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EXPERT ANALYSIS

Finding Win-Win Outcomes for Conservation And Utilization

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The Magnuson-Stevens Fishery Conservation and Management Act, or MSA, governs marine fisheries management in federal waters of the United States. The statute's purpose is to conserve and manage fisheries resources, to rebuild overfished stocks and to generate yield for the domestic U.S. fishing industry.[1]

Since enactment in 1976, the MSA has undergone several iterations, with the most recent reauthorization in 2007 intended to strengthen the role of science in fisheries management. Regulations promulgated pursuant to the 2007 authorization introduced the concept of uncertainty into fisheries management and called for a precautionary approach to help prevent overfishing.

Under this regime, however, conservative catch limits are the only management tool readily available to address situations in which uncertainty is high, as for data-poor and data-moderate stocks. As a result, fishery managers are often in the difficult position of either invoking a highly precautionary approach, reducing catch levels below those estimated to be sustainable, or the less precautionary approach of higher catch limits. The latter possibly risks the long-term health of the fishery resources. This polarization of policy approaches is not necessary.

To achieve both the conservation and utilization goals of the MSA, regulators should provide guidance to fishery managers to assist them with developing additional tools for dealing with uncertainty in ways that do not compromise sustainability objectives. Providing alternative pathways for dealing with uncertainty can reduce the policy polarization existing under the current regulatory regime.

THE ECONOMIC IMPORTANCE OF FISHERIES

U.S. commercial and recreational fisheries are a financial mainstay in many coastal communities, generating billions of dollars of economic activity annually. According to the National Marine Fisheries Service, the federal agency tasked with implementing the MSA, the most recent data show that the U.S. commercial seafood industry generated approximately $55 billion in value added impacts in 2011.[2]

The commercial industry also supports approximately 1.2 million full- and part-time jobs and provides nearly $37 billion in annual income to industry workers.[3] Similarly, recreational fisheries generated about $32 billion in value added impacts in 2011, supporting over 455,000 full- and part-time jobs.[4] In addition, the depressed status of many stocks suggests that the economic importance of the U.S. fishing industry has not reached its full potential, because fishing could increase as depressed stocks rebound.[5]

The economic importance of the U.S. fishing industry cannot be overstated. The survival of many coastal communities largely depends on whether Congress and fishery managers can establish policies allowing fisheries to generate yield over the long term, rebuild overfished stocks and achieve the conservation objectives of the MSA.

HISTORY AND PURPOSE OF THE MSA

Signed into law April 13, 1976, the MSA was enacted "to prevent overfishing, to rebuild overfished stocks, to ensure conservation, to facilitate long-term protection of essential fish habitats, and to realize the full potential of the nation's fishery resources."[6] The MSA was enacted at a time when unregulated foreign fishing fleets were depleting fishery resources off the coasts of the United States.[7]

In response, the MSA established a fishery conservation zone extending 200 nautical miles from the coast. In that zone, the United States would exercise exclusive regulatory authority over fishing practices.[8] As noted during the Senate debate on the MSA, the 200-mile limit was intended to "protect and conserve fishery resources," as well as to "revitalize the American fishing industry."[9] By effectively controlling foreign and domestic use of fish stocks, the MSA would provide "greater economic stability within the fishing industry," thereby "enabling the industry to sustain itself in a healthy condition."[10]

Pursuant to the MSA, there are approximately 45 fishery management plans, or FMPs, providing a framework for managing the harvest of 230 major fish stocks or stock complexes comprising 90 percent of the commercial harvest. These FMPs are developed by Regional Fishery Management Councils in eight regions nationwide.[11] Once an FMP is developed, it must be approved by the U.S. secretary of commerce, who has delegated that authority to the National Marine Fisheries Service. An FMP will be approved only if it is consistent with 10 national standards of fishery management.[12]

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The management tools Congress included in the MSA reflect the goals of rebuilding overfished stocks, generating fishery yield and preventing overfishing. As required by National Standard 1, each FMP must "prevent overfishing while achieving, on a continuing basis, the optimum yield … from each fishery for the U.S. fishing industry."[13]

In other words, the MSA's focus is to provide optimum yield for fishermen, processors and fishing-dependent communities. Optimum yield is defined as the amount of fish that: "(a) will provide the greatest overall benefit to the nation …; (b) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social or ecological factor; and (c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery."[14] Achieving optimum yield means managing fish stocks to produce "a long-term series of catches" that do not result in overfishing.[15]

Thus, the goal of the MSA is to generate yield for the fishery while preventing overfishing. The concept of maximum sustainable yield in the definition of optimum yield links the conservation goals of the MSA with its utilization goals; preventing overfishing ultimately facilitates the long-term economic viability of the fishing industry and fishery-dependent communities.

Thus, optimum yield and maximum sustainable yield reflect the MSA's ultimate purpose of preventing overfishing while generating fishery yield. In reviewing FMPs, courts have agreed that, "Congress' primary goal in passing the MSA was to address overfishing and mandate the sustainable conservation of threatened fish stocks."[16]

UNCERTAINTY AND THE PRECAUTIONARY APPROACH TO PREVENTING OVERFISHING

When the MSA was last reauthorized in 2007, Congress sought to increase the role of science in the Fishery Management Council decision-making process.[17] The 2007 amendments gave an enhanced role to the council's scientific and statistical committees, which are intended to assist in the development, collection and evaluation of biological, economic, social and other scientific information.[18] The amendments also required the councils to use annual catch limits as a tool for preventing overfishing, giving the scientific and statistical committees a central role in setting annual catch limits.[19]

The United States' oceans comprise a complex and dynamic ecosystem, where inter-relationships among species and their habitats are often poorly understood. As such, certain fishery management decisions must be made in the face of uncertainty.

Uncertainty in fisheries management exists on several levels, including estimating stock abundance and setting acceptable harvest levels. It also exists in the ever-important catch data fishery managers use to ensure harvests remain within the levels set by the Fishery Management Councils, in coordination with their scientific and statistical committees. Uncertainty, by definition, means scientists and managers may unknowingly make decisions that are wrong. A scientist could use the best available information to establish a sustainable catch limit for a stock, but that limit may ultimately be too low or too high.

To address these situations, National Marine Fisheries Service regulations implementing the reauthorized MSA require Fishery Management Councils to consider uncertainty when setting catch limits.[20] The regulations, however, provide only one management option to address uncertainty: reducing catch levels. Fishery managers deserve a more sophisticated approach; they need more tools to address uncertainty.

TOOLS FOR ADDRESSING RISK AND UNCERTAINTY IN FISHERIES MANAGEMENT

Outside the world of fisheries management, natural resource managers, ecologists and social scientists frequently use a variety of tools for addressing risk and uncertainty. Providing fishery managers with additional risk management techniques will allow for flexibility, enable fishery managers to avoid undesirable outcomes and ensure the goals of the MSA are realized. At least two more methods can be invoked to deal with uncertain and high-risk situations. Before addressing these additional tools, however, it is important to examine the management tool of catch reductions.

The management tools Congress included in the Magnuson-Stevens Fishery Conservation and Management Act reflect the goals of rebuilding overfished stocks, generating fishery yield and preventing overfishing.

Reducing catch

Reducing catch is often a desirable policy approach to address uncertainty from a biological perspective, as well as an economic perspective. Reductions in catch are effective because they reduce the probability of unknowingly engaging in overfishing.

Indeed, the North Pacific Fishery Management Council has maintained healthy populations of groundfish for decades by utilizing this method.[21] To help ensure fishery populations remain healthy, the NPFMC has frequently imposed conservative catch limits to address uncertainty. Today, this precautionary management approach is a formal aspect of the NPFMC's groundfish FMP.

It is imperative that this precautionary approach be applied reasonably. For data-poor and data-moderate fisheries where little scientific information is available or uncertainty is relatively high, large catch reductions could result in underfishing becoming the norm. Reducing fishing activities more than may be necessary could have severe socio-economic consequences.[22]

Invoking catch limits that are unreasonably low ignores one of the principal goals of U.S. fishery management: to generate yield for the domestic fishing industry. That is, overly conservative catch reductions prevent fisheries from achieving optimum yield.

Congress' intent to strike a balance between utilization and conservation is then undermined because the cultural, social and economic benefits of commercial and recreational fisheries are not fully realized. Conversely, setting fishing limits too high in the face of data uncertainty can result in harvest levels exceeding appropriate biological levels and causing declines in species abundance.

In considering how to address uncertainty, it is necessary to recognize that not all uncertainty is of equal importance. From a management perspective, the presence of uncertainty may be inconsequential if a stock size is well above the point needed to generate maximum sustainable yield.

For example, assume a stock is at 100 percent of unfished biomass and optimum yield (the fisheries management goal) is at 50 percent of unfished biomass. If a degree of uncertainty exists with respect to setting catch limits, it may be reasonable to afford such uncertainty less weight because the adverse consequences associated with such uncertainty would be minimal.

Specifying harvest levels that are slightly too high may lead to a short-term decline in the stock size, but such decline would be harmless because the stock size would still be above the optimum yield target and considered healthy. The weight given to uncertainty should be proportional to the risk associated with being wrong.[23] That is, where uncertainty poses no real threat to maintaining a healthy stock size, uncertainty should be given less weight than when the threat is more significant, such as when a population is near or below maximum sustainable yield. Uncertainty should matter less when there are few or no adverse consequences associated with it.

Adaptive management

Adaptive management is another tool available to address data uncertainty. Adaptive management is a structured approach to learning from operational practices, monitoring and experiments in order to continually improve a management regime.[24] Adaptive management can allow for decision-makers to take corrective management actions before adverse effects occur. The concepts of risk and uncertainty are inextricably linked to adaptive management.[25]

For fisheries, adaptive management principles are best reflected in the frequency of stock assessments. Stock assessments estimate the population and productivity of a stock, as well as a stock's biologically sustainable fishing levels. The assessments are performed at varying frequencies around the country. The more frequent the assessment, the more frequently managers can learn about the consequences of their decisions and adjust policies to achieve desired outcomes.

Preventing overfishing ultimately facilitates the long-term economic viability of the fishing industry and fishery-dependent communities.

Off the coast of Alaska, stock assessments for many species are performed annually, and fishery managers use that information to adjust acceptable catch limits based on the most recent assessment. This means fisheries in the North Pacific are able to make course corrections on an annual basis. This provides managers with opportunities to change actions in order to avoid undesirable outcomes or to better achieve desirable outcomes.

As the frequency of stock assessments declines, the ability of the system to adapt slows, and hence, the ability of decision-makers to manage risk is reduced. In many respects, use of adaptive management principles (such as frequent stock assessments) reduces the need for other risk management tools. In an era of reduced federal financial resources, increasing the frequency of stock assessments is no easy task, but requiring and funding more frequent stock assessments should be a goal of fishery management.

Resilience

A third tool to address data uncertainty is the application of the principles of resilience. Resilience is the capacity of a system to absorb disturbance and reorganize while undergoing change so as to retain essentially the same function, structure, identity and feedbacks.[26] Resilience is a risk mitigation approach that allows a system to "bounce back" if an unexpected impact to that system has occurred, thus minimizing the consequence of adverse circumstances.

When considering risk mitigation strategies, it is important to consider the inherent resilience of a stock based on its life history characteristics. In some cases, it appears that management strategies can be developed to enhance a stock's resilience by capitalizing on certain life-history attributes. For instance, where age diversity of sedentary fish and shellfish stocks has been reduced due to anthropogenic activity, studies have shown that enhancing the age structure of these stocks can lead to enhanced resiliency.[27]

In the case of pink abalone, populations of abalone rebounded quickly from a hypoxia event in areas where diverse ages resided.[28] This was attributed to the large-sized abalone in these regions and the higher egg production of those adults. The management measures protecting these older populations provided resilience through greater resistance and faster recovery.[29]

In other regions, Fishery Management Councils have implemented slot limits and mesh size restrictions, which are designed to catch or exclude particular size (and therefore, age) classifications. The studies referenced above suggest that, in cases where age structure is enhanced with spatial management tools, their use in combination with catch limit reductions may address uncertainty to achieve both the conservation and utilization goals of the MSA.

CONCLUSION

Regulators should not require fishery managers to use catch reductions as the only way to account for uncertainty. Other fisheries management tools, including adaptive management and tools designed to enhance resilience, may help achieve the conservation and utilization goals of the MSA. While the decision regarding whether to use any management tool is the responsibility of fishery policymakers in consultation with fishery scientists, it is important that all appropriate tools be available. Providing fishery managers with the opportunity to utilize alternative methods for achieving desired levels of precaution can lead to win-win outcomes for conservation and utilization.

NOTES

1 *See* 16 U.S.C. §1801(a)(6).

2 *See* U.S. Dep't of Commerce, Fisheries Economics of the United States 2011 at 7 (December 2012), *available at* http://1.usa.gov/1l3XtNR.

3 *Id.*

4 *Id.* at 9.

5 U. Rashid Sumaila et al., Impact of the Deepwater Horizon well blowout on the Economics of U.S. Gulf fisheries, 69 Can. J. Fisheries & Aquatic Sci. 499-510 (2012).

6 16 U.S.C. § 1801(a)(6).

7 *See* 16 U.S.C. § 1801(a)(3).

8 *See* Pub. L. No. 94-265, 90 Stat. 331 (Apr. 13, 1976).

9 *See* Legislative History of the Fishery Conservation and Management Act of 1976, at 260 (1976) (statement of Sen. Hatfield); *see also id.* at 261 (increased domestic fish catch would generate needed income for shipbuilders, fishermen, processors, suppliers and other members of the fishing industry).

10 *Id.* at 265 (statement of Sen. Hollings).

11 *See* 16 U.S.C. § 1852(a).

12 16 U.S.C. § 1851(a).

13 50 C.F.R. § 600.310(a); *see also* 16 U.S.C. § 1801(a)(6) (explaining the purpose of the MSA is to conserve and maintain fisheries "so as to provide optimum yield on a continuing basis").

14 16 U.S.C. § 1802(33).

15 74 Fed. Reg. 3178, 3189 (Jan. 16, 2009).

16 *Legacy Fishing Co. v. Gutierrez,* No. 06-0835, 2007 WL 861143, at *3 (D.D.C. Mar. 20, 2007), rev'd on other grounds, *Fishing Co. of Alaska Inc. v. Gutierrez,* 510 F.3d 328 (D.C. Cir. 2007); *see also N.C. Fisheries Ass'n Inc. v. Gutierrez,* 518 F. Supp. 2d 62, 103 (D.D.C. 2007) ("Congress made halting overfishing the primary goal of the MSA.").

17 Pub. L. No. 109-479, 120 Stat. 3577 (Jan. 12, 2007).

18 16 U.S.C. § 1582(g).

19 16 U.S.C. § 1582(h)(6).

20 *See* 74 Fed. Reg. 3178 (Jan. 16, 2009); *see also* 50 C.F.R. § 600.310(a)(3); 50 C.F.R. § 600.310(f).

21 *See, e.g.,* NPFMC Programmatic Supplemental Environmental Impact Statement (June 2004); see also Daniel D. Huppert *et al., Precautionary approach to fisheries,* Part 2: Scientific papers, prepared for the Technical Consultation on the Precautionary Approach to Capture Fisheries (Including Species Introductions), Lysekil, Sweden (June 6-13, 1995).

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25 George H. Stankey, Roger N. Clark & Bernard T. Bormann, U.S. Dep't of Agric., Adaptive Management of Natural Resources: Theory, Concepts and Management Institutions (2005).

[26] Brian Walker et al., Resilience, adaptability and transformability in social–ecological systems, 9 Ecology & Soc'y 5 (2004).

[27] *See* Jono R. Wilson et al., Integration of no-take marine reserves in the assessment of data-limited fisheries, Conservation Letters 1–8 (Dec. 16, 2013); Stephen J. Bobko & Steven A. Berkeley, Maturity, ovarian cycle, fecundity, and age-specific parturition of black rockfish, 102 Fishery Bull. 418–429 (July 1, 2004); Steven A. Berkeley, Pacific Rockfish Management: Are we circling the wagons around the wrong paradigm?, 73 Bull. Marine Sci., 655-668 (2006).

[28] Fiorenza Micheli et al., Evidence That Marine Reserves Enhance Resilience to Climatic Impacts, 7 PLoS ONE e40832 (July 2012).

[29] *Id.; see also* Berkeley, *Pacific Rockfish Management* (indicating that managing for age structure can increase both resilience and yield).

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