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Challenges Faced by the U.S. Fishery Policy in Overcoming Overfishing in Federally Managed Waters: Shifting from Traditional to Responsible Fishery Management for Sustainable Seafood

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INTRODUCTION

The total amount of seafood consumption in the United States has been steadily increasing and is second only to Japan and China.[1] Seafood consumption in the United States as well as the rest of the world is expected to increase further with growing awareness of its health benefits.[2] The Food and Agriculture Organization of the United Nations (FAO) estimates that the continuing global demand for seafood will exceed supply in the future and that marine-capture fisheries will be unable to meet this demand.[3] Fish is an important source of animal protein. However, the increasing demand for natural resources such as fish can lead to their degradation; moreover, waste from the exploitation of natural resources will increase if not managed sustainably. In other words, renewable natural resources like fish can be naturally replenished, thus ensuring an indefinite stream of benefits only if managed properly. The most important question is how can we continue to meet the growing demand for

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seafood in a way that is sustainable in the long run. Therefore, when considering a sustainable supply of seafood as a source of food, the importance of "fishery management" cannot be overemphasized.

Overfishing has become a global concern: it could result in the depletion of fish stocks,[4] thereby threatening future seafood consumption as well as the economies of nations and communities dependent on sustainable fishing. It is well known that over 90 percent of the world's marine fish catch comes from the 200 miles of coastline, because of higher productivity in the coastal areas. It follows, therefore, that these areas face the maximum problems related to fishery management. Like many coastal countries, the United States has been confronted with the commercial challenge of depletion of fish stocks and low profitability.[5] In a congressionally mandated report, the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) acknowledged the excess harvesting capacity of one-third to one-half of the assessed federally managed fisheries;[6] this excess harvesting is likely to result in poor economic profitability.[7]

The primary legal authority for fishery management in the federally managed waters of the United States (from 3 miles to 200 miles) is the Magnuson-Stevens Fishery Conservation and Management Act (MSA), Public Law 109–479. The MSA establishes a regional council-management system for regulating fisheries. When the council shortened the annual fishing season, fishermen responded by increasing their fleet size and began using engines that are more powerful. This triggered further cuts in the duration of the season, prompting the fishermen to place more hooks, lines, and nets, which, in turn, led to more reductions in the length of the season. In some fisheries, such as that of the Alaskan halibut, the annual commercial fishing season has been reduced from forty-seven days to only two or three days.[8] These reductions have resulted in a kind of "race for fish," compelling fishermen to go out in bad weather for fear of losing their catch to competitors. Further, this has had a negative effect on the fish population since most fishermen exceed their catch limits. Moreover, all the fishermen deliver their catch at the docks simultaneously, and this temporary glut of fish depresses prices. In addition, much of the catch is frozen, thereby reducing the year-round availability of fresh fish and adversely affecting quality and income. Finally, fishermen often return home to long months of unemployment after the short fishing season. This "tragedy of the commons" encourages dangerous, economically wasteful, and environmentally damaging fishing activities.

A key feature of a renewable resource like fish is that its stock can be both increased and decreased. Nevertheless, no renewable resource can regenerate to levels higher than what the ecosystem can handle. It should be noted that if the harvest is always limited to less than or equal to the sustainable yield, the resource stocks will not deplete. However, in the case of weak or absent fishing-related property rights, "derby fishing" or the race for fish continues until the break-even point or until no more profit can be made. This often results in overfishing, which eventually leads to the depletion of fish stocks. Therefore, it is highly unlikely that a fishery adopting a laissez-faire approach will benefit society.

The aim of U.S. fishery management is similar to that of rights-based management (RBM) in U.S. fisheries, in that it aims at the optimum use of fishery resources and economic efficiency. Over the last three decades, councils have been established in the United States to address the trend of overfishing, improve the economic performance of fisheries, and strengthen the conservation of species. The federal government has been inclined to employ some exclusive quota forms of RBM, for example, access limitation programs, including the individual (transferable) fishing quota (IFQ). However, the introduction of certain IFQ programs has had a negative impact on fishing activities, for example, the elimination of vessels and reduction in crews. Therefore, an amendment to the MSA, better known as the Sustainable Fisheries Act, Public Law 104–297, established a moratorium on all the new IFQ programs and shifted the progress toward fishing reforms until the moratorium was lifted in 2002. The IFQ expanded over the years, and in the 2006 reauthorization of MSA, it was referred to as a limited access privilege program (LAPP).[9]

This article aims to clarify U.S. fishery-management policy and explore the evolution of RBM with respect to U.S. fisheries for addressing the trend of overfishing. In other words, the article attempts to show that responsible fishery management is needed to ensure the sustainable supply of seafood. Further, the article attempts to explain (1) why the U.S. government introduced and implemented a moratorium on the IFQ programs, and (2) how the U.S. government lifted and expanded these programs.

The remainder of this paper is divided as follows. Section I explores the concepts, theory, and characteristics related to RBM in fisheries. Moreover, this section prepares the framework for analyzing the potential and actual effects of RBM in U.S. fisheries. Section II identifies the manner in which RBM has been implemented in the United

States. It applies the analytical framework developed in section I to describe the characteristics and assess the effectiveness of some of the programs, including license/vessels limitation and exclusive quotas, such as IFQ programs, community development quota (CDQ) programs, and fishing cooperatives. Given the overcapacity problem that emerged in the 1990s, at both the national and international levels, section III discusses the implications of this for the U.S. fisheries that led to the expansion of the IFQ programs and their evolution into LAPPs. In order to determine the most suitable management tool for addressing overcapacity, I conducted a comparative analysis, from both economic and environmental perspectives, among LAPPs, traditional management methods, and decommissions schemes. Further, this section identifies the special features of the LAPP, referring to a brief comparative analysis between LAPP and Japanese community-based resource management (JCBRM). Finally, the article provides concluding remarks, policy implications, and a discussion of the scope for future study.

I. PROPERTY RIGHTS IN FISHERIES

A. Concepts of "Property Rights in Fisheries"

It is widely recognized that the primary cause of overfishing is the lack of property rights. In fact, this was the main theme of Garrett Hardin's seminal article "The Tragedy of the Commons."[10] Since no one can own a fish until it is caught and placed in a boat, there are no incentives to conserve the stock. However, postponing the harvest may make economic sense in terms of being able to obtain a larger and more valuable catch later. In addition, allowing the fish to spawn before harvesting may provide for even larger catches in the distant future. From an individual perspective, the postponement will not appear feasible unless the individual who foregoes the harvest is guaranteed the right to future harvest increases. Nevertheless, with no property rights for fish, there are no such guarantees.

Consider a simple counterexample: the overexploitation of cattle is not a matter of concern because if owners postpone the harvest, they are guaranteed future benefits. Anderson (2007) suggests that the case of property rights with regard to cattle should be studied in more detail.[11] For instance, no one, not even the government, can take cattle away from an owner without providing adequate compensation. Therefore, indi-

viduals are able to buy or sell cattle to achieve a balance between the number of cattle and the productivity of pastures. This also implies that an owner can choose to do whatever he or she desires with the cattle; for instance, they can either be kept for breeding or sent to the slaughterhouse. Moreover, if someone inadvertently or deliberately kills the owner's cattle or lowers their value, the owner can sue for compensation. Given the nature of these property rights, owners have sufficient incentive to utilize their cattle to maximize the economic value from their use, because they will receive all of the gains. If the economic returns from breeding the cattle are high, an owner will be motivated to retain them. On the other hand, since the returns for slaughtering depend on the throughput of feedlots each year, an owner will be have an incentive to develop procedures that maximize profits by considering the choice and costs of input and the timing of production.

The basics of property rights in fisheries are derived from the notion of attempting to simulate some of the aspects of property rights that are extremely efficient with respect to cattle.[12] However, it is difficult to imitate these aspects without analyzing them in detail, and this has not been done, for technical reasons. First, fish move around over wide spaces, and it is impossible to identify and assign individual fish to individual owners. Similarly, it is not possible to track fish offspring. Thus, property rights in fisheries are clearly different and weaker than those that apply to cattle and other land-based animals. Although property rights can be understood as rights that are related to an object or a thing, it is wrong to simply assume that property rights refer to rights over things. In fact, more correctly, property rights are a set of relationships between people and things. However, this is a broad definition of property rights, and a number of different types of rights (e.g., use, access, harvest, and ownership rights) exist under this general category.[13] Unlike some of the other natural resource sectors, such as land, private ownership of wild fish has never been conceivable. If the ownership of wild fish is inconceivable, then property rights in fisheries can be defined as a "bundle of rights."

Regarding the nature of property rights in fisheries in the United States, there are some legal and political constraints. The Sustainable Fisheries Act clearly stipulates that an IFQ program is merely a permit to harvest and that it does not confer any right to compensation, and that there are no rights, title, or interest in any fish until harvested.[14] Thus, if a regional fishery-management council creates an IFQ program but then

later decides to replace it with another type of regulation, the holders of the IFQ permits will not be entitled to compensation. Furthermore, the weak nature of the property rights in fisheries is supplemented by case law in the United States. According to the common law public trust doctrine, which has been extensively developed in the United States and is applicable to all public assets that are of universal public interest,[15] these assets cannot be alienated from the state.[16] These public assets are thus held in trust by the government for the citizenry. This doctrine has been repeatedly applied to case law in the Unites States against claims related to property rights of fish, and this may have an inhibiting effect on the development of property rights in fishing.[17] Thus far, the public trust doctrine has been used as an argument against property rights in fishing; however, it cannot be applied as a convincing argument against rights-based fishery management.[18]

In many parts of the world, there exist property rights systems in fisheries that depend on unwritten, traditional, or customary agreements pertaining to who can fish in a particular location and, sometimes, what type of gear can they use.[19] In these situations, social, cultural, or political traditions will determine the nature of the property rights in fisheries. Thus, property rights in fisheries, in most cases, do not convey the actual ownership of the resources themselves to any individual. In fact, in the United States, fisheries resources are recognized as public resources, and property rights in fisheries are defined in terms of an individual's right to harvest or otherwise use the fishery resource.[20]

B. Analytical Framework of the Characteristics of RBM in Fisheries

When examining the characteristics of the existing property rights systems in fishery management, Scott (1996) identified the following as the most important: (1) exclusivity of participation in the fishery, (2) durability of the rights conferred, (3) security conferred by the rights, and (4) transferability of the rights.[21] Generally speaking, the more of these characteristics in a right, the more valuable and costly it is.

Exclusivity is valued because it protects the right holder from interference with respect to fish stock and fishing. In a fishery, it is regarded that the low exclusivity of a fisherman's license compels competition every time with other vessels for a typical share of the catch. Durability is valued because it allows the right holder to obtain payoffs in the future from the investments made in earlier years. Indeed, if a right's duration

is short, the holder will avoid any long-term improvements or investments. In a fishery, durability encourages the right holder to invest in costly changes in the size and age structure of the fish stock that may result in larger and more profitable catches, even if it means an extended waiting period. Security is valued because it saves the right holder from the costs of protecting and enforcing that right to fish. In most public fisheries, a fisherman's right is secure; however, the fisherman may be taken aback by new arrangements that arbitrarily reduce the characteristics of the right. Finally, transferability is valued because it allows the right holder to make the best use of his or her time and capital by selling the right if the fisherman so wishes. Thus, in the context of ideal fisheries, each characteristic appears to play an important role.

C. Measurements of the Characteristics

Following Scott (1988), it is helpful to portray these characteristics as measures along axes in a four-dimensional space (figure 1).[22] A perfect property right must lie within the outer limits of all the characteristics (figure 2). It follows that the corresponding characteristics of RBM must be completely contained within the triangle in figure 2.

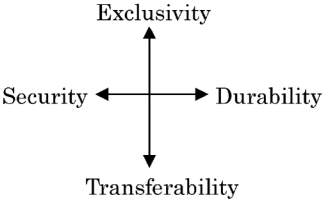

Figure 1

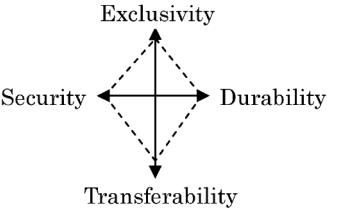

Figure 2

Using such a graphic approach may help in understanding, at a glance, the key strengths and weaknesses of particular management instruments with respect to the expected outcomes. In figure 3, if the representative portion of the given instruments is located within this gray area, in principle, the instruments will be able to facilitate the optimal use of the existing fishing capacity. In figure 4, the representative portion indicates that some degree of transferability (e.g., leasing) exists and that these may facilitate short-term adjustment.

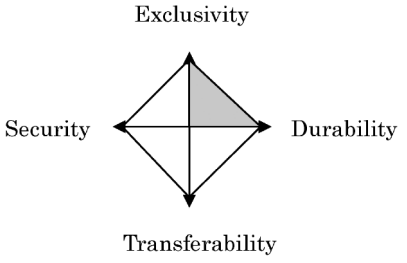

Figure 3

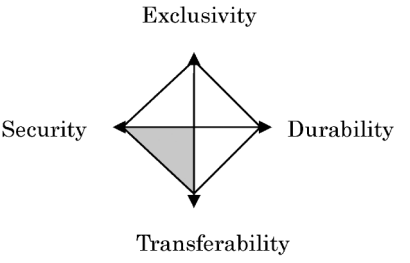

Figure 4

In figure 5, if the representative portion of the given instrument is located in this gray area, in principle, the instrument will be able to facilitate and secure appropriate investment (by providing some levels of exclusivity, durability, and security). In figure 6, if, in addition, some degree of long-term transferability exists, the instrument is expected to facilitate long-term adjustment of the fleet.

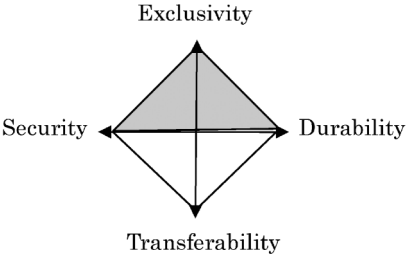

Figure 5

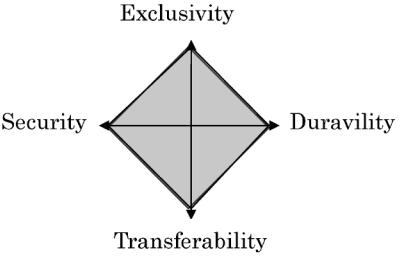

Figure 6

These four characteristics are interrelated to a considerable extent. Together, they generate a particular bundle of rights that possess the ability to facilitate particular management outcomes.[23]

II. DEVELOPMENT AND IMPLEMENTATION OF LIMITATION OF ACCESS IN U.S. FISHERIES

In general, RBM has increasingly gained acceptance in the United States. In fact, several instruments have been implemented to limit the

access to resources, depending primarily on the biological, social, and geographical characteristics of the fisheries. In this section, license/vessel limitations, IFQ programs, CDQ programs, and fishing cooperatives are examined with respect to their status and effectiveness by using the analytical framework derived in section I.

A. License/Vessel Limitations

License/vessel limitations are designed to cap or reduce the number of participants and/or vessels in a fishery by establishing criteria for their continued inclusion, such as historical participation. As of December 2008, there were forty-five fishery-management plans in effect, most of which were license/vessel limitation programs. However, the extent of use of these programs varies considerably among regions of the country.[24] The North Pacific Council, for example, has chosen to implement moratorium measures, despite the fact that the majority of stocks in the waters of Alaska are not overfished. The New England Council and the Mid-Atlantic Council, on the other hand, have taken similar actions in response to the problems resulting from severe overfishing and overcapitalized fisheries.

Exclusivity: Since the right is attached to either the vessel or the owner, right holders are expected to have some incentive to compete. However, in practice, the councils have been inclusive with respect to approving a limited-access program and setting criteria for continued participation.[25] In addition, the councils have sometimes established lengthy qualification periods for the inclusion of many fishermen/vessels. This suggests that considerable latent effort is made in terms of a limited-access program. Under such circumstances, when the fishery is rebuilt, dormant effort can be reapplied and the potential benefits that might have otherwise accrued for those fishermen who remained in the fishery through the hard times will be dissipated.[26] In general, exclusivity may vary from low to relatively high, depending on the nature and structure of the fishery; however, in most cases, a low level of exclusivity has been observed.

Duration: Licenses/vessel permits are often given on an annual or seasonal basis, and they are renewed at the beginning of each period. When the renewal of a license is conditioned on objective criteria, such as compliance with rules, the time horizon can be considered as long but loosely defined. In the absence of clear rules regarding the attribution of licenses, the time horizon can be extremely short, thereby weakening the incentive

of right holders to modify their investment and operational behavior. Therefore, the characteristic of duration with respect to licenses regimes is considered to be moderate.

Security: Since the right is attached to either the vessel or the owner, security for limited licenses/vessels is considered high. In practice, however, security has been attenuated by external events such as the closing of a fishery for environmental or safety reasons. Since enforceability, in general, is relatively easy, it seems reasonable to assume that security is relatively high.

Transferability: By definition, licenses/vessels limitations are not transferable.

Depending on the nature and structure of the fishery, it follows that this type of management is primarily intended to incite license holders to invest in the fishery. The New England Council case has demonstrated the theoretical aspects of this to a large extent.

B. Individual Fishing Quotas

IFQs are management tools that can be employed to constrain effort and achieve a rational application of capital to the available fish resources. The primary purpose of IFQs has been to achieve a better match of capacity to resource productivity and to address economic inefficiencies by eliminating "derby fishing" and allowing for the consolidation of fishing efforts. Traditional fishery-management tools have focused on input controls (e.g., restrictions on gear and licenses/vessels limitations) and output controls (e.g., quotas and trip limits). These tools, particularly input controls, seek to limit the productivity of fishing vessels, affecting their efficiency and profitability. Moreover, the input/output control approach places a significant administrative burden on fishery managers because they are often required to "command and control" the measures pertaining to the fishery in order to make decisions that would be better made by the individual entrepreneur (e.g., when and how to fish) or by the market. IFQ-based management has the same goal as that of output controls, but with the added efficiency of private ownership and market transferability of access to the output. The following four fisheries in the United States are under IFQ management: Surf clams/ocean quahog (Mid-Atlantic), halibut/sablefish (Alaska), wreckfish (South Atlantic), and bluefin tuna (North Atlantic).

Exclusivity: IFQs provide an individual, group, or association with the privilege to harvest a given quantity of fish. Further, IFQs provide holders of the privilege with a strong sense of exclusivity. As a result, this characteristic can be considered to be high with respect to IFQs.

Duration: In principle, any IFQ program is subject to a formal and detailed five-year review after implementation.[27] While the explicit duration may be considered as limited, in practice, available information suggests that renewal is fairly automatic. Thus, the overall presence of this characteristic is also considered to be high.

Security: IFQs are revocable privileges that are granted by a responsible agent of the state to an individual, allowing him or her to use a resource that rightly belongs to the general public. Such resources are held in trust only by the government and cannot be alienated. The legal status of an IFQ in the United States may be weaker than it is in other countries.[28] With regard to enforceability, experience suggests that in most cases improvements in the possibility of adjusting catch capacity to the available resources have reduced illegal, unregulated, and unreported behavior.[29] Thus, the security level in IFQs is moderate.

Transferability: In principle, U.S. IFQs are transferable. However, the extent of transferability varies between fisheries. In most IFQ fisheries, transfers are subject to procedures ensuring current and historical harvest and to the participation of the fishing communities. While the arrangements do vary across fisheries, it can be considered to vary from levels that low and moderate (e.g., halibut/sablefish) to relatively high (e.g., surf clam/ocean quahog). As a result, it can be stated that there is high transferability with IFQs.

By allowing high levels of two characteristics, namely, exclusivity and duration, the U.S. IFQ system, in general, provides the holders with the privilege of a planning horizon that is relatively secure. Further, it provides the holders with proper incentives to make efficient investment in harvesting techniques and in developing new markets. Moreover, the relatively high levels of transferability facilitate the fleet adjustment process.

C. Community Development Quotas

Community development quotas allocate a catch quota to a certain "fishing community." The available information suggests that CDQs

have been implemented in Japan, Korea, New Zealand, Canada, and the United States. However, in the United States' halibut/sablefish fishery, concerns among fishery managers regarding the preservation of rural communities in western Alaska led to the creation of CDQs in 1991. CDQ programs were intended to improve the social and economic conditions of these fishing communities through capacity building; these communities were given special consideration and were allowed to engage in commercial fishing.[30] CDQs were formalized as part of an amendment to the MSA in 1996. The statutory language ensures that a portion of the total allowable catch is to be set aside for the qualifying coastal native communities in the most remote reaches of western Alaska.

Exclusivity: CDQ programs are highly exclusive with regard to access. Eligibility requirements are highly specific and restrictive with regard to community location and qualifying criteria.

Duration: Since CDQs are authorized in the MSA, their duration is considerably long.

Security: Due to the specific authorization of this program in the MSA, and because of the specificity of language in describing eligible participants, security under CDQ programs is higher than that in any other program.

Transferability: A community's share (annual allocation) is transferable between the nonprofit managing organizations that represent the member communities. Further, leasing shares to external parties to conduct fishing is easy and common. Thus, the stated goal of CDQs, that is, to provide fishermen residing in the remote fishing-dependent communities with an opportunity to participate in the Bering Sea and Aleutian Island fisheries, is sufficiently achieved.

D. Fishing Cooperatives

Fishing cooperatives are relatively new in the United States.[31] Although they have been developed as an alternative to IFQ programs, instead of allocating fish to individual vessels, the cooperative members reach a consensus on how to share the allocation. Thereafter, vessel owners or operators coordinate their fishing activities to achieve economic efficiency or to meet other mutual objectives. Currently, three cooperatives are in operation, namely, in the Pacific Northwest, with Alaskan pollack vessels fishing in the Bering Sea, and in the cod hook sector in

the Georges Bank. Their primary objective is to eliminate "derby fishing." Further, in cooperatives, there is no government involvement.[32]

Exclusivity: Entry into the three fishing cooperatives is strictly limited. Moreover, since new permits are not being issued, potential entrants are obligated to procure existing vessels and/or permits with their concomitant histories and capacity limitations. As a result, fishing cooperatives are highly exclusive.

Duration: There is no provision for a sunset mechanism in fishing cooperatives. Thus, participation within the cooperative is subject to a contract.[33] As a result, the characteristic of duration under fishing cooperatives can be considered to be relatively high, but limited.

Security: Sector allocations are not endowed with the trappings of property; further, sector participants are not given rights of ownership. In practice, the fishing history associated with sector participants is a principal factor in determining quota allocation to a sector. In fact, industry members may consider the fishing privileges provided under fishing cooperatives to be as good as the privileges of owing the fishing vessel.

Transferability: Within the Alaskan pollack fishery, several cooperatives exist. The transfer of vessels from one cooperative to another is possible, but without incentive. Within a cooperative, implicit transferability is considerably high, allowing for the most efficient set of vessels to harvest the entire cooperative share of the total allowable catch. Thus, transferability under fishing cooperatives is relatively high, but limited.

Fishing cooperatives provide an opportunity to restructure the fleet in order to maximize profits. Further, cooperatives possess the potential to preserve fishing-dependent communities that are located at key ports.

III. EMERGENCE OF LIMITED ACCESS PRIVILEGE PROGRAMS: ARE IFQ PROGRAMS THE SOLUTION TO REDUCING FISHING CAPACITY?

A. From the Regulatory Actions of Regional Councils to Mandatory National Standards

Since the adoption of the United Nations Food and Agriculture Organization (FAO) International Plan of Action for the management of fishing capacity in 1999,[34] it has been more widely recognized that overcapacity is the most obvious problem in many domestic and international fisheries, fostering destructive derby operations, aggravating overfishing, and undermining the economic performance of the harvesting

sector. In order to address the problems related to the management of overcapacity, the SFA authorized a fishing-capacity reduction program that may be used with complementary management tools. The most direct and obvious response to overfishing was the implementation of a buy-back program. Permit/vessel buy-back programs may be publicly or privately funded, or, at times, they may be supported by both public and private financial resources. Further, most of the permit/vessel buybacks have involved a certain amount of public funding. However, there is a concern that the management of latent capacity can pose a special challenge to the buy-back administrator. For instance, while $10 million was spent to buy back latent permits, critics maintain that this did not reduce active capacity and was ineffective in terms of decreasing capacity.[35] Nevertheless, if buybacks ease management and enforcement and result in more profitable operations, the net natural economic benefit may be positive.

Among the complementary management tools, limited entry is typically one of the simplest means of managing capacity. However, its biggest shortcoming is that while it restricts new entrants, it does not constrain the effort and investments made by established participants. A study by the Organisation for Economic Co-operation and Development (OECD) concluded that limited entry is, in general, not a highly effective means of curbing overfishing and overcapacity.[36] On the other hand, exclusive quotas, another management tool, can be effective and economically efficient. A typical form of an exclusive quota program is the IFQ. Experience with several IFQs in the United States has demonstrated that this form of management can be effective in managing capacity as it affects effort, investment, and participation according to the objectives and structure of the IFQ program. Further, IFQ programs have resulted in improvements from both biological and ecological perspectives, for example, a decline in the discard of small clams and a significant reduction in the frequency of halibut overharvests. These improvements are primarily the result of incentives to determine a good fishing time and location with larger sized and/or more valuable products.[37] However, this does not imply that an IFQ program is the best management tool for addressing fishery problems such as fishing capacity.

In 1996 the U.S. Congress, as part of the SFA, placed a moratorium on the implementation of new IFQ programs in U.S. federally managed waters. The major impetus behind the moratorium appeared to have been a concern over the design and implementation of the North Pacific hal-

ibut/sablefish IFQ program. However, there were also many social and economic issues associated with IFQs (e.g., its affect on fishing communities and on vessel crewmembers) that triggered vigorous public debates.[38] In establishing the moratorium on new IFQ programs, Congress also required that the National Academy of Sciences review the existing IFQ programs and make recommendations regarding their future use.[39] The 1999 study concluded that the U.S. IFQ programs were meeting most of their objectives and were successful, albeit not without problems.[40] Clearly, IFQs are not a universal solution to all the problems related to fishery management. They require a considerable initial investment in design and implementation. Moreover, IFQ management requires sound science for determination of quotas and considerable enforcement to ensure adherence to regulations. However, when appropriately implemented, IFQs can be a powerful tool in ensuring effective and efficient fishery management.

Further, the National Academy of Sciences believed that councils would be able to manage resources with greater efficiency if IFQs were implemented, and they provided additional appropriate conditions that should be set in future legislation with respect to new IFQ programs.[41] The NMFS administrator stated on more than one occasion that IFQs should be made available to the councils as a valuable management tool to address overcapacity in the harvesting sector.[42] Furthermore, at the time, discussions pertaining to IFQs were also occurring in a larger debate on ocean policy and governance. An important recommendation from the U.S. Committee on Ocean Policy was to establish normal standards for the exclusive quota program.[43] Thus, in the United States, conditions were nurtured for the development of national standards and guidelines for the development and implementation of IFQs. In fact, over the years, there has been an increase in the use of exclusive quotas, including IFQs, CDQs, and fishing cooperatives, for the purpose of rationalizing fishing. Since 2002 the NMFS has steadily continued to move away from the traditional regulated open access to other limited-access programs; in addition, the number of exclusive quota programs has doubled, from six to twelve,[44] and this trend is expected to continue.

In comparison with (public-funded) buy-back programs, IFQs are considered to be cost-effective measures. In 2002 the NMFS concluded that the cost of buy-back programs in five fisheries alone was approximately $1 billion.[45] While aggregated public costs have amounted to almost $70 million, no public funding has been appropriated since 2004.[46] In the case

of IFQs, capacity is reduced through the rationalizing effect of the secondary market for IFQ shares. This market is driven by several factors, including the industry's capital, market and input prices, and stock conditions. In addition, the U.S. IFQ programs require that the participant pay 3 percent of the aggregate ex-vessel revenue toward the management and enforcement cost attributable to that program under the MSA.

Thus, IFQs have not only evolved into, but also have produced, alternatives such as CDQs and fishing cooperatives. In sum, these exclusive quota programs developed for the purpose of replacing the regulatory actions of the council and under a formalized guideline stipulated by the MSA are subsumed under the limited access privilege program. The primary driving force behind this may be that the LAPP can address the problem of "creeping effort" or "latent" management, which is related to retired or inactive permits and vessels in the case of limited license or buy-back programs. Another factor may be that LAPPs are more cost-effective in terms of constant or shrinking federal budgets. Perhaps, LAPPs, at this stage, are the best and most practical tool for addressing structural adjustment and the reduction of fishing capacity.

B. Special Features of LAPPs

Since LAPPs are an improvement on IFQs, their special features can be examined by comparing the two. First, LAPPs are designed by employing mandatory procedures; IFQs, on the other hand, were designed and developed at the complete discretion of a council without any mandatory procedures. Further, the MSA specifies certain mandatory conditions and provisions for the developing of LAPPs.[47] If a council wishes to develop a LAPP, it needs to employ the national standards, other applicable laws, and the management of the particular fishery-management program as the criteria for selecting and designing a LAPP.

Second, LAPPs possess flexibility and diversity. In New Zealand, for example, there is only one individual transferable quota program for all the different federally managed stocks. The rules governing the transferability and other aspects of the individual transferable quota programs are the same for all the different fisheries. This consistency helps in lowering management and monitoring costs. On the other hand, as a result of having eight councils under the MSA, LAPPs in the United States are designed individually in the various regions, sometimes varying within

each region, or even for a single species within a fishery. For instance, in the sablefish/halibut IFQ program, the council included numerous provisions under the program, such as restriction of transfer across the vessel categories and restrictive share cap, in order to maintain the social fabric of the fishing community. On the other hand, the pollack fishery cooperative system, and to some extent the crab/IFQ/processors program, were designed to reflect the more industrial nature of these fisheries; however, in the case of the crab/IFQ/processors program, there still exist regional delivery provisions that have been designed to protect the involvement of the existing community in these fisheries.

Third, under the LAPP, there is a broader emphasis on allocating privileges to a wider range of potential recipients. Although it was not required by the earlier versions of the MSA, traditionally, IFQs have been given to a "person" in the narrow sense of the word. Primarily, IFQs were given to individuals or various types of business entities. However, it is now possible to consider two types of entities, as mentioned in the MSA, as well as other types of organizations. Thus, the MSA of 2006 increased the range of entities to which IFQs could be given. As previously noted, the new LAPP places more emphasis on the community and on geographically based control of harvesting privileges, where the community is defined in the broadest possible sense, including groups and cooperatives.[48]

Fourth, as authorized in the MSA provision of 2006, fishermen's initiative (as is evident from the growing interest in fishery cooperatives) and sector allocations can be viewed as examples of devolution. This is because, in both cases, the user group exercises certain authority that would otherwise be provided for in a federally approved fishery-management program.[49]

It is often suggested that the United States and Japan are at opposite ends of the fishery-management spectrum. Makino (2003) argues that the conceptually opposite aspects relating to fishery management between Japan and United States exist because Japanese fisheries management includes the concept of "resource preservation and breeding by resource users themselves," which implies conservation measures undertaken by local fishermen.[50] On the other hand, U.S. resource management is basically a dual system, which means "resource management by the government, and resource use by citizens."[51] Nevertheless, there are relatively more similarities than differences between the LAPP and Japanese community-based resource management.[52] Conceptually,

JCBRM has several characteristics, including fishermen's initiative or involvement in the decision-making process regarding conservation measures, minimum or no government intervention, and a flexible program. The LAPP has come to have similar characteristics to JCBRM, that is to say fishermen's groups or cooperatives have more responsibilities in implementing conservation measures and quota allocations as industry-based programs with minimal government intervention. Major differences can be viewed in the form of management measures: LAPP uses exclusive quota, whereas JCBRM uses "command and control," such as restricted fishing gear and closed seasons. In sum, both LAPP and JCBRM share almost the same management concept of "comanagement" or self-governance, and both intend to develop economically and biologically sustainable fisheries.[53]

CONCLUSION

Fishery management in the United States has gradually evolved through several stages in accordance with the changes in the internal and external environments of the fishing sector. In other words, the development did not happen at once. Moreover, U.S. fishery-management policy has evolved from relatively simple responses to biological problems in the 1970s to much more complex problems of allocation and overcapitalization in the 1990s. In fact, RBM was developed in response to these problems. The range of management schemes implemented to resolve emerging problems include (1) limited entry or regulated open access programs; (2) IFQs in fisheries on both coasts of the United States; and (3) comanagement as witnessed in the CDQs in Alaska and industry-based programs with minimal government intervention, for example, fishing cooperatives. However, to overcome overfishing in the United States, the focus has been on the use of exclusive quota programs; this has resulted in the development of LAPPs through major amendments to the MSA in 1996 and 2006. Although a majority of the U.S. fisheries are still managed under the limited-entry program, a growing number of federally managed fisheries are expected to employ a LAPP.

With a broader recognition of LAPP, different fisheries can have different goals; for instance, one may choose to maximize economic efficiency, while another may want to preserve the current owner-operator-fleet structure. In fact, LAPPs can be designed to optimize these goals. Further, the implementation of LAPPs in twelve fisheries in the United States has demonstrated their effectiveness in curbing overfishing and

helping rationalize fisheries. However, this does not imply that traditional or conventional management schemes such as license limitation, harvest restriction, or buybacks should be done away with. Instead, if these conventional schemes are implemented in conjunction with a LAPP, they can contribute to an effective management regime that meets the objectives of sustainable fisheries. Hence, LAPPs should be a central part of U.S. fishery policy. Many challenges still exist, and the NMFS will continue to refine and reexamine its guidelines and policies in response to constantly changing conditions.

The U.S. experience in the evolution of fishery management can provide insight for other fishing nations. First, optimal management of a specific fishery requires the most appropriate combination of all available tools and the rights associated with them. No single fishery-management strategy can be applied to all fishery-related problems. Second, management entities should shift from central/federal government-based managers to geographically local users or groups employing self-governance or comanagement. Such users or groups are in the best position to involve regional stakeholders and design management programs appropriate to the species that they manage. Third, the fishery-management structure should be designed to support an optimum system, depending on changing socioeconomic and environmental conditions. While changing the system may have a significant impact on the fishery sector in the short term, in the long run, it could contribute to economically and biologically sustainable use of fishery resources.

The sustainability of seafood can be achieved when the population of that species is managed in a way that ensures that current needs are met without damaging the ability of the species to reproduce and be available in the future. Any mismanagement of fish stocks in the United States will ultimately reduce the amount of seafood available to U.S. consumers. Attempts by the United States to rebuild sustainable fish stocks using LAPPs may result in an increased supply of seafood to U.S. consumers in the future.

Finally, it must be emphasized that this article is only the beginning of a more extensive analysis of U.S. fishery-management policy. Future research might include (1) the socioeconomic and cultural aspects of fisheries and the fishing community in the United States, (2) conflicts between stakeholders over the policy-formulation process, (3) a comparative study of the United States and Japan with respect to fishery management, and (4) interaction between international fishery-management regimes and U.S. fishery-management policies.

NOTES

[1] National Marine Fisheries Service (NMFS), *Fisheries of the United States 2008*, 21 July 2009.

[2] In 2005 Americans consumed a record 16.6 pounds of seafood per capita; health professionals are encouraging a doubling of this amount. NOAA News Release, 12 July 2007.

[3] Food and Agriculture Organization (FAO), *The State of World Fisheries and Aquaculture*, Rome, 2004.

[4] Regarding the global status of fish stocks, the proportion of fully utilized, overexploited, depleted, and recovering stocks appears to be more than 80%, with no room for further expansion owing to excess fishing pressure in the past. FAO, *The State of World Fisheries and Aquaculture*, Rome, 2008.

[5] A well-documented example concerns New England's "Atlantic cod" stock, which has not recovered from excessive fishing despite the drastic fishing restrictions that have been implemented over the last several years. See, for example, S. R. Playfair, *Vanishing Species*, (Hanover, NH: University Press of New England, 2003), chaps. 2–3.

[6] The NMFS is the ultimate management authority with respect to fishery resources in federally managed waters that are controlled by the National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.

[7] NMFS, *Excess Harvesting Capacity in U.S. Fisheries*, 28 April 2008.

[8] Natural Research Council (NRC), *Sharing the Fish: Toward a National Policy on Individual Fishing Quotas*, (Washington, DC: National Academy Press, 1999), 306.

[9] See Sec. 303A, Public Law 109–479.

[10] G. Hardin, "The Tragedy of the Commons," *Science* 162 (1968): 1243–48.

[11] L. G. Anderson and M. C. Holliday, eds., *The Design and Use of Limited Access Privilege Program* (NMFS, November 2007), 9.

[12] Ibid.

[13] European Commission, *Studies and Pilot Project for Carrying Out the Common Fishery Policy* (Brussels, February 2009).

[14] See Sec. 303(d)(3), Public Law 104–297.

[15] R. Connor, "Are ITQs Property Rights? Definition, Discipline and Discourse," in *Use of Property Rights in Fisheries Management* 2 (Rome: FAO, 2000), 46–62.

[16] Ibid.

[17] D. C. Slade, R. K. Kehoe, and J. K. Stahl, *Putting the Public Trust Doctrine to Work* (Washington, DC: Coastal State Organization, 1997).

[18] Connor, *Are ITQs Property Rights?*

[19] S. Foale, "Ownership and Management of Trochus Fisheries at West Nggela, Solomon Islands," in Proceedings of the *2nd World Fisheries Congress,* (Australia, Collingwood: Commonwealth Scientific and Industrial Research Organisation (CSIRO), 1996), 266–72.

[20] See Sec. 303(d)(3), Public Law 104–297. In other countries, such as Japan and Taiwan, there are instances wherein the property rights for fishery resources belong to local communities.

[21] A. Scott, "The ITQ as a Property Right: Where It Came From, How It Works and Where It Is Going," in *Taking Ownership: Property Rights and Fisheries Management on the Atlantic Coast*, (Halifax, NS: Atlantic Institute for Market Studies, 1996), 31–98.

[22] A. Scott, "Development of Property Rights in the Fishery," *Marine Resource Economics* 5 (1988): 289–311.

[23] Ibid. Scott suggests that all the characteristics can be viewed as attenuated simply because a fishery's activities are influenced by other potential uses that do not consider the design of the management instruments.

[24] For more details, see FishWatch, http://www.nmfs.noaa.gov/fishwatch (accessed 10 August 2009).

[25] The New England Council, for example, has, in some fisheries, accepted proof of a single landing of any quantity of a species in that fishery as proof of historical participation.

[26] In other cases, when the stock can be accessed by several user groups, fishing operators are inclined to "race for fish." Such behavior has also reduced the level of exclusivity, leading to "effort creeping" or "capital stuffing" and higher costs.

[27] See Sec. 303A, Public Law 109–479.

[28] Ragnar Arnason suggests that the quota right is regarded as a property by the Australian courts and that constitutional protection and certain rights to compensation may exist should the individual transferable share quota be revoked. See R. Arnason, "A Review of International Experience with ITQs," *Reports* 58 (University of Portsmith, Centre for the Economics and Management of Aquatic Resources, 2002).

[29] OECD, *Further Examination of Economic Aspects Relating to the Transition to Sustainable Fisheries* (Paris, September 2005).

[30] NRC, *Sharing the Fish*, 124–28.

[31] Joseph M. Sullivan, "Harvesting Cooperatives and U.S. Antitrust Law: Recent Developments and Implementations," Paper presented at the International Institute of Fisheries and Trade Symposium, Corvallis, Oregon, 10–14 July 2000.

[32] NRC, S*haring the Fish*. With regard to potential antitrust violations, the U.S. Department of Justice concluded that cooperatives did not appear to have anticompetitive effects.

[33] The Alaskan pollack cooperative is supported by the American Fisheries Act, Public Law 105–277, and it enjoys some expectation of permanence.

[34] The plan requires the states to develop national plans of management regarding fishing capacity. See the *United States National Plan for the Management of Fishing Capacity* (NMFS, August 2004).

[35] Ibid.

[36] OECD, *Toward Sustainable Fisheries: The Economic Aspects of the Management of Living Marine Resources* (Paris, 1997).

[37] NRC, *Sharing the Fish*, 64–65, 74–75.

[38] Ibid., 295–96.

[39] Ibid., 243–45.

[40] Ibid., 192–224.

[41] Ibid.

[42] For more details, see Congressional Testimony, http://www.legislative.noaa.gov/111testimony.html (accessed 14 July 2009).

[43] E. G. Buck, *Ocean Commission: Ocean Policy Review and Outlook*, (Washington, DC: Congressional Research Service, July 2007).

[44] Ibid.

[45] NMFS, *The Estimated Vessel Buyback Program Costs to Eliminate Overcapacity in Five Federally Management Fisheries*, June 2002.

[46] NMFS, *United States National Plan for the Management of Fishing Capacity*, August 2004.

[47] See Sec. 303A, Public Law 109–479.

[48] Ibid.

[49] Sections 303A(c)(6) (B) and (D), Public Law 109–479 refer to the procedures for the initiation of LAPP by way of "petition" or "New England and Gulf referendum."

[50] M. Makino and W. Sakamoto, "History and International Characteristics of the Idea of Fishery Resource Management in Japan," *Journal of Japan Fishery Science* 69 (2003): 368–75.

[51] Ibid.

[52] From an economic viewpoint, JCBRM aims to maximize profit by catching particular target species and selling them in the market. See A. Hasegawa, "Theoretical Study on the Shigen Kanrigata Gyogyo and Its Actual Types in Japan," *Journal of Fishery Economy* 33 (1989): 1–39.

[53] Ibid. Comanagement can be defined as "an arrangement wherein the responsibility for resource management is shared between the government and user groups."