

ENFORCEMENT AND COMPLIANCE IN U.S. COMMERCIAL FISHERIES:

Results from Two Recent Studies

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Executive Summary

This paper summarizes the results of two recent studies of enforcement in U.S. commercial fisheries. One study by the University of Maryland and the Environmental Law Institute (UM/ELI, 2009) focused on the significance of illegal fishing and whether enforcement efforts by NOAA, USCG, and others are successful at detecting and deterring illegal fishing. The other study by the Department of Commerce, Office of Inspector General (OIG Report, 2010) focused on NOAA's management and oversight of fishery enforcement and on specific complaints by some fishermen and a fish dealer that NOAA enforcement officers are overly aggressive, and that penalties imposed on violators are excessive, arbitrary and unfair.

A synthesis of the results of the two studies is important at this time for three reasons:

First, the NOAA management and oversight problems identified in the OIG Report are receiving a great deal of political and media attention and are the focus of high level discussions about reforming how NOAA manages fishery enforcement. However, addressing these internal NOAA management problems will not affect the fundamental and urgent fishery enforcement and related noncompliance problems identified in the UM/ELI Report. Those problems are associated with rates of detection and prosecution of fishing violations that are not adequate to deter illegal fishing, which many fishermen believe is significant enough to adversely affect their livelihoods and prevent critical fish stock rebuilding programs from succeeding.

Second, the UM/ELI Report concluded that declining fish stocks and tighter fishing restrictions are increasing economic incentives for fishermen not to comply. At the same time fishermen are becoming more frustrated and distrustful of fishery science and management, which is weakening the normative or moral constraints that normally result in widespread voluntary compliance despite potential illegal gains. This is interpreted in the UM/ELI Report to mean that more enforcement and more certain and meaningful penalties are needed to adequately deter illegal fishing. Whatever conclusions the OIG reaches about the validity of specific claims of overly aggressive enforcement and excessive penalties, they need to be viewed within the context of the more general results in the UM/ELI Report to prevent them from being misused and leading fishery enforcement reform in the wrong direction.

Third, many commercially valuable fish stocks are so depleted that they are more vulnerable now than ever to the adverse effects of illegal fishing, which also threatens to prevent fish stock rebuilding programs from succeeding. The recommendations in both the OIG Report and the UM/ELI Report need to be implemented soon, before options for restoring fisheries become more costly to fishing industries and communities and more risky and difficult to implement.

NOAA oversight and management problems identified in the OIG study contribute to weak deterrence and noncompliance problems described in the UM/ELI study. However, there are many other causes of these problems that also need to be addressed. U.S. Coast Guard at-sea enforcement activities, for example, usually account for 90% of federal spending on domestic fishery enforcement, fail to detect or deter most fishing violations and result in "official" observed compliance rate estimates that vastly understate the significance of illegal fishing. To succeed, fishery enforcement reforms need to be based on a clear understanding of enforcement and compliance problems and their interrelated causes.

1. Introduction

Managing marine fisheries sustainably requires establishing fishing restrictions to prevent depletion of fish stocks and implementing enforcement strategies that result in fishermen complying with them. Even small rates of noncompliance can result in fishery management goals not being achieved, and therefore a need for more restrictive and more costly fishing regulations in the future. Besides protecting the biological health of fish stocks, adequate enforcement is important to protect the long-term economic health of fishing industries and communities.

In the U.S., most fishermen voluntarily comply with fishing regulations. However, potentially high economic payoffs from illegal fishing and underreporting catches provide strong incentives for some fishermen not to comply. In some fisheries combinations of declining fish stocks and increasingly restrictive fishing regulations aimed at rebuilding them are imposing significant economic hardships on law-abiding fishermen. This is increasing economic incentives for more fishermen not to comply.

Two recent studies of enforcement in U.S. commercial fisheries identified problems that demand immediate attention. Both studies were national in scope, but focused considerable attention on the Northeast groundfish (NEGF) fishery where fishery management problems and conflicts involving fishery enforcement seem most acute.

The first study, conducted by the University of Maryland and the Environmental Law Institute, addressed a broad range of issues related to both enforcement and compliance and identified problems associated with the failure of dockside and at-sea fishery enforcement to detect and deter illegal fishing. The study resulted in a report released in 2009 that will be referred to here as the **UM/ELI Report** and, so far, in three articles published in peer reviewed journals. The UM/ELI Report and links to the three articles are available at *http://dkingweb.cbl.umces.edu/fisheriesenforcement.html.*[1]

The second study by the Department of Commerce, Office of Inspector General (OIG) focused specifically on NOAA's management and oversight of fishery enforcement, including complaints by some fishermen and a fish dealer that NOAA enforcement officers are overly aggressive and unfair and that penalties imposed by NOAA are excessive and arbitrary. In January, 2010, the OIG released a report that described significant problems with NOAA's management and oversight of fishery enforcement and provided recommendations for resolving them. That report also listed and categorized the complaints the OIG has received about NOAA enforcement abuses. Because the OIG is still investigating these claims the report did not attest to the validity of any of these complaints. That report will be referred to here as the **OIG Report** and is available at http://www.oig.doc.gov/oig/reports/2010/OIG-19887.pdf.[2]

[1] The UM/ELI Report was directed by Dennis King, author of this paper, and was supported by the Lenfest Ocean Program.

[2] The OIG Report was directed by The Honorable Todd Zinser, Inspector General of the U.S. Department of Commerce.

This paper will briefly describe these two studies, provide context for comparing and synthesizing their results, summarize some particularly important conclusions, and close with recommendations for improving U.S. fishery enforcement that are based on the results of both studies.

2. Current Fishery Enforcement Challenges

It is important that the results and recommendations in these two studies be considered together at this time for the following three reasons:

First, the results of the OIG Report are receiving a great deal of attention and are the focus of high level discussions and directives regarding ways that NOAA's management of fishery enforcement should be reformed. However, addressing internal NOAA management problems identified in the OIG Report and resolving any abuses of enforcement power the OIG discovers will not affect the fundamental and urgent fishery enforcement and compliance problems identified in the UM/ELI Report. Those problems are associated with rates of detection and prosecution of fishing violations that are not adequate to deter illegal fishing, which many fishermen believe is significant enough to adversely affect their livelihoods and the likelihood that fish stock rebuilding programs will succeed.

Second, the UM/ELI Report concluded that declining fish stocks and tighter fishing restrictions are increasing economic incentives for fishermen not to comply. At the same time fishermen are becoming distrustful of fishery science and management, which is weakening the normative or moral constraints that normally result in widespread voluntary compliance despite potential gains from illegal fishing. This is interpreted in the UM/ELI Report to mean that more enforcement and more certain and meaningful penalties are needed to adequately deter illegal fishing. Complaints of overly aggressive enforcement and excessive penalties contained in the OIG Report are receiving a great deal of media and political attention. Unless these relatively few specific cases are viewed in the context of the more general results in the UM/ELI Report they could be misinterpreted and misused and lead fishery enforcement reform in the wrong direction.

Third, many commercially valuable fish stocks are so depleted that they are more vulnerable now than ever to the adverse effects of illegal fishing, which could also prevent fish stock rebuilding programs from succeeding. It is important, therefore, to use all available information to improve fishery enforcement and compliance now, before options for restoring fisheries become more costly to fishing industries and communities and more difficult to implement.

3. Overview of the UM/ELI Report and the OIG Report

3.1 The UM/ELI Report

The UM/ELI Report addressed fishery enforcement carried out by NOAA (primarily dockside), by the U.S. Coast Guard (primarily at-sea), and under Joint Enforcement Agreements (JEAs) between NOAA and state and other nonfederal enforcement agencies. It also addressed issues

related to deterrence, including how compliance is affected by such factors as fishermen's expectations about the probability of violations being detected, the probability of detected violations being prosecuted and resulting in a penalty, the size of the expected penalty, and so on.

The UM/ELI study included an analysis of five years of NOAA enforcement data (October, 2001 through May, 2006) and interviews with fishermen, fishery managers, enforcement personnel, and others. However, the most important part of the study was an extensive mail survey of 1,295 randomly selected fishermen in three representative case study fisheries (New England groundfish fishery, Pacific trawl fishery, Gulf of Mexico red snapper fishery). The Pacific and Gulf surveys covered 100% of permitted fishermen. The New England survey reached 708 of 1,665 active fishermen with groundfish permits. For more information about the UM/ELI survey methodology, see the UM/ELI Report at: http://dkingweb.cbl.umces.edu/fisheriesenforcement.html.

The UM/ELI survey of fishermen resulted in an extraordinarily high response rate (43.5%) and could be expected to represent the perspectives of many fishermen. By contrast, the OIG Report presents perspectives only of fishermen who contacted the OIG with complaints about NOAA enforcement. This is important because the fishermen complaints listed in the OIG report, although relatively small in number, have given some media and political leaders the impression that penalties for fishing violations are too high, enforcement is too harsh and inflexible, etc. Results from the more representative UM/ELI survey lead to exactly the opposite conclusion; fishermen believe more enforcement and more certain and meaningful penalties are needed to improve compliance, deter chronic violators, and protect their livelihoods.

The UM/ELI Report included the following basic findings:

- Because of relatively weak enforcement, the economic factors that favor noncompliance in many U.S. fisheries are becoming stronger. The relatively low probabilities of a violation being detected, prosecuted, and penalized, when combined with the relatively low expected penalties, result in economic benefits of noncompliance that often outweigh the expected costs of noncompliance.

- Because of ongoing problems with fishermen’s mistrust in the legitimacy and fairness of fishery management, noneconomic factors, such as moral obligation and social and family pressure that normally favor compliance, are weakening. This means more enforcement is needed to achieve a given rate of compliance.

- Costly at-sea USCG enforcement activities fail to effectively detect or deter many types of violations. High observed compliance rates reported by the USCG as measures of successful deterrence actually reflect the failure of USCG at-sea inspections to detect most violations. USCG reports of high compliance, therefore, are misleading about the extent of illegal fishing and may be resulting in a wasteful misallocation of federal spending on domestic fishery enforcement.

- Chronic and substantial violators contribute disproportionately to the adverse effects of illegal fishing. Many fishermen view chronic violators as a threat to their livelihoods and want them eliminated from U.S. fisheries.

- NOAA needs to increase efforts to collect, analyze, and interpret federal fisheries enforcement data, and also to supplement that data using routine surveys and interviews to generate information about fishing violations that are not detected by enforcement officers, and therefore are not reflected in official enforcement data.

3.2 The OIG Report

The introduction to the OIG Report indicates that the OIG investigation of NOAA Office of Law Enforcement (OLE) and General Counsel for Enforcement and Litigation (GCEL) offices addressed "their overall conduct of enforcement actions, how they prioritize actions and set penalty assessments, and their use of resources, including funds obtained through imposed penalties." OIG investigations of specific complaints about NOAA enforcement staff are not yet complete, but the OIG Report does state in several places that "based on the review to date complaints of abusive treatment are not widespread." Results presented in the UM/ELI Report support this general conclusion.

The OIG report was based on "over 225 interviews with fishermen, boat captains, industry association representatives, conservation officials Fishery Management Councils (FMC), and current and former NOAA officials" and, like the UM/ELI Report, on a review of NOAA enforcement records for a five year period (July 2004 through June 2009).

The following direct quotations summarize the conclusions in the OIG Report:

- "NOAA leadership has had minimal involvement in setting enforcement priorities, linking enforcement to its fishery management goals, or evaluating enforcement program effectiveness."
- "NOAA leadership plans identifying the most pressing fishery and conservation issues do not include enforcement priorities or strategies."
- "NOAA has problems with its data systems (and) it is not possible to effectively manage a national enforcement program… without reliable and efficient management information systems and meaningful data."
- "Neither OLE nor GCEL is able to generate data …on recidivism rates, which is important for assessing deterrence and therefore program effectiveness."
- "The absence of formal procedures for sufficiently documenting its decisions regarding penalty assessments and settlement amounts has resulted in a process for determining civil penalty assessments that appears arbitrary."

The following direct quotes summarize the recommendations in the OIG Report:

- "Senior NOAA leadership and headquarters elements need to exercise substantially greater management and oversight of the agency's regional enforcement operations."

- "NOAA needs to strengthen policy guidance, procedures, and internal controls …to address a common industry perception that its civil penalty assessment process is arbitrary and unfair."
- "NOAA needs to reassess its OLE workforce composition (presently 90 percent criminal investigators) to determine if this criminal enforcement-oriented structure is the most effective for accomplishing its primary regulatory mission."

4. Context for Comparing Study Results

The goal of fishery enforcement is not to detect and punish violators, but to provide enough deterrence to achieve acceptable rates of compliance. It is customary, therefore, to assess the effectiveness of fishery enforcement by examining how it is likely to affect the two main factors that influence fishers' decisions to comply or not with fishing regulations.

1. ***Economic factors***, primarily the difference between expected economic gains from illegal fishing or underreporting catches and the expected costs, which are associated with the likelihood of being detected and prosecuted and the size of the resulting penalty. The UM/ELI Report, for example, determined that in the NEGF fishery expected economic gains from illegal fishing can be five times expected costs.
2. ***Normative factors***, such as moral commitment and social and family pressure to "do the right thing" even when potential illegal gains are high and the likelihood of being detected or penalized is low. These are influenced by the perspective of fishermen and their families and communities about the legitimacy, competency, and fairness of fishery management institutions, and the validity of fishery science. In the UM/ELI survey, for example, some fishermen in the NEGF fishery reported that they believe some regulations that give advantages to certain fleets are unfair and other regulations that require them to throw back dead or dying fish to comply with species or fish size limits are wasteful and immoral.

Where normative factors favoring compliance are strong, less enforcement is needed to offset economic factors that favor noncompliance, and vice versa. The UM/ELI study determined that both sets of factors, especially in New England, favor less compliance and indicate a need for more deterrence.

The important challenge facing NOAA at the current time, therefore, involves deciding how to design enforcement strategies to achieve two goals. They must be aggressive enough to offset the combined effects of increasing economic pressures on fishermen to ignore fishing regulations and weakening normative or moral pressures on them to comply; and they must be viewed by fishermen as being fair, transparent, and evenhanded in order to promote more voluntary compliance and more collaboration between enforcement staff and law-abiding fishermen. This challenge provides the context for interpreting the combined results of the UM/ELI Report and the OIG Report.

5. Combined Results of the Two Studies

The following sections compare and synthesize the results of the two studies with respect to specific enforcement and compliance issues.

5.1 NOAA Enforcement Data Management and Interpretation

The UM/ELI Report identified some likely causes and results of NOAA enforcement management problems identified in the OIG Report. Both studies describe poor NOAA enforcement data management which the OIG Report cited as one important reason why NOAA leadership has not had the capacity to effectively prioritize and manage enforcement efforts. However, another outcome of inadequate enforcement recordkeeping at NOAA is that NOAA leadership has had to rely on official USCG reports of compliance rates in U.S. commercial fisheries to assess how much enforcement oversight and management are needed. Based on observations during at-sea boardings, the USCG routinely reports annual compliance rates near or above the stated goal of 97%; that is, the USCG detects significant violations during only 3% of at-sea boardings. This "annual performance metric" is used by the USCG as evidence that at-sea domestic fishery enforcement is enormously successful at deterring fishing violations, likely contributing to the lack of interest in fishery enforcement among NOAA leadership as reported in the OIG Report. Noncompliance rates of only 3% indicate that illegal fishing is not a fishery management problem that requires much attention from upper level management at NOAA or the USCG.

However, the UM/ELI Report attempted to reconcile this roughly 3% USCG observed noncompliance rate with the 10% to 20% noncompliance rates estimated by fishermen, enforcement agents and others. That research determined that there is nearly universal agreement among fishermen, enforcement agents and others involved in fisheries that the high observed compliance rates reported by the USCG as indicators of successful deterrence actually reflect the failure of USCG at-sea boardings to detect many actual violations. There are many potential reasons for this, including inadequate incentives and training for USCG boarding parties to detect significant violations. However, the most important reason is that USCG vessels are visible at sea from long distances, so nearly all fishermen, who communicate routinely via VHF radio and cell phone about the whereabouts of USCG vessels, know when and where their vessels may be boarded by the USCG. Even habitual violators do not violate fishing regulations and do their best to hide evidence of previous violations when USCG vessels are in the vicinity. In fact, when told of the 3% noncompliance rate reported by the USCG, one interviewee commented humorously that "it only means 3% of fishermen are stupid." The UM/ELI Report concluded that low noncompliance observed by the USCG may accurately reflect conditions within a relatively small "zone of deterrence" around each USCG vessel, but that the higher noncompliance rates estimated by others reflect more general conditions and are a more reliable basis for assessing the significance of illegal fishing.

The misinterpretation of the only available federal statistics regarding the extent of illegal fishing in U.S. domestic fisheries is not only misleading NOAA and USCG leadership, but probably has a direct effect on other problems identified in the OIG Report and the UM/ELI Report. Official compliance statistics that are generally viewed by fishermen as being inaccurate and misleading, for instance, contribute to fishermen's lack of faith in the ability of federal fishery managers to competently use data to detect and solve problems that affect their livelihoods, and leads fishermen to question whether the fishery science that is used to set regulations may be based on incomplete catch and by-catch data. This directly affects their willingness to comply with fishing regulations.

5.2 Allocation of Federal Domestic Fishery Enforcement Budget

The combination of overly optimistic USCG "enforcement success" statistics and lack of NOAA management and oversight contributes to another issue that was identified in the UM/ELI Report as needing attention: the allocation of the federal domestic fishery enforcement budget. In 2006, the USCG budget for at-sea domestic fishery enforcement was $563.9 million, over 90% of the overall federal fishery enforcement budget and fifteen times the NOAA domestic fishery enforcement budget of $33.7 million. During that year the USCG made 5,810 boardings, resulting in the detection of 198 significant violations (3.4%) at a cost of $2.85 million per detected violation. Only 36.5% of violations detected by the USCG in that year were prosecuted and resulted in penalties, so the cost per violation detected by the USCG in that year that resulted in a penalty (and therefore had an outcome that is likely to deter future violations) was $7.8 million. These numbers need to be further examined and compared with the cost of other at-sea enforcement methods based on improved electronic surveillance, expanded observer responsibilities, etc. They should also be compared with the cost of improved shore-based and intelligence-based enforcement strategies.

Federal fishery enforcement budgets that favor expensive at-sea USCG operations over NOAA enforcement likely contribute to some other problems addressed in the OIG Report, namely, the size and consistency of penalties. Regional NOAA enforcement staffs operate with budgets that are too small to increase deterrence by expanding efforts to detect and prosecute more violations. Their only alternative, therefore, is to attempt to achieve acceptable compliance rates by imposing higher penalties for those violations that are detected. This results in more severe economic consequences for fishermen who are occasionally or frequently caught violating fishing regulations and adversely affects their relationships with NOAA enforcement staff. However, both the OIG Report and the UM/ELI Report concluded that inadequate NOAA enforcement recordkeeping makes it difficult for NOAA to identify and target repeat offenders. This can be expected to result in cases where normally law-abiding fishermen who are detected based on what might be an accidental violation may be suspected of being routine violators and treated accordingly, resulting in strained relationships between them and NOAA enforcement staff. One surveyed fishermen commented, for example, that he felt he was "one accidental violation away from bankruptcy." The root cause of some problems related to NOAA fishery enforcement, in other words, may be the allocation of federal fishery enforcement dollars that favor relatively ineffective at-sea USCG operations and make it difficult for shore-based regional NOAA enforcement staff to do their job effectively.

5.3 Effectiveness of fishery enforcement

The OIG Report did not address the effectiveness of fishery enforcement in terms of detecting or deterring violations, but did assert that NOAA's mismanagement of enforcement records would make it difficult or impossible to effectively prioritize NOAA's enforcement efforts. The UM/ELI Report examined the effectiveness of the overall U.S. fishery enforcement system and determined that it is not effective. This can be demonstrated by reviewing two different sets of study results associated with: 1) Perspectives of fishermen about rates of noncompliance and the size and impacts of the illegal harvest; and 2) a simple fishing violation deterrence model that is based on a combination of survey results and NOAA enforcement records.

Fishermen Perspectives

Based on UM/ELI survey results, fishermen in three representative U.S. fisheries believe that an average of 15.2% of their peers are routine violators and that another 21.1% are occasional violators. Results also indicate that on average fishermen believe only 34.6% of fishing violations are ever detected and that illegal harvests account for 11.8% of the overall harvest, which is up from estimates of 7% to 8% found in surveys conducted in the 1980s. Fishery enforcement staff estimate the illegal harvest at 24%.

Survey results also show that over 30% of fishermen and over 70% of enforcement agents agree or strongly agree with each of the following three statements:

- Violations of fishing regulations are jeopardizing the sustainability of fish stocks in the fisheries.
- Violations of fishing regulations are significant enough to reduce long-term economic returns from fishing.
- Violations of fishing regulations reduce fishermen expectations that they will gain from fish stock rebuilding programs.

Also, 37% of fishers and 80% of fishery enforcement staff surveyed in the NEGF fishery believe that "the combined adverse impact of all violations on the health and manageability of fish resources" is significant, highly significant, or extremely significant; and 23.9% of fishermen and 53.8% of enforcement agents in that fishery believe that illegal fishing will prevent law abiding fishermen "from benefiting from fish stock rebuilding programs."

Economic Analysis of Deterrence

Using UM/ELI survey results and NOAA enforcement data in a simple economic deterrence model indicates that the expected gains from illegal fishing are sometimes five times the expected costs. In the NEGF fishery, for example, the UM/ELI Report estimated that a midsize trawler can gross an extra $5,500 per trip by ignoring fishing regulations. Surveys indicate that violations in that fishery have a 32% probability of being detected, and NOAA enforcement data show that a detected violation in that fishery has a 33% probability of being prosecuted and resulting in a penalty. Based on 2001-2006 NOAA enforcement data, the average penalty assessed for a violation is $20,455, and the settlement amount averages 53% of the assessed penalty. This means that the expected (risk-adjusted) cost of a violation is approximately $1,166 which, when compared with the expected illegal gain, results in an economic incentive not to comply of $4,334 per trip.

Based on both fishermen perspectives and an analysis of NOAA enforcement statistics, therefore, the conclusion of the UM/ELI Report is that fishery enforcement in U.S. commercial fisheries is not effective.

5.4 NOAA management and oversight of fishery enforcement

The OIG Report found significant inadequacies in NOAA's management and oversight of fishery enforcement. The UM/ELI Report did not address NOAA management, but found significant problems with the effectiveness of fishery enforcement which support the conclusions in the OIG Report that NOAA's management of fishery enforcement has been inadequate. In a previous section it was suggested that improperly interpreted USCG enforcement success statistics may have prevented NOAA leadership from appreciating the significance of illegal fishing as a fishery management problem. However, UM/ELI survey and interview results showed that regional fishery enforcement staff, fishermen, and many others involved in U.S. commercial fisheries have been aware for years that noncompliance rates are much higher than those in official government reports and in need of more attention. If management systems were in place for NOAA leadership to receive critical information from regional fishery enforcement staff, or if NOAA leadership were paying attention to the results of enforcement/compliance surveys, it is likely that changes would have been initiated within NOAA to try to improve fishery enforcement.

5.5 NOAA fishery enforcement tactics

The OIG Report addressed complaints by fishermen of overly aggressive tactics by NOAA enforcement agents. The OIG is still investigating specific fisherman complaints, but the OIG Report states that based on its review to date "allegations of abusive treatment are not widespread."

The UM/ELI Report did not focus on enforcement tactics or on abuses of enforcement authority by NOAA. However, it did provide some results that support the OIG conclusion that abusive enforcement by NOAA is not widespread. For example, the UM/ELI fishermen survey included an open-ended question that asked fishermen *"In your opinion, what are the top two to three things that can be done to improve enforcement of fishery regulations?"* Most fishermen recommended some combination of changes in regulations, penalties, and enforcement activity. Over 50% of fishermen provided at least one comment that recommended a change in enforcement and, of those, nearly half in the New England survey and over half in the Gulf of Mexico survey commented that more enforcement is needed. By contrast, less than 10% of fishermen in those fisheries recommended less enforcement. And, significantly, only around 8% percent of fishermen commented about enforcement officers being "overzealous," "confrontational," "antagonistic", etc. This relatively small percent of fishermen commenting about enforcement tactics is consistent with the conclusion of the OIG Report that allegations of abusive enforcement by NOAA are not widespread.

(A statistical summary of fishermen's answers to this question is available for review as Table 1 at http://dkingweb.cbl.umces.edu/fisheriesenforcement.html)

Fishermen recommendations to improve compliance

The OIG Report lists fishermen complaints "that fishing regulations are unduly complicated, unclear, and confusing," "change with little or no advance notice," and "in some instances conflict with state regulations." These same types of comments about the complexity of regulations were received during the UM/ELI survey. For example, when NEGF fishermen were asked what two or three things could be done to improve compliance, over 70% of answers referred to changes in regulations, whereas only 16.7% of answers referred to changes in enforcement, and 15.5% referred to changes in penalties.

The OIG Report also listed complaints by fishermen that were reported to reflect a potentially strained and even a "dysfunctional" relationship between fishermen and NOAA. The OIG Report did not imply that these perceptions are widespread or adversely affect compliance. However, previous research described in the UM/ELI Report indicates that if such fishermen perspectives are widespread, they usually have an adverse effect on fishermen's willingness to voluntarily comply with fishing regulations.

The UM/ELI survey contained an open ended question that asked fishermen: *"In your opinion, what are the top two to three things that can be done to improve fishermen's willingness to comply with fishery regulations?"* Their answers imply that they do not believe that enforcement abuses are having a significant adverse effect on compliance; and that they do believe more enforcement is needed to improve compliance. As expected, the most frequent fishermen recommendation for improving compliance was to make regulations simpler and more consistent. However, considering the focus of the OIG Report, it is interesting that many fishermen who recommended changes in enforcement in all surveyed fisheries (e.g., 44.8% in New England) called for more enforcement, while few (3.4% in New England) called for less enforcement. Similarly, of those fishermen who mentioned penalties, most (e.g., 55.5% in New England) recommended stronger penalties, and few (e.g., 11.1 % in New England) called for lowering penalties or commented that penalties are unfair. A smaller than expected percentage of all fishermen (e.g., 10.3% in New England) recommended improving relationships and communication between fishermen and fishery enforcement or management staff as a way to improve compliance. This supports the widely held belief, at least among fishery economists, that harsh economic realities tend to drive noncompliance decisions, implying that increasing the expected cost of noncompliance (e.g., by increasing detection and prosecution rates and/or penalties) will be more effective than attempting to increase compliance by improving NOAA's image with fishermen.

(A statistical summary of fishermen's answers to this question is available to review as Table 2 at http://dkingweb.cbl.umces.edu/fisheriesenforcement.html)

5.6 Uniformed Regulatory Compliance Monitors vs Criminal Investigators

The OIG Report concludes that because NOAA enforcement staff is involved primarily in enforcing fishing regulations that involve civil penalties, but consists of 90% criminal investigators, "NOAA needs to reassess its OLE workforce composition to determine if this criminal-enforcement-oriented structure is the most effective for accomplishing its primary

regulatory mission." The OIG Report refers to previous OIG investigations that recommended "increasing uniformed fishery enforcement officers to 50% of enforcement staff to provide greater enforcement visibility."

The UM/ELI Report did not directly address NOAA's use of criminal investigators. However, most fishing violations take place offshore and out of sight, so it would be very difficult for dockside inspectors, uniformed or not, to detect or deter many types of fishing violations. Interviews with NOAA enforcement agents indicate that this is one reason why violations of fishing regulations are often detected as a result of tips and information provided to enforcement agents by fishermen during investigations of suspected violations or likely violators.

These interviews and other research results also lead to the conclusion that increasing the number of uniformed dockside inspectors "to provide greater enforcement visibility" may be counterproductive and not increase compliance rates or result in more violations being detected. As described earlier, the UM/ELI Report concluded that the high visibility of USCG vessels and communication among fishermen about their whereabouts make it difficult for USCG to detect many fishing violations at sea. Shore-based fishery enforcement carried out through JEAs involve mostly uniformed enforcement agents conducting port-based inspections and, based on interviews with enforcement agents who are familiar with these operations, seem to suffer from the same "visibility" problem as USCG vessels at sea. If this is the case, NOAA should investigate whether increasing the visibility of NOAA dockside enforcement staff and reducing their capacity to use techniques that are usually reserved for criminal investigations may result in less effective enforcement.

5.7 Regional Disparities in Penalties

The OIG Report noted that based on an examination of five years of NOAA enforcement data, fines imposed in New England are "two and a half times higher than the second highest region, and about five times or more higher than the other four regions." This is worth further examination, but the results of the UM/ELI Report indicate that this may reflect differences in regional fisheries and not any unfair regional disparity in the penalties NOAA imposes for fishing violations. For example, the average revenues per trip in the NEGF fishery, especially for large trawlers, are as much as ten times higher than in other UM/ELI case study fisheries. This implies that the potential economic returns from illegal fishing in that fishery, and the penalties that may be required to offset them, are both higher. Also, the deterrence necessary to increase compliance and the enforcement resources available to increase deterrence differ from one region to another. The relatively large numbers of fishing vessels and fishing ports in New England, for example, may make it relatively difficult for limited numbers of NOAA enforcement staff in this region to provide adequate deterrence by increasing the likelihood that violations will be detected. Similar challenges may not exist, for example, in California where there are relatively few fishing ports. Under the circumstances, increasing penalties may have been the only option for attempting to increase deterrence and achieve an acceptable rate of compliance in New England. An examination of these factors may provide logical reasons why fines for fishing violations in New England are higher than fines elsewhere.

Also, the OIG reports that during January 1, 2005 through June 30, 2009 $96 million in fines were collected from commercial fishermen and put into NOAA's Fishery Enforcement Asset Forfeit Fund. During that period total ex-vessel U.S. commercial fish landings were approximately $18.5 billion. If 10% to 20% of these landings were associated with illegal fishing, as the UM/ELI survey results indicate, the $96 million in fines for illegal fishing represent between 2% and 5% of earnings from illegal fishing. Whatever the OIG determines with regard to specific complaints about NOAA imposing excessive fines, the overall amount of fines charged by NOAA is small when compared to these estimated illegal earnings.

6. Conclusions and Recommendations

Specific conclusions and recommendations from the UM/ELI Report and the OIG Report were summarized previously in Section 3. Below are some additional conclusions and recommendations that are based on a combined assessment of the results of both studies.

6.1 Conclusions

- **Illegal fishing, although not widespread, is a significant problem** in U.S. commercial fisheries. Many fishermen believe illegal fishing is adversely affecting their livelihoods, and believe that it will prevent them from benefiting from ongoing fish stock rebuilding programs.

- **NOAA abuses of enforcement authority are not widespread**, but previous abuses need to be resolved and future abuses need to be prevented in order to encourage more voluntary compliance and cooperation between fishery enforcement staff and law-abiding fishermen.

- **Enforcement/compliance problems differ significantly among fisheries** and over time within fisheries. Deterrence necessary to achieve acceptable compliance rates requires that expected costs of detected violations are commensurate with potential illegal gain from undetected violations.

- **Weak deterrence is a growing problem**. The relatively low probabilities of a violation being detected, prosecuted, and penalized in some fisheries, combined with relatively low penalties, result in weak deterrence at a time when other economic factors favoring noncompliance are increasing and normative factors that favor voluntary compliance are weakening.

- **Addressing compliance problems will require enforcement reforms at USCG as well as NOAA**. Discussions about necessary reforms should include a realistic examination of the value of the current USCG at-sea enforcement program which is responsible for over 90% of federal spending on domestic fishery enforcement.

- **Prosecution of chronic and substantial violators needs to be more forceful.** Chronic violators account for a disproportionately high amount of the illegal harvest, and many fishermen believe they have a significant adverse effect on the incomes of law-abiding

fishermen and the health of fish stocks. Many law-abiding fishermen want chronic violators more aggressively targeted and punished and/or to have their fishing privileges revoked.

- **Enforcement data collection and analysis is inadequate.** NOAA needs more effort in collecting, analyzing, and interpreting fisheries enforcement data. USCG is misrepresenting compliance data it collects. Some important information about violations that are not detected during routine enforcement activities need to be obtained via routine surveys and interviews or intelligence gathering that involves fishermen collaborating with enforcement staff.

6.2 Recommendations

- Implement a "Smart Compliance Policy" that employs different types of enforcement strategies and penalties with different groups of fishermen based on their compliance histories. Such strategies should include aggressive targeting of frequent violators, criminal penalties and mandatory forfeiture of fishing privilages for certain types of violations, and incentive programs to support compliance and collaborations between law-abiding fishermen and enforcement staff. Enforcement priorities and penalty assessments should be fully documented so observed differences are not viewed as arbitrary.

- Initiate a review of all spending on enforcement in U.S. commercial fisheries to determine if budgets needs to be adjusted in order to achieve compliance rates high enough to allow legally mandated fish stock rebuilding goals to be achieved.

- NOAA and USCG should spend more time collecting, analyzing, and interpreting fisheries enforcement data and also supplement that data using routine surveys and/or interviews to learn as much as possible about fishing violations that are not detected by enforcement agents and therefore not reflected in conventional enforcement data.

- Remote sensing and increased use of observers for at-sea enforcement should be considered, along with additional training and incentives for at-sea observers and inspectors and more use of observers and electronic monitoring in situations where it is unlikely that USCG boarding parties will detect violations.

- Enforcement reforms should include inducements or rewards for fishermen who collaborate with fishery enforcement agents to target and convict chronic violators.

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