer an alternative definition of capacity utilization which may be easily derived. Capacity utilization is defined to be the ratio of the technical efficiency index corresponding to output and both fixed and variable input levels divided by the technical efficiency index corresponding to the potential output which could be produced when only the fixed factors are limiting. The technical efficiency index is a measure of the percentage by which output could be increased if a firm or industry efficiently utilized the fixed and variable factors of production. The Färe et al. definition ensures elimination of possible bias which may be caused by inefficient production.

Morrison (1985) and Berndt and Fuss (1989) offer another definition of capacity utilization based on an economic orientation. They define capacity utilization as the ratio of the total cost associated with observed production to the total cost associated with the optimum production level.

The standard definition of capacity utilization may not be particularly useful for assessing the effects of government programs designed to increase or decrease overall fishing activity. What can a manager do if it is known that capacity utilization as defined by the ratio of observed to optimum output is 0.5? One cannot say that there are 50 percent too many vessels or inputs or that the fleet would be more economically efficient if there were fewer. The only real conclusion which may be drawn from a CU of 0.50 is that the potential exists for a greater harvest without the necessity of major expenditures of new capital or equipment.

If CU was measured relative to a target level of output, it would be possible to draw substantial conclusions about the long-run or optimum capacity utilization. If the optimum output for a fishery was determined to equal 20,000,000 pounds and the observed output for the industry equaled 10,000,000 pounds, CU would equal 0.5. It could possibly be concluded that the stock abundance was inadequate to allow the industry to operate at full capacity. Alternatively, economic conditions may have been responsible for firms not operating at full capacity.

What are the ranges on CU? Relative to a primal-based approach, CU is restricted to between 0.0 and 1.0; it is not possible to produce more than the actual maximum potential output. A primal-based measure of CU less than 1.0 implies that the fleet had excess harvesting capacity relative to the period for which CU was less than 1.0. It does not mean that the fleet should be reduced by the difference between 1.0 and the CU measure. The economic-based measure of CU may be less than 1.0, equal to 1.0, or greater than 1.0. The optimum utilization of capacity occurs for the output level at which CU equals 1.0. A value of CU greater than 1.0 implies that there is a shortage of capacity relative to demand. Similarly, a value of CU less than 1.0 implies a surplus (excess capacity) of capacity relative to demand.

## ***Capacity, CU, and the Sustainable Fisheries Act***

Both the primal and economic definition offer a basis upon which to comply with the requirements of the Sustainable Fisheries Act (SFA). The SFA requires substantial rebuilding of marine resources under the purview of the federal government. Under the SFA, various

allowable harvest levels may be established to rebuild resources within a ten year period. Using the primal or economic definition will allow a matching of capacity to the desired allowable limits such that the threat of overharvesting is reduced or minimized.

## ***Capital and Capitalization***

### **Capital**

It appears that when resource managers or program administrators use the terms capacity and capacity utilization, they are often referring to capital and capital utilization. More precisely, managers appear to be concerned with total effective fishing effort or total factor utilization. Fishing effort equates to fishing mortality and effective effort equals fishing mortality. Managers want to know how much could be produced by an existing fleet, and what is an optimal configuration of a fleet (e.g., number of vessels, size of vessels, type of gear, crew size, and days at sea).

The concept of capital is as difficult to define as is the concept of capacity. As noted by Hirshleifer (1970), there are two simple concepts of capital. First, there is real capital which is an aggregate measure of physical capital goods; in the case of fisheries, real capital appears to be the concept of most interest (e.g., number of vessels). Managers routinely state that a fishery has excess capacity or is overcapitalized and subsequently refer to number of vessels. Real capital is also the concept most often interchanged with capacity (e.g., excess capacity vs. overcapitalization). The other concept of capital is capital value. Capital value is also a concept with important applicability for fisheries but one which is seldom actually determined. Capital value is the market value of an economic agent.

In very simple terms, capital may be defined as one of the factors of production consisting of property from which an income is derived and is usually expressed in terms of money. Capital need not be measured in dollar terms if appropriate information is available. Varian (1978, 1984), for example, defines capital to equal the physical number of machines (or number of standardized fishing vessels in a fishery) used in production. Capital is actually a stock concept; Varian and others, thus, argue that the appropriate concept is capital services (e.g. vessel hours). Kirkley and Squires (1988) demonstrate the importance of using real capital rather than a simple vessel count to assess excess capitalization and harvesting capacity.

## Capitalization

Capitalization may be defined as the total dollar value invested in the capital stock over time. A formal definition of capitalization is the present value of the future flow of annual returns from a given resource or economic agent. There are, of course, numerous other definitions.

In the case of fisheries, it is critical to be able to separate or distinguish capital invested in harvesting and on-board processing or producing activities from capital invested in nonaugmenting or nonproduction activities (e.g., onboard stereo system; more powerful air conditioner for crew; onboard laundry facilities, etc.). There is, however, an empirical issue of whether or not investment in non-specific producing activities enhances the productivity of the crew.

## Capital and Capitalization Defined for Fisheries

We define capital as the aggregate stock of vessels and equipment (e.g., addition of small vessels to large vessels plus different gear sizes). We also note a need to be able to determine capital services (e.g., the number of hours of use of all capital). Capital should also be defined as the total dollar value of all vessels and related equipment. This is important to adequately assess how subsidies may have distorted capital investments or encouraged the misallocation of resources. Alternatively, the use of dollar values allows comparisons between capital investments in different types of industries.

## *Recreational Fisheries and Capacity*

Defining and assessing capacity and capacity utilization in recreational fisheries is complicated by several factors. First, the output is the quality of the recreational experience and not the number of fish caught; the number of fish caught, however, is typically related to the quality of the experience. Second, data for assessing the maximum potential harvest by anglers are typically not available. Third, there is an issue of assessing the trade-offs between leisure and work, and subsequently, assessing the associated utilities. Fourth, it is critical to determine the demand for recreational trips in order to assess capacity.

A possible definition is the maximum potential output corresponding to the number of trips which maximizes utility of the recreational angler. To determine the maximum potential output, however, it will be necessary to consider a large number of possibly extreme assumptions. For example, a

minimum assumption would be that the demand for recreation, in general, was separable from the demand for all other goods and services. That is, consumers group items together as composite bundles such as food, shelter, clothing, and recreation when they purchase various goods and services. The assumption of separability permits an analysis of the demand and subsequent utility for recreational fishing without conducting an analysis of the demand for all goods and services.

Given the data typically available, it appears that capacity and capacity output for recreational fisheries will have to be defined and measured in terms of a primal or physical-based concept. We could define capacity as the maximum potential catch in terms of the number of angler trips or angler days. If the data series was sufficiently long, this measure would reflect changes in response to a variety of economic and social changes.

It is important to realize, however, that the maximum potential physical catch is not an adequate indicator of capacity nor does it provide an adequate reference for assessing capacity utilization in recreational fisheries. It does, however, represent a potential upper limit on the maximum catch given customary and traditional recreational fishing practices.

## *Measuring Capacity*

### Potential Methods

The FAO Expert Consultation failed to agree or offer a measure or set of measures of capacity or capacity utilization. The failure to offer a measure, however, was the result of inadequate time to adequately discuss possible measures. Kirkley and Squires (1998) offer a

comprehensive listing of possible measures as well as numerous examples. Whatever measures are adopted by any government agency will depend on available data. That is, the measures used to assess capacity in any given fishery will be partly dictated by the available data.

The simplest approach, particularly given the types of data typically available for fisheries, is the peak-to-peak approach of Klein (1960) and Klein and Summers (1966). Assuming constant returns to scale, measures of output per bundle of inputs, aggregate output divided by aggregate input, may be obtained over time. Interpolating peak years (maximum output per input bundle) as years of full capacity and assessing a technological trend between peak years permits measures of capacity output to be obtained. The ratio of observed output to capacity output in each year equals capacity utilization. Ballard and Roberts (1977) used the peak to peak approach to assess capacity and capacity utilization for ten west-cost fisheries.

An approach developed by Färe (1984), Färe et al. (1989), Färe et al. (1994), and Färe and Grosskopf (1998) and modified specifically for fisheries by Kirkley and Squires (1998) is data envelopment analysis (DEA). DEA is basically a mathematical programming approach which permits an analysis of technical and economic efficiency. It also offers a framework for determining capacity output from either an input or an output orientation and from a production (primal) or economic perspective. The ability to measure capacity and capacity utilization from either an input or output orientation is critical because many fishery managers and nations are attempting to define capacity in terms of standardized bundles of inputs.

DEA is being increasingly used to assess

technical, scale, and economic efficiency; capacity and optimum factor utilization rates; the private and social costs of undesirable outputs (e.g., juvenile bycatch); and optimum allocation of resources. DEA is a linear programming approach which yields solutions in terms of the optimum for each decision making unit (DMU) (Charnes et al. 1994).

Another approach is that of the stochastic frontier production function. The stochastic frontier production function permits statistical estimation of the maximum potential output given factors of production. By solving for the maximum potential output, an estimate of capacity output may be obtained. Unfortunately, the stochastic frontier is difficult to estimate in the case of multiple outputs. It also poses difficult problems for the actual estimation of capacity.

A fourth approach for estimating capacity is an econometric approach. With an econometric approach, a profit or cost function is specified and statistically estimated. Output levels corresponding to the maximum profit or tangency between the short and long-run average costs curves represent the capacity output.

In order to assess the potential influence of subsidies on capacity, empirical measures of capacity are necessary. These empirical measures may be obtained via several of the above mentioned approaches. For the purpose of assessing the possible ramifications of subsidies on capacity, it is recommended that an annual time series of capacity be estimated. These measures may then be examined relative to subsidy programs.

## ***Summary and Conclusions***

The concepts of capacity and capacity utilization are often difficult to define and even more difficult to measure. In general, these concepts are short-run in nature; but, in the case of fisheries, it is essential to consider the concepts relative to a long-run optimum level of production and input usage. Because of the special needs of fisheries, we recommend adopting the primal and economic definitions of capacity offered in this chapter: (1) the maximum potential output that can be produced given no limitations on the availability of the variable factors of production; (2) the output level corresponding to an underlying economic optimum (e.g., profit maximization or cost minimization). Adoption of the above definitions offers sufficient flexibility to develop practical measures of capacity and capacity utilization subject to most of the data typically available on fisheries.

Capacity utilization should be defined and measured two ways: (1) the ratio of observed output to capacity output; and (2) the ratio of technically efficient output to capacity output. The two ratios may be based on either the production orientation or the economic orientation of capacity output. The two measures allow an assessment of the potential reasons why vessels do not produce at full capacity (e.g., technical efficiency vs. resource constraints). The second definition also yields an unbiased measure of CU relative to the capacity level of production (Färe et al. 1989).

We also recommend that any empirical analysis of capacity and capacity utilization incorporate the fishing activities of recreational anglers. Although it may be extremely difficult to develop measures of capacity for the recreational sector, the catch of the recreational sector, nevertheless, needs to be considered

when developing measures of capacity for any fishery. Unfortunately, there does not appear to be an easy or acceptable approach for developing capacity measures for the recreational sector; we thus recommend that research is needed on the important issue of measuring capacity and capacity utilization in fisheries involving commercial and recreational components. The Task Force also recommends that: (1) public funding be allocated to improve statistics on recreational catch, effort, and expenditures by anglers; (2) implementation of educational programs to make anglers aware of fisheries regulations; (3) enhanced enforcement of recreational fishery regulations; and (4) promotion of methods that would reduce incidental fishing mortality.

Given the data typically available on U.S. fisheries, it is unlikely that the economic measure of capacity can be estimated for many fisheries. It is, therefore, likely that most initial assessments of capacity will have to be based

on the primal or production oriented definition of capacity.

Relative to empirical approaches for determining capacity, we offer that the empirical approach will be determined by the available data. The peak-to-peak and DEA approaches offer extremely useful approaches for assessing capacity and capacity utilization in fisheries when data are limited. The stochastic frontier is another approach for single species fisheries, or multiple species fisheries in which the catch of different species can be aggregated. We also conclude that measures of capacity will probably have to be developed from both an input and output orientation. Fishery managers desire measures of capacity in terms of standardized input bundles (e.g., a 100 ton, 125 foot, 1500 horsepower vessel has a capacity value of 1.25). This latter concern is critical for capacity reduction programs in which the intent of resource managers is to reduce the overall fishing capacity of a fleet.



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# Chapter IV: Concept of Subsidies

## Abstract

*This chapter serves two purposes: (a) it defines “subsidy” in a manner suitable for the work of the Task Force; and (b) it provides a taxonomy of types of subsidies which have, in the United States or elsewhere, been applied to marine fisheries.*

### *Definition of Subsidy:*

*Government action or inaction that modifies, by increasing or decreasing, the potential profits earned by the firm in the short, medium, or long-term.*

*Subsidies, then, are measured in terms of the changes in anticipated profits of the industry that result from government action or inaction, not in terms of the cost to the government. In fact, for an action to be a subsidy there need be no direct cost to the government. The cost to government of a subsidy is an interesting and computable variable, but is not central to the concept of “subsidy.”*

*Subsidies in and of themselves are value-free. Whether they are good or bad must be determined in the context of circumstances, in the context of the social goals which the government is attempting to implement. A fishery subsidy helpful in the wake of the Americanization program that followed passage of the Magnuson Act in 1976, for instance, may no longer be helpful in the context of the failure of certain commercial fisheries in the 1990s. A program that stimulated the building of new vessels twenty years ago might be out of date, but on the other hand might be seen as helpful if its focus were converted to stimulating the acquisition of new safety equipment, or gear that reduces bycatch.*

*Subsidies are either positive or negative. Government action may stimulate profits, perhaps through direct grants, or may serve to reduce profits, perhaps through regulation such as that which imposes the use of safety equipment or that imposes trip limits on fishing vessels. To emphasize the value-free nature of the subsidy itself, the negative subsidy that reduces profits by forcing firms to install safety equipment may be viewed as a “good” subsidy in that human safety is an overriding social goal. The trip limit regulation may be more complicated, in that there is a negative subsidy component in that firms cannot fish as much as their immediate business calculations tell them they should, but reduced catches may drive up market prices. Thus, government action might have both positive and negative subsidy components, the true subsidy being the net result.*

## ***The Concept of Subsidies***

The assignment given to the Task Force was to investigate the role of the federal government in subsidizing the expansion and contraction of the fishing capacity of fishing fleets managed under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), and in otherwise influencing aggregate capital investment in fisheries. This chapter deals with various concepts of subsidies, and considers which of those concepts are most relevant for the current study.

In everyday parlance, a subsidy is the granting of money to an individual or firm by the government.<sup>1</sup> Presumably the grant serves what is seen as a useful public purpose. For instance, were a government to desire to increase the nation's fishing capacity, the government might pay a "boat bounty," or subsidy, of a certain percentage of the cost of fishing vessels. By reducing the cost of the vessel, a purchase that might not otherwise have been profitable for the potential boat owner may become profitable and the purchase made. Dictionaries tend to restrict their definitions to subsidies of this type.<sup>2</sup>

Yet, the range of possible subsidies is much broader than this. A popular public finance textbook of fifty years ago ( Groves 1945, p. 331-334) considered a different kind of subsidy. Although automobile sales have never been directly subsidized in this country, roads have generally been built with government funds. In the absence of taxes, fees or tolls levied against road users, the road users receive a subsidy in that the owner of the vehicle does not pay the full cost of operating the vehicle. Individual states, as early as 1901, charged motor vehicle registration fees, and starting in 1919, individual states collected gasoline taxes. If these and similar fees and taxes, as well as

tolls, do not cover the full cost of building and maintaining the roads, Groves argued, the expenditure includes a subsidy component for the automobile manufacturing sector as well as the public in general.

The objective of this chapter is to establish an exhaustive categorization of subsidy types. First, the rationale for federal activity related to the provision of subsidies is presented. Then, attention is given to formulating a concise and operationally effective definition of a subsidy in the specific context of this Task Force's report. Finally, an exhaustive categorization of subsidy types, based upon the operational definition of a subsidy, is presented.

## ***Subsidies: Implemented for a Purpose - Not Necessarily Evil***

Any subsidy is introduced for a purpose. From different perspectives, the subsidy might be considered to be "good" or "bad." If the subsidy accomplishes a universally desired goal, then society would rate it "good." But there are always distributional effects associated with any subsidy, whereby some sectors of the economy are favored over others. An example, contained in a public sector economics textbook (Stiglitz 1986, p. 184-197), is the environmental problem of pollution abatement. Firms, such as steel producers, operate factories that pollute. Governments, increasingly concerned about the impact of pollution, have adopted a number of methods to control pollution, including the subsidization of firms which purchase and install the necessary pollution abatement equipment. While the policy achieves the socially desirable objective of reducing pollution, an argument could be made that, in addition to helping to clean the air, taxpayers are subsidizing the

private profits of the polluting industry; thereby resulting in a redistribution of income from the general taxpaying public to the steel industry. Such distributional effects can always be expected to generate controversy.<sup>3</sup>

Rather than categorizing different government programs as “good” or “bad” subsidies, subsequent chapters evaluate the effect of specific federal government programs on the fishing capacity of the American fishing fleet; and recommend whether subsidies currently in effect should be continued. Regardless of the current connotations of the word “subsidy,” each government program must be evaluated on its own merits. Since subsidies are always controversial, and the term appears pejorative, it must be emphasized that subsidies are not necessarily “evil.” Some subsidies can serve a useful social purpose, such as subsidies for furthering the preeminent social goal of improving human safety; while others may contribute only marginally or even detract from the stated or implied social goal.<sup>4</sup> Some subsidies, furthermore, which may originally have served a useful social purpose, may no longer contribute positively to the social goal and, in fact, may detract from it due to a change in structure of the fishing industry (e.g., from undercapitalized to overcapitalized), a change in the collective social goals, or some amalgam thereof.

If the goals of society can be ascertained, the individual “subsidy” can be evaluated in the context of whether it moves society closer to achieving its goals. The Task Force assumed that the relevant “goals of society” for federally managed fisheries are established by the Magnuson-Stevens Fishery Conservation and Management Act.

Some subsidies involve the allocation of government money directly to the immediate beneficiary of the subsidy, while others are

government programs that have a real or potential impact on firms without direct payments necessarily being made. The concern of this Task Force, in part, was to ascertain the effect of subsidies on fishing capacity and aggregate capital investments; and, on this basis, to then evaluate whether they are warranted. Direct government payments to the fishing industry for capital expenditures would clearly fall within the Task Force’s purview. It would be inadequate, however, to limit the inquiry to direct expenditures on fishing capital. To determine how broad a range of government roles to consider, the Task Force first established a working definition of subsidies.

### ***Subsidies, or Expenditures in the Public Trust***

There are alternative ways of looking at activities which we denote as subsidies. Since marine fish are “owned” by the public, i.e., are a public good, the state has a fiduciary responsibility, a public trust, to protect the resource. The costs of science and enforcement (and management as well) are necessary costs to the government in pursuing this public trust. To that extent, these are not subsidies.<sup>5</sup> However, carried to an extreme, it could be argued that there are no subsidies, only expenses in the public trust. The difference may constitute an important philosophical point, and certainly reflects strongly on one’s attitude towards government expenditures. The Task Force did not pursue this philosophical, and political, question further. It attempted to view subsidies in a functional sense. Whether or not the subsidies serve a “public trust” function is an important question but was not the focus of the Task Force’s inquiry.

## ***A Historical and Legal Note***

Subsidies of the sort conceptualized in the standard dictionary definition have a long, and not very controversial, history in the United States. During the late eighteenth century, when the Constitution was being framed, it was understood and accepted that individual states subsidized industries within their borders. However, taxes (which the Task Force would treat as a “negative” subsidy, see discussion below) that offered preference to in-state industries were problematic, given the obvious harmful effects of state tariffs during the Articles of Confederation period. The commerce clause of the Constitution was intended to abolish such tariffs, and the Supreme Court has ever since generally ruled that preferential taxes, and tax rebates which favor in-state business to the detriment of out-of-staters, are unconstitutional. On the other hand the Supreme Court has continually upheld the constitutionality of grants of money (subsidies in the dictionary sense) which favor in-state business over out-of state business (Coenen, 1998).

It is very difficult, more properly impossible, to differentiate between the economic effects of the constitutional and unconstitutional forms of subsidies. Both are either revenue enhancing or cost diminishing — profit increasing — and the anticipated response of a firm is identical. For a functional analysis, determining the effects of government policy on fishing capacity, both types of subsidies must be considered, so the legal framework is of little help in searching for a working definition of “subsidy.”

## ***Criteria for Defining Subsidies***

In determining a definition of “subsidy” which is useful for our purposes, it is helpful to review alternative criteria that could form the basis of the definition. Three criteria, 1) correction of market failures, 2) cost reduction, and 3) revenue enhancement, can be considered but are ultimately not helpful.

### **Correction of Market Failures**

One criterion which could potentially be used in defining a subsidy is based on the concept of market failures.<sup>6</sup> One could establish an ideal case, for instance perfect competition, as a basis for determining the degree to which government programs help to distort or correct the operation of the market. Problems with this criterion are twofold. First, there is the problem of establishing the perfectly competitive norm in the pervasive presence of market failures. Second, even if the competitive norm could be established, one must then also be able to isolate the specific distorting (or correcting) effects of government programs. A program, such as a lower-than-commercial interest rate loan program, might be undertaken by government to correct market failure caused, for instance, by incomplete information available in the private sector.<sup>7</sup> One might interpret such a loan program as a “good” subsidy, but it is difficult to see how it could be excluded from a general definition of “subsidy.” Who is to judge whether the higher commercial loan rate or the lower government rate more adequately reflects the rates that would exist in a “perfect” market?

There is yet another consideration to be taken into account. When there are a number of market imperfections, correcting a subset of

these imperfections will not necessarily move the system closer to the ideal; and may, in fact, make it worse. Thus, to continue with our example, correcting loan conditions, leaving all other imperfections intact, may actually move the system further away from the conditions of a perfect market.<sup>8</sup>

## Cost Reduction

A second criterion which could potentially be used in defining a subsidy is based on the concept of costs to the individual firm. Specifically, any government program which reduces the firm's costs, either implicitly or explicitly, serves to increase its profits. In the long-run, such a program would stimulate the use of additional inputs and, with some rare exceptions, output.

## Revenue Enhancement: Profits

A third criterion could be revenues. As with the second criterion, any government program (e.g., a price support program) that serves to increase revenues would stimulate profits and, again with some notable exceptions, output. Subsidies affecting either revenues or costs, or which modify market imperfections (and as a result affect revenues or costs), affect, at least potentially, the firm's profits. In evaluating a subsidy, therefore, a suitable all-encompassing framework is provided by looking at the potential effect of the government program on the profits of the firm. After all, the concern of the Task Force is the effect of government policy on private investment in capital equipment, and such investment is made in anticipation of future profits.

Profits are defined as revenues minus costs (however revenues and costs are themselves defined) and the effect of either cost reduction

or revenue enhancement would be to increase profits. Consider the hypothetical example of a firm which expects to take losses, but the government agrees to "subsidize" the firm by increasing the firm's revenues through government payments, to the extent that the result is precisely zero profit and zero loss at the end of each year. Can it be argued that the subsidy increases the firm's profits? The answer clearly is "yes." Rather than viewing profits as a positive number, consider profits as a numerical continuum ranging from very large negative numbers (losses), to smaller negative numbers, to zero, to positive numbers and to very large positive numbers. Anything that shifts profits, so defined, towards the larger positive numbers (even if the operative numbers are all negative or zero) increases profits. Thus the subsidy paid to this hypothetical firm does enhance profits.

## *A Tentative Definition of "Subsidy"*

Based on the previous discussion, a subsidy can tentatively be defined as any government program that potentially permits a firm to increase its profits beyond what they would have been in the absence of the government program. It should be noted that anything that increases the profits of a firm presumably increases government tax revenues and therefore decreases the net government financial outlay for the subsidy. To accurately compute the amounts of the net subsidies, therefore, it is necessary to take these counterbalancing taxes into account. This factor is of little concern at low marginal tax rates. As the marginal tax rate increases, however, the net government financial outlay will be reduced accordingly but would equal zero only in the extreme case where the marginal tax rate approached 100%. This

factor is not given further consideration in this chapter.

The definition of subsidy should also reference the explicit concern of the Task Force, the effects of government actions on the capacity of the fishing fleet. Profits are the result of economic activity by a firm. Assuming that the firm is functioning within an unchanging form of industrial organization (e.g., monopoly, monopolistic competition, perfect competition, etc.), and an event occurs which stimulates an anticipation of increased profits, there will be a tendency by the firm to further enhance its profits by increasing its level of economic activity, that is, by expanding its output. Once a decision is made to expand output, if the firm is operating at anything like full capacity,<sup>9</sup> the decision to expand output must be made in conjunction with the long-term decision to expand capacity. In the case of fisheries, capacity would be expanded by increasing the number or capacity of fishing vessels and fish processing plants.<sup>10</sup> Thus, a subsidy that potentially leads to an increase in profits, potentially leads as well to an increase in capacity.

### ***Subsidies Increase Profits with Respect to What?***

Looking at subsidies in terms of potential changes in profits, the question arises of “Changes with respect to what?” An obvious candidate from the perspective of an economist would be the situation that would exist under the theoretical considerations of perfect competition. The primary difficulty, referred to earlier, is that this is a theoretical construct that cannot exist in many cases, so it becomes an amorphous criterion that fails as an operational construct. Even when perfect competition could exist, information

requirements necessary to determine the norm are liable to be too great to permit the criterion to be used.

Rather than use conditions existing under a specific form of industrial organization, the Task Force considered an alternative approach roughly analogous to that of the economist’s concept of partial equilibrium analysis. That is, an interpretation of the effects of any program considered as a subsidy, must start with the existing situation, the government program is then invoked, and under the rather stringent assumption that no other “external” factors change, the potential change in pre-tax profits can be determined. Thus, at least conceptually, the effect of the subsidy can be determined.

### ***Subsidies Increase Profit over what Time Frame?***

In economic theory, the terms very short run, short run, long run and very long run are in common usage and are readily defined:

- very short run — the output is fixed
- short run — while some inputs (such as capital) are fixed, other inputs (such as labor) are allowed to vary so that output changes
- long run — all inputs (including capital) are allowed to change
- very long run — technology, as well as all inputs, changes.

Some fisheries subsidies might affect the short run and others the long run, but the long run creates additional complications. Take a program, such as the Fishery Vessel Assistance Act of Canada under which, from 1942 to 1986, the federal government paid the owner a bounty for every new fishing vessel built. As a result

of this bounty, the cost of vessels decreased, anticipated profits rose, with the result that more fishing vessels were built. Since vessels are capital, the usual time frame for the analysis is the long term. But that is not the end of the story. The standard economic theory of open-access fisheries states that as more vessels are added, the profits ultimately will be dissipated. Thus, the bounty leads to anticipated increased profits and an increase in fishing capacity but this increase in capacity ultimately leads to a reduction in profits. It will be helpful to distinguish between these two aspects of the long term. In the absence of a conventional expression in economic theory, the Task Force viewed the “impact” or intermediate effect the “medium” term and the ultimate effect the long term. In general, the Task Force focused on the medium term, on the immediate impact of a government action.

### ***Subsidies to Whom?***

While much of the discussion to this point has concentrated on subsidies in relation to the harvesting sector of the fishery, subsidies to other sectors/institutions are also worth considering. As one specific example, subsidies could be given to the processing/marketing sector of the fishing industry. The issue then becomes whether subsidies to this sector can impact capacity in the harvesting sector. The answer clearly is yes. Consider the situation whereby a given number of processors in a region each generate identical demand conditions for the raw fish input to be used in the production (i.e., processing) process. A subsidy to the processing sector would allow for the entry of otherwise unprofitable establishments as well as the possible expansion of existing facilities (assuming the price of the processed product does not respond significantly to increased production). This expansion, in turn, results

in an increase in the aggregate demand for the raw input and a “bidding up” of the price of the raw input. This “bidding up” process results in an increase in profits in the harvesting sector thereby encouraging the expansion of harvesting effort and capacity.

### ***The Effect on Fisheries of Subsidies to Other Industries***

In addition, the issue of whether subsidies given to sectors outside the fishing industry can influence capacity within the fishing industry is worthy of consideration. Assume, for concreteness, that subsidies are given to the agricultural sector. There are at least two ways in which capacity within the fishing sector could be affected. First, an “artificially” high level of agricultural product, to the extent that it competes with fishery products for the consumers limited food budget, reduces demand for fishery products, thereby negatively influencing capacity. Second, to the extent that agricultural runoff is positively related to input usage, degradation of the marine ecosystem may be in excess of what would occur in the absence of subsidies to the agricultural sector. This, too, would negatively influence capacity in the fishing sector. Other examples could undoubtedly be given which would culminate in a positive influence on fishing capacity.

### ***Additional Factors***

Many other factors enter into the consideration of how to characterize potential subsidies to fisheries.

## Can a Subsidy lead to a Dissipation of Profits?

Usually the computation of profits is made in a short-term context, although it need not be so. If subsidies lead to a rise in profits, there will generally be an increase in output and, in the long-term, an increase in capacity. The circle is thus closed and we are brought back to the primary focus of this Task Force, the evaluation of government programs that affect capacity. According to this argument, therefore, a government policy that initially increases fishermen's profits, but sets in train a sequence of events that leads to a dissipation of those new profits, is considered a subsidy. This apparent conundrum is perfectly consistent with the view often expressed about the world's commercial fisheries, that: "In the short-term, subsidies produce additional profits for the fisherman, attract more fishermen into the fishery, and raise total costs until [profits disappear]" (FAO Fisheries Department, 1992).

## Negative Subsidies

Although the concept of a negative subsidy runs counter to our usual way of thinking, it may be useful. Consistent with the Task Force's broad conceptual definition of subsidy, a negative subsidy is simply a government program that tends to reduce profits. With this understanding, when regulatory changes have the potential ability to decrease profits, as is usually the case, they could be treated as negative subsidies.

## Regulations and the Bureaucracy

Taking the analysis a step further, the concept of a subsidy might be applied to the

agencies given the responsibility of managing the fishery resources. Can this type of agency activity result in levels of harvesting capacity that are different than would be observed in the absence of agency behavior of this nature? The answer is clearly yes. For example, regulation results in higher costs to the boat than would otherwise be the case. As a second example, the harvesting sector may "voluntarily" impose costs upon itself through, say, self-funded observer programs, in an effort to prevent enactment of additional regulation. To the extent that costs, and anticipated profits, are influenced, capacity will likewise be influenced.

## Global Changes

Global changes, such as changes in monetary policies by the Federal Reserve System or general changes in tax rates affect profits in fisheries as well as in all other industries. As such, government activities resulting in these changes constitute subsidies, according to the Task Force's broad definition. We will not consider these subsidies in the sequel, with the exception of the Investment Tax Credit (see p. 43, below).

## Government-Funded Buyback Programs

Is the payment a government makes to a vessel owner to reduce capacity (as part of a buyback program) a subsidy? To clarify the argument, let us assume that the payment is to retire the vessel and gear, as well as any licences owned by the vessel owner. The vessel owner therefore is being paid to leave the industry. A direct payment, or subsidy, is being made to the individual vessel owner. Assuming that the remainder of the fishing fleet is not expanded

to compensate for the reduction in capacity that results from this payment, the subsidy serves to reduce fishing capacity. This is not directly a subsidy to the fishing fleet, if the fleet is defined as that which remains after the buyback occurs. It does, however, potentially affect profits since the productivity of the remaining vessels increases. Production of a given volume of fish would be cheaper as a result of the buyback payment. Had the government not intervened, profits, at least in the short-term, would have been lower. Buyback programs therefore are subsidies according to our definition. This subsidy affects fishing capacity, but negatively. Given the current perspective that most commercial fisheries are overcapitalized, buyback programs would generally be considered as socially desirable subsidies.<sup>11</sup> Here the need for the evaluation of subsidies in the context of the social perspective of the times becomes clear. In the context of a perceived undercapitalization of the fisheries that existed in the 1950s, and that existed with the Americanization program that followed the passage of the Magnuson Act in 1976, subsidies that served to increase fisheries capital would be viewed favorably. Now that the situation has been reversed, and fisheries are perceived to be overcapitalized, these subsidies are out of favor and subsidies that reverse the previous direction are favored.

### Can Lack of a Government Program Constitute a Subsidy?

Referring to the steel mill example cited earlier, would the lack of a government program to prevent pollution constitute a subsidy?<sup>12</sup> In general, government action is required for there to be a subsidy. The exception (see #14, p. 39) is a situation where one government takes no action while other governments in similar and competitive

situations take action, for instance by charging the costs of certain government operations to private firms.

### POLICIES GOVERNING ACCESS TO FISHERIES

Consider the extreme situation of a government which changes its fundamental fisheries policy from one of completely free access to one of individual transferable quotas (ITQs), where the quotas are both permanent and set in terms of a percentage of the total allowable catch. Assume, as is usually the case, that the initial ITQs are assigned on the basis of historical catch experience and without substantial charge. The government has essentially converted a public good, the fish in the sea, to private capital. Increasing a firm's capital, free of charge, is surely a subsidy. The firm is willing to participate in this operation in anticipation of increasing its profits. In addition to the long-run effects of limiting the access to the fishery of competitors, as in the case of buybacks discussed above, the recipient of an ITQ might immediately (or later) sell it, the receipts of which are a capital gain, a form of revenue and a component of profit. Such resource grants from the government can be made in less dramatic ways than the granting of permanent ITQs, such as through limiting access or establishing community quotas. In all cases, they comprise a form of subsidy.

### DELAYED EFFECTS

In some instances, the United States government is transferring ownership of decommissioned naval facilities to aboriginal peoples (Guam, Adak). If these people use the facilities for commercial fisheries, then the transfer may be a subsidy to the fishing industry. Alternatively, if the decommissioned facilities are being traded to the native groups

in exchange for the relinquishing of land or other claims, then the transfer is not a subsidy if it constitutes a fair exchange. Were the aboriginal people later to sell the facilities, or lease them, to fishing interests at less than market prices, then there is a subsidy to the fishing industry. An additional subsidy could arise when the government sinks vessels to provide habitat for marine fish. The Task Force concluded that these types of government roles were too remote to consider further.

### The World Trade Organization's Definition

The World Trade Organization (WTO) deems a subsidy to exist if a government directly transfers funds to a company by means of grants, loans or equity infusions, or "potentially" transfers such funds by guaranteeing loans, or foregoes revenues by allowing tax credits or waivers, or provides goods or services (other than infrastructure), or offers income or price supports. However, exempting exported products from taxes (*e.g.* various forms of value added taxes) that are applied to domestic consumption, is a form of tax waiver not considered subsidies. In addition, there is a specificity requirement that a subsidy must not be general, but must apply only to "an enterprise or industry or group of enterprises or industries" (GATT, 1994). This definition conceives only of positive subsidies specifically oriented to a single industry or group of industries, excludes infrastructure payments, and excludes programs that may have a more indirect effect on revenues, costs, or profits.

The WTO, following on its predecessor organization, the GATT, is concerned with distortions in world trade that act adversely against national trading partners. Subsidies on

products that are not traded internationally are not actionable under the international conventions. Actions against nations which are engaged in trade distorting subsidies are only taken if a trading partner believes it is being disadvantaged by the subsidy. The WTO definition is oriented expressly towards world trade considerations.<sup>13</sup> Further, it must be recalled that the WTO definition is operational in the sense that it specifies prohibited actions against which nations can take remedial action. The Task Force was concerned with subsidies as they might affect fish catching capacity in the United States. These concerns differ from those of the WTO, and in fact are much broader. Thus, the Task Force's definition of subsidies must differ as well.

### *Definition of "Subsidy"*

In consideration of these factors, the Task Force adopted the following general definition of "subsidy":

Government action or inaction that modifies, by increasing or decreasing, the potential profits earned by the firm in the short-, medium-, or long-term.

Subsidies, then, should be measured in terms of expected changes in the profits of the industry that result from government action (or inaction), not in terms of the cost to the government. In fact, for an action to be a subsidy there need be no direct cost to the government. The cost to government of a subsidy is an interesting and computable variable, but is not central to the concept of "subsidy."<sup>14</sup>

## ***Taxonomy of Fisheries Subsidies***

The following classification system is intended to provide a general framework for the Task Force to evaluate subsidy programs.

### **Direct Government Payments Related to Fisheries**

1. Direct expenditures of the government to the fishing industry which lower costs and therefore potentially increase the industry's profits are subsidies. Such programs involving direct payments to fishing entities have been exceedingly rare in the United States. One example resulted from federal legislation in 1960 which paid the difference between vessel construction costs in the United States and lower costs abroad, up to one-third of the total cost of the vessel. Under this program, the federal government financed 50% of the \$6 million cost of each of the Seafreeze Atlantic and Seafreeze Pacific (Dewar 1983).

2. Direct payments can take many forms and be made for many purposes. Of \$25,000,000 allocated for vessel buybacks in New England in August, 1996 (the Fishing Capacity Reduction Initiative), \$2,000,000 was redirected as a direct grant for the Fishing Partnership Health Plan program which was established to help low income uninsured fishing families pay for health insurance. Federally funded buyback programs also fall into this category of direct payment subsidies.

3. Gear conflict compensation programs that pay fishermen for gear losses due to foreign or U.S. fishing operations, or the oil industry are subsidies. Government regulation permits offshore oil and gas operations which may be deleterious to the fishery. In compensation, the

federal government mandates an industry "tax" to compensate fishermen for future disruption to the fishing industry that results from the oil and gas operations. This is a case where government has a clear role to play in mitigating externalities across different business sectors. Full compensation to fishermen for losses caused solely by government policies yields no net subsidy. Yet the analysis is clarified by using the negative/positive subsidy approach.

4. A subsidy arises when the United States government pays foreign governments to permit United States vessels to fish in their waters. This arrangement began in pre-Magnuson Act days when the federal government "insured" U.S. distant water fishermen against seizures by South American governments for fishing in extended zones not recognized by the United States at that time. It continues today in the form of the South Pacific Tuna Treaty. Today, under the South Pacific Tuna Treaty, the United States provides the bulk of payments to sixteen nations of the South Pacific for access to the very large fishing area covered by the treaty for up to fifty-five U.S. tuna vessels. These payments amount to approximately \$18 million annually.

5. Under the Fishermen's Protective Act, another subsidy was paid to United States vessels fishing in foreign waters. Until 1992, the United States did not recognize the jurisdiction of coastal nations to conserve and manage highly migratory species of tuna within their exclusive economic zones. U.S. vessels that were arrested and subjected to fines, penalties, forfeitures and other sanctions for fishing in these areas were reimbursed under this law for the cost of such sanctions. In addition, the Department of State provided diplomatic assistance to fishermen in these difficulties; and the Act provided compensation for lost profits to fishermen during periods of

arrest, incarceration, and detainment.

6. Infrastructure expenditures directly relating to fisheries, such as fishing port facilities, fish unloading facilities, or fishing vessel haulout or maintenance facilities are subsidies. Similarly, construction or maintenance by government of jetties for use by fishermen or grants for fish processing or fish landing facilities are also subsidies in the Task Force's framework.

7. Unemployment insurance paid to fishermen would constitute a subsidy. Profits would be enhanced by reducing the cost of labor to employers since the "fishing income" of employees is not only the income earned from fishing but is the sum of earned income and net unemployment insurance compensation. Fishing operators need pay crew less than they would have to in the absence of unemployment insurance. However, state unemployment insurance programs that cover fishermen, if benefits exceed premiums when averaged over all fishermen, would constitute a subsidy.

8. Direct government infusions of equity capital into fisheries companies, except when the government makes a portfolio investment on identical terms available to private individuals in the market are subsidies. However, this does not occur in the United States, with the possible exception of the creation and allocation of indirect transferable fishing rights.

### Government Fishery Loans, Loan Guarantees, and Insurance

9. In 1960, the Bureau of Commercial Fisheries of the federal government, under the Fish and Wildlife Act of 1956, established the

Fishing Vessel Mortgage Insurance Program to provide mortgage insurance for the building or refitting of fishing vessels (Dewar, p. 68). However, this program has evolved into the next one discussed.

10. Loans made to the fishing industry to finance the replacement and operation of fishing vessels, either directly by the government or indirectly under government guarantee, at less than market rates of interest, or on terms, such as amortization periods, that are more advantageous to the firm than those otherwise available are subsidies as the Task Force viewed them. The direct loan program originated under the Fish and Wildlife Act and subsequently evolved into the Fisheries Obligation Guarantee program and ultimately into the current Fishery Finance Program. The philosophy underlying this program assumes that the commercial market overestimates the risk associated with fishing and the government is correcting the market failure. This program is discussed in greater depth in Chapter VII.

11. Recently (Pacific Fishing 1998; and NOAA 1998) the National Marine Fisheries Service announced loans at 2% above the Treasury lending rate to crew members of small fishing vessels for up to 80% of the purchase price of Individual Fishing Quotas in the Halibut and Sablefish fisheries with a twenty year amortization period. Loans can also be provided for disaster relief as in the case of Louisiana, where the Farmers' Home Administration has, in the past, made loans to the oyster industry (for the refurbishing of leases, etc.) after hurricane damage. Finally, loans may be made to finance industry-wide buyback programs. It is most unlikely that commercial banks would participate in funding industry-wide buyback programs since individual enterprises, per se, are not responsible for repayment.

12. Under the American Fisheries Act of 1998, \$75 million in loan funds were made available for vessel buyouts in the Bering Sea and Aleutian Islands Alaska pollock fishery. The loans will be repaid over an extended period through a fee of 6/10ths of one cent per pound of Alaska pollock caught in this region. An additional \$20M will be a direct government charge to this buyback program. An interesting cross-subsidy is built into this buyback program in that the vessels to be bought out are specified in the Act, as are those that are to remain in the fishery. The federal government is essentially declaring that there shall be a buyout program, that the government will pay part of the buyout amount, but that 80% of the amount paid to the specified vessels being withdrawn will be made in the form of a loan to the specified surviving vessels, to be repaid over an extended period. The vessels bought out are presumably receiving a positive subsidy (the difference between the income earned on the cash buyout and the profits that would have been earned were the vessels to remain in the fishery) while the surviving vessels are presumably subject to a negative subsidy (the annual cost of repaying the loan). The negative subsidy, however, is at least partially offset by the positive subsidy implicit in the increased catches that the surviving vessels are expected to harvest as a result of reduced pressure on the fish stock.

### Implicit Payments to, or Charges against, the Fisheries Industry

13. Where there are government supported marketing efforts with the costs not charged back to the fishing industry, there would be a positive subsidy. Where costs are charged back, the net subsidy is the sum of a positive subsidy (government expenditure on marketing) and a negative subsidy (the charge-back). This type of computation is relevant,

for example, in determining the net subsidy under the arrangement whereby the Alaska Seafood Marketing Institute, a state agency, advertises Alaskan seafood products, financed by a 3/10ths of 1% tax on the value of marine fish landed in the state. Domestic market promotion efforts for fishery products funded by the federal government, e.g. under the Saltonstall-Kennedy Act, would be a subsidy under this analysis. In the mid-1980s, federal legislation was passed establishing the National Seafood Promotion Council, for a limited period of time, with the mandate to determine whether the industry was interested in the establishment of self-funded regional or industry-component seafood promotion agencies. In 1989-90, a seafood advertising campaign was carried out under this program. Most such programs existing today, such as the Louisiana Fish Products Promotion Board, are financed by states or by the industry rather than by the federal government. Activities under the Saltonstall-Kennedy Act will be further discussed in Chapter X. These also include programs such as the U.S. Department of Agriculture Surplus Commodity Program, and the P.L. 480 program to provide food to deserving nations.

14. Programs to enhance fish stocks through hatcheries or improvements in fish habitat are subsidies. By improving the availability of fishery resources, these programs reduce costs and thus contribute to increased profits. This topic will be discussed further in Chapter V.

15. Government expenditures in support of the fishery, other than direct payments to the fishery, or loans or loan guarantees, which could be, or in other jurisdictions are, recovered from the fishing industry are subsidies. The costs of enforcement and monitoring of fishery regulations in this country are generally paid for by the

government, but this is changing. To cite a single example, the Alaska groundfish fleets engage government mandated on-board observers paid for by the industry. Search and rescue operations by the Coast Guard or similar agencies in other countries historically did not charge for their services. This, too, is changing. In an international commodity market, the fact that government does not pass costs along to an industry, when such costs are passed along in other, competing, jurisdictions, gives the industry a price, and therefore profit, advantage. Such a government expenditure amounts to a subsidy. Science expenditures, for instance those for stock assessments, can be similarly treated, but whether they would fall under our rubric of “subsidy” depends upon whether other countries which compete with our fisheries industry pass the science costs along to the industry, and how much of the cost is considered a legitimate expense of the federal government as a public trustee. It is likely that as charges are more generally made for formerly government funded enforcement programs (as they are now in Canada and Iceland) and stock assessment programs (as they are now in New Zealand), these subsidies will become serious international political issues. Similarly, other ocean science programs and research and development programs in such areas as gear development and exploratory fisheries which may or may not involve technology transfer, also reduce costs and increase potential profits for the fishing industry. As such, they must be viewed as subsidies.

16. Costs imposed by government regulation or legislation are considered here as being profit-reducing costs of compliance and therefore as negative subsidies. Examples are costs imposed by the Clean Air Act, bycatch reduction devices (BRDs), marine mammal protection, endangered species and seabirds, and bilge water dumping and other

environmental legislation.<sup>15</sup> One interpretation of buybacks is that they are payments to fishermen severely affected by conservation regulations.<sup>16</sup> With this interpretation, the regulations are seen to impose a negative subsidy that is at least partially counteracted by the positive subsidy of the buyback. Buybacks are discussed in greater detail in Chapter VIII.

17. Government technology transfer programs are positive subsidies in that they reduce the cost of introducing new gear. Sea Grant programs have acted this way with respect to the development of techniques for catching previously underutilized species. Similarly, Sea Grant programs have developed safety equipment. Such a government program has interesting subsidy connotations. To the extent that the government develops the equipment and passes the technology free of charge to the industry, there clearly is a positive subsidy. If however, the technology transfer is accompanied by a regulation that requires the new equipment to be used, and there is only partial or no subsidization of the cost of the new equipment, then profits are lowered because of the regulation and the net subsidy might be negative. It is best to think of this situation as the sum of two subsidies, one arising from the technology transfer and the other resulting from the regulation.

18. The Overseas Private Investment Corporation (OPIC) is a United States government-owned, profit making corporation, which guarantees loans to U.S. firms making investments in high-risk foreign countries. OPIC funding has been used to transfer fishing capacity from the United States to foreign countries (e.g., to Russia). As long as foreign fleets are not permitted to fish in U.S. waters, the effect of the guaranteed loan is benign; U.S. fishing capacity is reduced.

## Price Support Programs Affecting Fisheries

19. Price support programs that affect fisheries through explicit government mandates that raise prices to consumers, for instance, through officially sanctioned marketing boards or through structures that support minimum prices are subsidies. In addition, allowable fishing harvests might, theoretically, be kept low, not primarily for the protection of the species, but as a device for raising prices. Segments of the surf clam industry have been known to make such requests of the Mid-Atlantic Fisheries Management Council for consideration in setting quotas.

20. The imposition of tariffs is a traditional method of profit enhancement which raises the domestic price of competing foreign products and therefore allows domestic producers to charge higher prices. Except for certain tuna products, there remain few significant United States tariffs on fish products.

21. Embargoes work as tariffs to keep prices charged by domestic producers high. With embargoes, unlike tariffs, prices of foreign goods are not artificially inflated, the foreign goods are simply banned altogether. The United States bans all imports from certain countries, such as Libya (which probably has little effect on the fishing industry) but, more significantly for our purposes, applies sanctions against environmental violators — such as countries that permit tuna catches with dolphin bycatch or shrimp catches without suitable turtle excluder devices. However, the United States recently lost a case at the WTO that challenged the validity of this type of measure.

## General Programs which Affect Fisheries

22. Dredging and construction projects of the U.S. Army Corps of Engineers may affect the profits of the fishing industry and therefore are subsidies to the fishery. This topic will be discussed in Chapter V.

23. The Jones Act and the Nicholson Act provide that United States fishing vessels must be constructed in the United States, that foreign vessels may not carry cargo between U.S. ports, and that foreign vessels are prohibited from landing their high seas catches in the United States. The first two of these restrictions are negative subsidies to the fishing industry in that, unless otherwise compensated, U.S. fishermen must pay more for their vessels and for shipping. The third of these restrictions is a positive subsidy to the U.S. fisheries since prices are kept artificially high.

24. Infrastructure expenditures that are not targeted to fisheries but which provide an advantage to the fishery, e.g. port facilities, are subsidies.

25. Payments have been provided for disaster relief to compensate fishermen for hurricane losses and for stock depletion. Under programs sponsored by the Small Business Administration or the Economic Development Administration, for instance, low interest loans, technical assistance grants, retraining programs and buyback programs were funded for disaster relief. While these payments are directed specifically to the fishing industry, the overall programs under which they were established were not specifically geared to the fishery. Disaster relief may comprise a positive subsidy in one of two ways, one encouraging increases, and the other decreases, in capacity. If disaster relief aid is used to replace gear, quality

changes will result in increased catching capacity. If disaster relief aid is used to aid in someone abandoning the geographical area and the fishery, then the pressure is towards less fishing capacity. A third way in which disaster relief could constitute a subsidy to the fishery is by creating an atmosphere where insufficient private insurance is carried, and thus the costs of fishing are reduced. The topic of disaster relief will be discussed further in Chapter X.

26. Aid from the Small Business Administration, the Economic Development Administration, Farm Credit Administration, and similar agencies can be interpreted as providing subsidies to fisheries even though they treat the fishery precisely as they treat other industries. Such programs give a price (and profit) advantage to the American fishery with respect to foreign fisheries but they do not specifically target fisheries. Under World Trade Organization (WTO) rules, cited earlier, a general program not specifically targeted at the fishery would not be a subsidy to the fishery for purposes of setting countervailing duties even if the fishery were, incidentally, given an advantage by the program. Under our definition, they would be considered subsidies. Aid provided by these agencies is discussed in further detail in Chapter X.

27. When the government subsidizes activities of non-fishing industries, the effects may negatively (or occasionally positively) affect the profitability of fishing firms and thereby comprise a negative (or positive) subsidy to the fishery. The federal government is currently heavily involved in attempts to offset lost and degraded habitat in rivers that are home to such anadromous species as Pacific salmon. In turn, federally funded hydroelectric dams and economic development on federal lands have tended to degrade estuarine habitat and coastal wetlands that provide early life habitat for fish; and the federal government is

involved in attempts to mitigate those damages. These issues are discussed at greater length in Chapter V.

28. Government financed marketing promotion efforts which incidentally, but not exclusively, help the fish products industry are subsidies to the fishery. Examples would be international marketing efforts to encourage consumption of American food or agricultural products. The United States Department of Agriculture Surplus Commodity Program was extended in 1985 to enable fishery products (in particular, initially it was used for pink salmon and later, in 1970, for tuna and Alaska pollock) to be included as products utilized in federally funded school lunch programs. Marketing and promotion efforts will be addressed further in Chapter X.

29. The Wallop-Breaux program applies a tax to recreational fishing gear and distributes the tax to a wide variety of purposes, including inter alia to state fish and wildlife agencies for the restoration and expansion of recreational fishing facilities (e.g., boating access). Although the program involves no net cost to the federal government, by improving recreational facilities and fisheries habitat, the program makes recreational fishing more attractive and therefore leads to an expansion of the recreational fishery. As a result, the anticipated profits of recreational equipment suppliers and charter boat owners increase. Therefore, the program provides a positive subsidy to the recreational fishing sector. The program has other implications as well. To the extent that recreational fisheries compete with commercial fisheries, the Wallop-Breaux program imposes a negative subsidy on the affected commercial fisheries. Symbiotically attached to Wallop-Breaux is the Sport Fishing and Boating Partnership Council which, funded by the U.S. Fish and Wildlife Service, promotes recreational fishing. This positive subsidy to

the recreational fishing sector, if successful, increases fishing gear sales which in turn increases Wallop-Breaux funds. The negative subsidy to competing commercial fisheries is thus magnified.

## Tax Policies

### TAX WAIVERS

30. Fuel tax rebates to the fishing industry if fuel tax revenues from non-fishery related activities accrue to general government revenues would be subsidies. If such taxes do not accrue to general revenue but are assigned to specific purposes such as road building, road maintenance, or road bond payments, then the rebate is not an indirect subsidy to the fishery since the fishing industry is simply not paying a tax that is specifically applied to pay for facilities that are not used by fishermen. Miscellaneous exemptions, such as sales tax exemptions for full time fishermen which exist in some states, such as Louisiana, are subsidies.

### DEFERRED TAXES

31. Programs such as the Capital Construction Fund which permit fishing vessel owners to defer income taxes by placing the tax due in interest earning accounts are subsidies. The amounts in these funds can only be used for selective purposes such as to build or rebuild a fishing vessel. This program will be discussed in detail in Chapter VI.

### TAX CREDITS

32. General investment tax credits, as existed from 1962 to 1986, may be considered as subsidies since they affect profits and fisheries capitalization even though they were not targeted specifically to the fishery. These are discussed in Chapter VI. The Investment Tax Credit acted as a catalyst that made other programs, such as the Fisheries Vessel Obligation Guarantee (see Chapter VII), even more profitable, and therefore appealing, to the fishing industry than they would otherwise have been.

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## Endnotes:

1 Firms can also cross-subsidize operations. For instance, a vertically integrated fishing-processing firm might use processing sector profits to finance harvesting losses. Such subsidies are independent of government actions, and are therefore not considered further in this report. However, the federal government, as in the case of recently-passed legislation designed to reduce capacity in the North Pacific, might mandate cross-subsidies among firms within a sector of the fishing industry. One aspect of that legislation mandates a tax on certain firms to finance buyouts of others. This aspect of cross-subsidization is discussed later in this report, in Chapter VIII, and in Appendix B (see the North Pacific and Alaska regional perspectives).

2 For instance, Webster's dictionary (1963, p. 876) defines subsidy as "a grant by a government to a private person or company to assist an enterprise deemed advantageous to the public."

3 The complexity of these issues is illustrated by the possibility that subsidies which reduce the costs of firms in the pollution generating industry may actually result in increased pollution levels due to expansion of existing firms and entry of new firms that result from the lower costs and therefore greater profits in the industry.

4 Those that contribute only marginally may still be considered beneficial if the costs entailed are small. Those that detract from the social goals would rarely be considered beneficial, even in the absence of any direct government expenditures.

5 To help clarify this point, the government would clearly have an interest in supporting scientific endeavors that help carry out its public trust responsibilities.

6 Panayotou (1993) defines market failures as institutional failures attributable partially to the nature of certain

resources and partially the failure of the government to (a) establish the fundamental conditions for markets to function efficiently (such as property rights and the enforcement of contracts) and (b) use the instruments at its disposal (such as taxation, regulation, public investment, and macroeconomic policy) to bring costs and benefits that the institutional framework fails to internalize into the domain of markets.

7 Dewar (1983, p. 67) notes that the Fish and Wildlife Act of 1956 authorized loans for replacement, repair and operation of fishing vessels when vessel owners could not obtain commercial loans. Congress, acting on the belief that fisheries were undercapitalized, authorized loans to vessel owners at unsubsidized market interest rates but with beneficial repayment terms. Dewar concludes that Congress believed that banks were overestimating the risks of loans to vessel owners. In passing, however, it might be noted that if the conclusion by Congress was erroneous (i.e., the banks' interest rate and repayment schedule did accurately reflect the risks involved in fishing operations), then government intervention would increase, not correct, market distortions.

8 As noted by Panayotou, government policies introduced for the purpose of correcting a market failure often tend to introduce additional distortions in the market for natural resources. As such, a market failure, by itself, is not a sufficient condition for government intervention. Specifically, government intervention is warranted only if (a) the intervention outperforms the market or improves on its performance and (b) benefits of intervention exceed costs, including indirect and unintended costs of distortions introduced via intervention in a given market.

9 The firm's definition of capacity is flexible. A fishermen or fishing firm may consider full employment of a vessel as occurring when the vessel is used at only 50% of its physical potential capacity.

10 Excess plant capacity can, in turn, lead to changes in harvesting capacity and pressure on fish stocks as owners attempt to utilize their capital and as workers seek employment.

11 It is worth noting, however, that in the absence of policy restricting what may be done with the income received by a fisherman participating in the buyback program, he/she may simply use the income to purchase the necessary equipment to enter an alternative fishery. Thus, buyback programs that are limited to a specific fishery may result in the expansion of capacity in those fisheries not included in the buyback program.

12 All resources, to the extent that they are scarce, are valued by society. Some may therefore consider the steel mill, to the extent that it is using scarce resources but not being charged "fully" for their use, as receiving a subsidy. Analogous to this, fish stocks in the sea may be considered as assets owned by society. To the extent that users of the fish stocks are not being charged for the use of these assets, some may argue that a subsidy is implicitly being given by society at large to the direct users of the resource. While the Task Force recognizes the relevance of this argument, it realizes that the argument is predicated on the structure of property rights which is largely outside the scope of this report.

13 See, for instance, the discussion in Schanz et al. (1986). Schanz avoids defining the word "subsidy" but he views subsidies as government actions that permit firms to avoid "paying the full, immediate cost of producing" its product, an interpretation which implicitly focuses on the ability of the producer to trade in the world market place at lower prices than would otherwise be possible.

14 The focus of this chapter has been on the concept of subsidies with respect to the commercial fishing sector. The definition presented here can be expanded, without loss of meaning, to also include the recreational component of the fishing industry. Specifically, income is earned for the purpose of purchasing goods and services that provide satisfaction. This suggests that any government action (or inaction) that results in an increase (or decrease) in satisfaction can be construed as a subsidy. Hence, government action (or inaction) that results in a potential change in satisfaction derived from fishing activity (either commercial or recreational) is considered a subsidy.

15 The Task Force also noted that fishery conservation and management programs greatly influence the circumstances under which fishermen and others make decisions whether to invest in fisheries. This topic was not dealt with extensively by the Task Force. (See box p. 7 )

16 See press release from the office of Senator J. F. Kerry of Massachusetts, October 23, 1996.