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conservation law foundation

For a thriving New England

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September 6, 2017

Honorable District Judge William G. Young
John Joseph Moakley U.S. Courthouse
1 Courthouse Way, Suite 2300
Boston, Massachusetts 02210

Re: *United States v. Carlos A. Rafael*, No. 16-CR-10124-WGY (D. Mass.)

Honorable Judge Young:

Conservation Law Foundation ("CLF") respectfully submits this letter as a victim impact statement for your consideration as you evaluate appropriate criminal penalties for Rafael in the above-captioned matter. CLF is a member-supported non-profit organization that uses law, economics, and science to protect New England's natural resources and communities from environmental threats. CLF and its members, who include fishermen, have a deep and abiding interest in the health and sound management of New England's fisheries. Since 1989, CLF has worked on groundfish management issues in court and before the New England Fisheries Management Council and the National Oceanic and Atmospheric Administration ("NOAA") to pressure these bodies to achieve the management objectives of federal fisheries law. In our opinion, CLF's efforts and the valuable programs that some of these efforts helped produce were significantly harmed by Carlos Rafael's crimes.

On March 30, 2017, Rafael pled guilty to all 28 criminal counts against him in this matter, including conspiracy to evade federal fishing quotas and profit from the sale of misreported fish, and falsified reporting to the federal government. Rafael's egregious crimes inflicted severe damage that has rippled across many communities. We submit this statement to call the Court's attention to the broad suite of victims who are suffering as a direct result Rafael's crimes, including:

- a New England commercial groundfish fishing community, central to the culture and history of our region, that has declined over the past decade, in our belief, partly due to an inability to compete with illegal fishing operations such as Rafael's;
- all participants in the groundfish fisheries that were affected by misreported information, which skews stock assessment models and weakens the credibility of fisheries scientists, thereby compromising acceptable future catch levels for all;

- conservation groups such as Conservation Law Foundation and recreational fishing groups who have worked for decades on behalf of the public and their thousands of members to safeguard the health and sustainability of New England's fisheries, the success of which has been undermined and jeopardized by Raphael's crimes and criminal activity;
- all New Englanders who value or make their living from the iconic groundfish populations that are among the stocks Mr. Rafael's boats illegally landed and misreported, and which have been subject to ongoing overfishing since the 1990s; and
- all who have a stake in a fishery management scheme that has not been able to achieve its statutory objectives of producing a sustainable yield of these stocks despite ever-tightening catch limits.

In particular, we write to your Honor on behalf of the many fishermen who are fearful of publically speaking out against Rafael even now, given the very real threat that his federal civil settlement will allow him to continue to participate in the New England commercial fishing industry. Many suspect, with good cause, that Rafael will continue to control his fishing businesses even if he receives jail time for his crimes. As we describe below, Rafael's historic contempt for his fellow fishermen and tactics of intimidation are well documented. His moniker, "The Codfather," speaks for itself. It is no surprise, then, that many of the fishermen most directly victimized by Rafael's crimes are unwilling to put their livelihoods at risk by publically detailing their harms to this Court. A few of the more forthright industry representatives have spoken out in the press, and we have enclosed copies of those press materials and incorporate them into this victims' statement for your Honor's consideration. We endeavor here to give voice to the many other silent victims, and all fishery stakeholders.

On behalf of all victims, we respectfully urge the Court to impose criminal penalties that are commensurate with the significant injuries Rafael inflicted through his crimes.

I. Rafael's illegal catches and falsified reports injured the fishing community and destabilized the fisheries regulatory regime.

Rafael's crimes have damaged the fishing industry and the very foundations of our regulatory system, undermining the well-being of every participant and stakeholder, and imposing significant costs.

Nothing is more corrosive to our fisheries regulatory scheme than fraud. Due to the cost of placing individuals on fishing boats to monitor activity, NOAA was only able to fund third-party observers on 14 percent of groundfish trips in New England last year.[1] This means that the

[1] NOAA, *NOAA Fisheries Announces At-Sea Monitoring 2017 Coverage Levels for Groundfish Sector Fishery* (Mar. 15, 2017), *available at* https://www.greateratlantic.fisheries.noaa.gov/mediacenter/2017/03/15_asm2017levels.html.

fundamental integrity of this critical fishery is on an honor system for vast majority of the time spent fishing; NOAA, fisheries scientists, other fishermen and the public must rely on fisherman to accurately self-report the amount, weight, location, and type of fish they catch. Another critical source of fishery data that directly impacts scientists' evaluation of population health is dealers' reports on recorded landings. These data sets are used by the populations assessment scientists at the NOAA Northeast Fisheries Science Center in Wood's Hole as inputs to their population assessment models, used in turn to propose maximum harvest levels to federal fishery managers. Most fisherman and dealers handle this responsibility with integrity; but we believe Rafael's criminal misreporting of landings has tarnished the reputation of all.

Furthermore, Rafael's crimes have caused fishermen to question the validity of their quota limits under the current catch-share program. The catch-share management system established in 2010 apportioned shares based on ten-year historic catch totals. Based on now-questionable catch numbers, Rafael accrued the biggest stake of groundfish shares. Rafael reportedly owns significant amounts of quota in nearly all groundfish species, including almost 10 percent of Georges Bank cod, 8.3 percent of Georges Bank haddock, 14.5 percent of Georges Bank yellowtail flounder, and nearly 23 percent of Georges Bank winter flounder.[2]

What's more, as noted above, Rafael's falsified data has flowed directly into the scientific models used to determine future catch-share allocations. Over the past few years, population predictions about yellowtail flounder and cod stocks based on these models has proven to be so unreliable that scientists have concluded that some of the models are no longer credible for providing management advice on quotas. American plaice and witch flounder models also remain largely out of sync. All of these are stocks that Rafael inaccurately reported or illegally fished, and of which Rafael had an outsized, substantial share. While a causal relationship will likely never be determined between Rafael's criminal misreporting and the failure of these models, the coincidence is striking and noteworthy.

In a regulatory scheme where scientists and the public depend on fishermen and dealers for accurate data and where fishermen depend on science to set accurate and sustainable catch targets, illegal actors such as Rafael initiate a negative feedback loop that is virtually impossible to overcome. Everyone gets hurt and is therefore a victim of such criminal activity—false data causes scientists and fisheries managers to doubt the validity of their datasets and catch advice, which in turn leads to establishment of more conservative catch levels or high-cost enforcement measures, or both. Law-abiding fishermen will bear the burden of expected higher monitoring compliance costs as a result of Rafael's crimes.

Just as importantly, false data can lead fishermen, committed conservation groups such as Conservation Law Foundation, concerned politicians, and the public to doubt agency guidance. The anxiety surrounding the stability and future of our fisheries is well documented; regulations

[2] Specific information on Rafael's catch and holdings is difficult for the public to access because of various confidentiality provisions implemented by NOAA pursuant to section 402(b) of the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1881a(b).

built on falsified data erode faith in the regulatory system and put critical management measures at risk.

II. Rafael ostensibly used criminal behavior to gain unfair market advantage at the expense of competitors.

As fishing businesses were collapsing around him, it is likely that Rafael's illegal behavior gave him a significant competitive advantage that allowed his business to buy out struggling competitors and increase his market share. In 2010, Rafael "horded" fishing permits in anticipation of the new catch-share system, allegedly spending $10 million[3] and growing his share of groundfish revenue from 9 percent to more than a quarter.[4] As of 2013, he was allegedly using 57 permits to operate 15 full-time trawl vessels and five part-time trawl vessels.[5] The size of his fleet, the large quotas, and his species misreporting allowed him and his fishing sector to continue fishing for groundfish when smaller operators could not. Much of this impact fell on the smaller fishing operations. Of the 120 boats that exited the fishery between 2010 and 2013, small boats left around twice the rate of larger boats.[6]

We urge the Court to consider the dire conditions of the groundfish fishing industry over the past five years, which put Rafael's crimes into sharp relief. Struggling groundfish populations—the very ones Rafael was directing his boats to catch and misreport—are in need of sustainable management and recovery. In 2012, the Department of Commerce declared the Northeast multispecies industry to be in a state of disaster.[7] Between 2011 and 2013, the value of the groundfish sector in New Bedford declined from $31 million to $19 million, losing a third of its value and costing over a hundred jobs.[8] THE BOSTON GLOBE ran a headline asking *Is this the end*

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[3] *See* Danny McDonald, *Carlos Rafael and His Fish Are the American Dream*, VICE (May 24, 2013), *available at* https://www.vice.com/en_us/article/kwnmea/carlos-rafael-fish-interview.

[4] Ben Goldfarb, *The Deliciously Fishy Case of the "Codfather"*, MOTHER JONES (Mar. 17, 2017), *available at* http://www.motherjones.com/environment/2017/03/codfather-carlos-rafael-fish-fraud-catchshares/.

[5] *See* Brendan Borrell, *The Last Trial of the Codfather*, HAKAI MAGAZINE (Jan. 10, 2017), *available at* https://www.hakaimagazine.com/article-long/last-trial-codfather.

[6] Goldfarb, *supra.*

[7] *See* NOAA Fisheries, *Secretary of Commerce declares Fisheries Disasters in Northeast, Alaska, and Mississippi* (Sept. 13, 2012), *available at* http://www.nmfs.noaa.gov/stories/2012/09/09_13_12disaster_determinations.html.

[8] *See* Borrell, *supra.*

of the New England fisherman?,[9] and Massachusetts set up a disaster relief fund for the struggling groundfish industry.[10]

In the midst of this devastation, Rafael was declared the "American Dream" by one media outlet, effortlessly and inexplicably thriving against odds that other dedicated, talented fishermen could not seem to overcome.[11] It is now known that what Rafael's failed competitors lacked was the benefit of a massive, vertically integrated criminal conspiracy and that his "American Dream" was more of an "American nightmare" for everyone else. It is our conclusion that Rafael distorted the market by leveraging fraudulent landings sales to expand, while the law-abiding fishermen struggled (and too often failed) to survive.

III. Rafael's behavior demonstrates malice and brazen disregard for the law.

Rafael has evidenced persistent, open, malicious and selfish disregard for the fishing community, regulators, and the public whose resources he has pillaged. Taken as a whole, Rafael's course of conduct should, we believe, lead this Court to conclude that his crimes deserve maximum punishment.

Rafael's reputation for aggressively challenging and belittling anyone who stood in his way is well-known by anyone in the groundfish fishery and is well-corroborated by Rafael's own reported statements to the media, as the following reported comments make clear. When his business was just starting out, Rafael would bid highest on daily hauls before systematically driving the price down later, claiming "*shame on them if they didn't know any better*."[12] When struggling fishermen protested the size of his colossal operation, Rafael decried them in crude terms as "*mosquitos on the balls of an elephant*"[13] and "*maggots screaming on the sidelines . . . they can scream all they want. Nobody can save them*."[14] He sued Massachusetts for excluding him from a portion of the state disaster relief funding, then threatened to sell his boats to a buyer out-of-state out of spite, arguing that he "*didn't want them to bring in one dollar for this state again*."[15]

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[9] Jenna Russell, *Is this the end of New England fishermen?*, BOSTON GLOBE (June 16, 2013), *available at* https://www.bostonglobe.com/magazine/2013/06/15/this-end-new-england-fisherman/XDE93VGrorgaz5iwui7s3L/story.html.

[10] *See* Jennifer Smith, *Mass. to receive $14.5m for groundfish disaster funding*, BOSTON GLOBE (May 29, 2014), *available at* https://www.bostonglobe.com/metro/2014/05/28/massachusetts-receive-million-for-groundfish-disaster-funding/ummCB1OfL0QL15ErdsuVSJ/story.html.

[11] *See* McDonald, *supra.*

[12] *Id.*

[13] Goldfarb, *supra.*

[14] McDonald, *supra.*

[15] Simon Rios, *King of New England groundfishing plans to sell his fleet out of New Bedford*, SOUTH COAST TODAY (Jan. 4, 2015), *available at* http://www.southcoasttoday.com/article/20150104/NEWS/150109720.

Rafael's self-centered philosophy and fundamentally criminal state-of-mind is plainly revealed in a quote recently attributed to him by a regulator: *"I am a pirate . . . . It's your job to catch me."*[16] To anyone involved in exercising the privilege of fishing in federal waters in the United States or anyone trying to manage or promote sustainable management of sustainable, healthy fisheries, this statement and perspective are extremely alarming. Pirates are criminals who do not abide by the laws or faithfully perform the responsibilities of a commercial fisherman. Pirates are not and should not be afforded the privilege of harvesting public resources, particularly those that are on the fragile edge of collapse. Pirates cannot be trusted to respect a management regime on which a great many honest fishermen depend for their livelihoods.

We respectfully urge the Court to impose criminal penalties that are just and commensurate with the significant economic, reputational, and environmental damage Rafael inflicted on the above-listed victims through his extensive crimes, including full forfeiture of all the vessels identified by the Department of Justice and NOAA as having played a part in this criminal enterprise. Given the notoriety of the defendant and the widespread attention on this case, Rafael's criminal penalties must be of sufficient magnitude to deter future illegal fishing conduct. The government has recommended the low end of possible prison time, per the Plea Agreement. As your Honor is well aware, criminal sentencing is not constrained by the prosecution's recommendation; the Court has sole discretion to impose Rafael's sentence up to the maximum sentence allowed by law. In the wake of Rafael's audacious illegal behavior, we feel it is critical that his term of imprisonment and other penalties send a strong signal that conduct like Rafael's will not be tolerated in our nation's fisheries. As we detailed above, illegal fishing and misreporting have real adverse consequences for real people; accordingly, we believe violators should be given penalties that are more than a mere "slap on the wrist" and a cost of doing business.

With regards to Rafael's fishing vessels subject to forfeiture, we respectfully urge the Court to consider the gravity of Rafael's crimes and order the forfeiture of all connected vessels. We strongly believe that Rafael and his associates should not gain any further benefit from vessels and permits that were used in the commission of crimes. Given the significant harms inflicted by Rafael through his crimes, forfeiture of *all* vessels identified in the indictment would be proportional and just.

Indeed, the purpose of the forfeiture provision of the Lacey Act, 16 U.S.C. § 3374(a)(2), is to impose strict penalties that match the grave environmental and economic impacts of illegal wildlife trade. The Report of the Senate Environment and Public Works Committee that accompanied the Lacey Act Amendments of 1981 explains that the amendments, including section 3374(a)(2), were a reaction to evidence that "uncovered a massive" and "highly profitable" illegal trade in fish and wildlife, often run by "well organized," "sophisticated,"

[16] Goldfarb, *supra*.

"professional criminals."[17] The Committee highlighted "grim environmental consequences" of illegal wildlife trade, which "threatens the survival of many species" and has "severe" economic consequences.[18] One of the express purposes of the Lacey Act Amendments of 1981 was to address enforcement problems that had developed over time due to the fact that the original statute's "penalties [we]re too low, and the culpability standard too stringent."[19] According to the Committee, "[f]orfeiture of equipment that has been used—and may be used again—in violation of the Lacey Act fosters the purpose of preventing further illicit use of the equipment and by imposing an economic penalty, thereby rendering illegal behavior unprofitable."[20]

Overall, legislative history suggests that Congress intended for the Lacey Act Amendments of 1981 to impose strict penalties that would deter sophisticated violators like Rafael and prevent repeat offenses. In the case of Rafael, forfeiture of *all* vessels and properties engaged in the illegal activities would further both of these aims.

Additionally, as the Court considers the fate of forfeited vessels, we respectfully urge the Court to consider remedies that would help bring relief to the fishery that has borne the brunt of Rafael's crimes. Rafael has pled guilty to crimes that have harmed many victims. This Court has discretion under Title 18 of the U.S. Code to order restitution to certain victims in connection with several of Rafael's crimes, including conspiracy (18 U.S.C. § 371) and falsifying federal records (18 U.S.C. § 1519).[21] Additionally, under the Mandatory Victims Restitution Act of 1996, 18 U.S.C. § 3663A, restitution is mandatory in any case where a victim has directly and proximately suffered a pecuniary loss as a result of a crime. In cases of illegal fishing, courts have held that such victims can include governments, who are trustees of public resources and represent the public's interest in protecting natural resources from illegal harvest.[22] Accordingly, we ask the Court to create a process by which fishing operations that believe they have been directly harmed by Raphael's illegal actions can make a claim for restitution.

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[17] S. REP. No. 97-123, at 1 (1981), *reprinted in* 1981 U.S.C.C.A.N. 1748.

[18] *Id.*

[19] *Id.* at 2.

[20] *Id.* at 14.

[21] 18 U.S.C. § 3663(a)(1)(A).

[22] *See* United States v. Bengis, 631 F.3d 33 (2d Cir. 2011) (where defendant plead guilty to conspiracy to violate Lacey Act by illegally harvesting lobsters in South Africa, finding that South Africa was due restitution under the Mandatory Victims Restitution Act); United States v. Oceanpro Indus., Ltd., 674 F.3d 323, 331, 332 (4th Cir. 2012) (upholding a restitution order to Maryland and Virginia where seafood wholesaler was convicted of conspiracy to violate Lacey Act, finding that the states "possess a legitimate and substantial interest in protecting the fish in their waters as part of the natural resources of the State and its fishing industries" and that "[t]o qualify as victims, Maryland and Virginia need not even have been 'owners' of the striped bass, although they were after the fish were illegally caught; they merely had to have interests that were 'harmed' as a result of the defendants' criminal conduct. Because we have concluded that their interests were indeed harmed, the States were victims and therefore properly awarded restitution").

Restitution proceeds could be obtained from the sale of forfeited vessels. Proceeds should also be used to fund fisheries monitoring initiatives that help to mitigate the adverse impacts caused by Rafael's crimes. Greater monitoring coverage would not only help to deter and identify illegal fishing operations like Rafael's but also improve data collection and scientific models that have been compromised by Rafael's illegal behavior. Enhanced monitoring coverage would allow fishing industry regulators and participants a more complete and accurate picture of what is happening on the water, which should in turn enhance the reliability of fisheries management models and control measures. Electronic monitoring, in particular, has the potential to feasibly allow 100-percent monitoring coverage, and would represent a major step forward in managing New England's complex and diverse fisheries and making Raphael's approach to fishing a bad chapter in New England fishing that everyone can now move beyond. Lack of adequate NOAA funding has resulted in delay in implementation of much-needed electronic monitoring programs. Funds obtained in connection with Rafael's violations could provide critical support for such programs.

Thank you for your consideration.

Sincerely,

Peter Shelley
Senior Counsel

Megan Herzog
Staff Attorney

Encls.

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Thomas A. Nies, Executive Director, New England Fishery Management Council

Letter: 'Codfather' should lose all his permits

southcoasttoday.com /opinion/20170503/letter-codfather-should-lose-all-his-permits

Carlos Rafael's environmental crime spree, spanning two decades, will finally come to an end. He pleaded guilty to federal charges of falsifying fish catch reports, conspiracy and tax evasion. He will serve at least four years in jail and will forfeit millions of dollars in fishing assets. For law abiding fishermen, this day is long overdue.

While other fishermen were complying with steep reductions in fishing quotas, Carlos Rafael decided those rules didn't apply to him. His violations set back groundfish rebuilding requirements, and forced others to compete with his illegal activity on the fishing grounds and in the market. He has harmed the entire groundfish industry, and fishermen from Maine to New York deserve to be compensated.

Carlos Rafael's history is so egregious that the National Marine Fisheries Service is obliged to cancel all his groundfish permits and fishing privileges. Existing regulations describe a process for re-distributing the fishing privileges from canceled permits to all other permit holders in the fishery — and this is precisely the process that should be followed in this case.

Maggie Raymond

Executive director, Associated Fisheries of Maine

Letter to the editor: Honest fishermen should get lawbreaker's privileges

Carlos Rafael's environmental crime spree, spanning two decades, will finally come to an end. Rafael pled guilty to federal charges of falsifying fish catch reports, conspiracy and tax evasion. He will serve at least four years in jail and will forfeit millions of dollars in fishing assets. For law-abiding fishermen, this day is long overdue.

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Maggie Raymond

executive director,

Associated Fisheries of Maine

South Berwick

JOHN PAPPALARDO: RAFAEL SHOULD BE PERMANENTLY BANNED FROM FISHING, REDISTRIBUTION OF QUOTA

May 15, 2017 — SEAFOOD NEWS — Carlos Rafael pled guilty to running a massive criminal enterprise that stole from honest fishermen and undermined the fisheries as a whole. One of his quotes offers a revealing insight into his perspective:

"This is America; anything can happen, with money behind it."

Let's put his money to work fixing the fishery he badly damaged.

Carlos Rafael should be banned from commercial fishing forever. The fish quota he owns should be redistributed to all the fishermen he harmed. That's what existing regulations mandate, that's what many in the industry believe, and we agree.

But we can demand and expect more. Honest fishermen have not been playing on a level field with the likes of Carlos. We need to make sure they aren't put in that position again.

To do that, we must invest some of his illegal gains in fishing's future by improving dockside monitoring, expanding electronic monitoring and increasing fishermen-scientist collaborations to get better fish counts.

We can transform this moment into an opportunity to create the oversight and infrastructure necessary to make honest, long-term success possible for our iconic fishery.

This can happen, and Carlos Rafael's money should be behind it.

This letter originally appeared on SeafoodNews.com, a subscription site. It is reprinted with permission.

Letter: Rafael's ill-gotten gains should go to those he cheated

southcoasttoday.com /opinion/20170517/letter-rafaels-ill-gotten-gains-should-go-to-those-he-cheated

Carlos Rafael pleaded guilty to running a massive criminal enterprise that stole from honest fishermen and undermined the fisheries as a whole. One of his quotes offers a revealing insight into his perspective:

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John Pappalardo

CEO, Cape Cod Commercial Fishermen’s Alliance

What justice looks like for our fisheries

capecodtimes.com/opinion/20170520/what-justice-looks-like-for-our-fisheries

By John Pappalardo

By John Pappalardo

The high-profile arrest of Carlos Rafael followed by his guilty plea to lying about the fish he caught and sold is final proof of the existence of a devastating rogue wave that has battered the historic New England fishery.

Rafael tainted an entire industry, making fools of hardworking, honest fishermen who have been playing by the rules under increasingly difficult circumstances.

It's entirely possible that his illegal reporting distorted the scientific analysis that powered our fish population assessments. By mislabeling depleted species and selling them as abundant species, Rafael kept scientists from making honest estimates of how much fish actually was in the water. Public policy was built on bad assumptions, which in turn created double damage — lowering limits on the amount of fish honest fishermen were allowed to bring to shore while at the same time stealing the resource we are all committed to rebuilding.

Now comes the crucial question: What does justice look like in the aftermath of an admitted economic and environmental crime of this magnitude?

First, Carlos Rafael should be banned from commercial fishing, forever.

Second, the fishing quota he owns (pounds of fish allowed to be landed each year) should be redistributed to all of the fishermen in our region, because they are the ones most damaged by his criminal enterprise.

Third, additional revenue on his assets, whether from outright confiscation and sale, or fines and penalties, should be used to fund major improvements in how our fisheries are monitored and studied. This is the only way to assure that the same thing won't keep happening over and over again, to protect honest fishermen and to revive fish populations.

While most fishermen are hardworking and law-abiding, making a living in a dangerous but gratifying way, we need to acknowledge that Rafael is not the only person to game the system (though he's likely the worst). This is the moment to learn from what he was able to pull off and shut the door on anyone who aims to steal public resources from the ocean, other fishermen and the American public.

By Rafael's own estimation, his fleet is worth between $75 million and $100 million. In the plea bargain proposed in return for his guilty plea, only 20 percent of his holdings (13 vessels and permits worth about $15 million) would be confiscated. This would leave him with $60 million or more of assets.

That can't be right. All of his fishing assets should be forfeited. The $15 million defined in the plea bargain should be to make amends directly to fishermen, distributing rights to catch fish worth millions of dollars to the struggling fleet across New England. Rafael's actions did not damage just people in New Bedford, where at least the port accrued jobs processing the fish Rafael's boats illegally landed. His crimes damaged groundfish fishermen from Maine to New York.

A lifetime ban means he must sell his remaining $60 million of ill-begotten assets, and a big chunk of those proceeds should be forfeited to the government and used to repair the fishery he damaged. That means improved at-sea and dockside monitoring, as well as funding for more and better fish counts done through fisherman-scientist partnerships, to give us better data and drive better management decisions.

Fishery managers know we need to improve monitoring and accountability. They've fashioned something called Multispecies Amendment 23 to do so. As managers learn more about what Rafael did and how he did it, they will have more information to build better oversight and protections — and he should pay for that, too, so what he did can never be repeated.

Already, some of the best captains in our fleet are turning to video cameras to record every trip, and every catch. Revenue recouped from Rafael's criminal activities could be used to expand this fledgling electronic monitoring program.

This is how we can turn disaster into benefit, and help rebuild fish populations vital for our future.

New England fishermen have borne the brunt of a well-organized, cynical crime. We cannot make them whole, but we have a rare opportunity to offer compensation, return Rafael's assets to the remaining groundfishermen across New England, end opportunities large and small to keep on cheating, and give honest people a fair fighting chance to fish for a living.

That's what justice looks like now. And that should be the real legacy of Carlos Rafael.

— John Pappalardo is chief executive officer of the Cape Cod Commercial Fishermen's Alliance in Chatham.

Letter to the editor: The Codfather's money could help fix fishing

We wholeheartedly agree with your editorial about Carlos Rafael ("Our View: Catching 'The Codfather' should just be first step," May 14).

His criminal actions stole from honest fishermen and undermined the entire groundfishery for cod, flounder and other bottom-dwelling species.

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Yet an opportunity exists now to make both fishermen and the fishery itself whole again by taking even bigger steps, and one of his quotes offers inspiration:

"This is America; anything can happen, with money behind it."

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Honest fishermen have not been playing on a level field with the likes of Carlos.

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This can happen, and Carlos Rafael's money should be behind it.

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CEO, Cape Cod Commercial Fishermen's Alliance

Chatham, Massachusetts

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Despite guilty plea, 'Codfather' continues to fish

capecodtimes.com/news/20170811/despite-guilty-plea-codfather-continues-to-fish

Doug Fraser @dougfrasercct

Doug Fraser @dougfrasercct

New England fishermen are wondering how the fishing fleet owned by New Bedford fishing mogul Carlos Rafael continues to fish nearly five months after he pleaded guilty on March 30 in federal district court in Boston to 28 offenses, including conspiracy, false labeling of fish, bulk cash smuggling, tax evasion and falsifying federal records.

“It’s the question I’m asked nearly every day by the people I work for,” said Maggie Raymond, executive director of Associated Fisheries of Maine, representing fishing boats that fish the Gulf of Maine and Georges Bank.

Those vessels include many Rafael agreed to forfeit in his plea deal for their role in his scheme to sell fish he didn’t have enough quota to catch, under the name of species for which he had enough quota. The fishing year starts May 1 and Rafael won’t be sentenced until Sep. 25 and 26. Many are angry that Rafael’s fleet has been allowed to operate through the summer months when fishermen traditionally catch most of their fish.

“It infuriates those of us that have been crippled by onerous regulations yet have managed to comply,” Boston fishing vessel owners Chris and Amanda Odlin wrote in their comments to the National Oceanic and Atmospheric Administration on their decision to renew the operations plan of Rafael’s fishing sector.

Others commenters demanded the sector be disbanded and the quota redistributed to the region’s fishermen.

In May, NOAA renewed the IX Northeast Fisheries Sector, in which Rafael was listed as president, and in which he owns 21 of the 22 vessels listed as actively fishing. The renewal is an interim measure, NOAA spokesman Jennifer Goebel explained in an email, which could be revised after Rafael is sentenced next month.

“The way I’m interpreting it is that it is a rubber stamp approval of an operations plan unchanged from prior years,” said Hank Soule, manager of the Sustainable Harvest Sector in South Berwick, Maine. Soule contends that Sector IX hasn’t investigated or penalized Rafael, violating the enforcement requirements of the sector contract.

RAFAEL’S DAUGHTER MANAGES SECTOR

The sector system was created in 2010 as a way to deal with chronic overfishing of groundfish (cod, haddock, flounder and other bottom feeding species) and a fleet that was too large for the resource. Fishermen were allocated a percentage of the annual groundfish quota based on their landings history. They formed associations, known as sectors, to collectively manage their combined quota shares. Autonomy came at a price: They agreed not to overfish their quota and to self-police members to guarantee that.

Rafael was listed as the president of Sector IX for more than a year after he was arrested, and is virtually its only active member, owning 21 of 22 of the vessels designated as actively fishing this year. The sector’s contract with NOAA states that the sector’s manager, in this case Rafael’s daughter Stephanie Rafael DeMello, must investigate serious transgressions as soon as she is aware of them and send them to an enforcement committee. DeMello is also required to report enforcement issues to NOAA, but Soule, in his comment letter on the operations plan renewal, said he was told by the agency that no report had come from the sector as of April.

The Sector IX contract also stipulates that a third offense of “subverting the reporting requirements” is an automatic expulsion from the sector, which ends the member’s right to fish in the sector. In the court case, Rafael admitted to misreporting around 800,000 pounds of fish of various species and 25 instances of false labeling and fish

identification, and falsifying federal records. He cannot change his guilty plea, according Judge William Young, even if the plea deal falls through.

But Rafael has not been expelled from the sector and his vessels still ply the waters off our coastline.

Soule contends that NOAA had an obligation to penalize the sector when they didn't adhere to their own enforcement rules.

"We also believe the failure of NMFS (NOAA Fisheries) to enforce the terms of its agreement with (Sector IX) undermines the entire sector management system," Soule wrote in his May 30 comment letter to NOAA.

"Fishermen are saying why should I do this (comply with sector rules) if NMFS is going to turn a blind eye," Raymond said.

Citing an ongoing case, NOAA officials at the regional office in Gloucester, the Office of Law Enforcement, and their General Counsel in Washington, D.C., declined to comment.

'ENORMOUS COLLATERAL IMPACT'

Rafael didn't resign as president and from the board of directors until a May 23 meeting. Sector IX's new president, Virginia Martins, and manager DeMello did not return several emails and phone messages left for them requesting comment. Board member Daniel Georgianna, a UMass Dartmouth economics professor, declined to comment.

Gloucester fisherman and vessel owner Vito Giacalone is the chairman of governmental affairs, and sits on the board of directors of the Northeast Seafood Coalition, the umbrella organization that oversees a dozen sectors, including Rafael's. Up until 2016, Rafael was also a coalition board member.

Giacalone believed that Rafael was simply too big to be allowed to fail, that his sector worked with NOAA to enact changes — including bringing in new board members and a new enforcement committee — that allowed them to stay in business.

Rafael's vessels control considerable groundfish quota, up to 75 percent of what New Bedford holds, according to New Bedford Mayor Jon Mitchell, and Rafael has said he has 280 employees.

"You don't have to be too imaginative to see that that is an enormous collateral impact as soon as that operation is stopped in its tracks," Giacalone said, estimating that as many as 80 fishermen would be immediately out of work.

"I wish Carlos Rafael had thought about that before he did what did," Soule said. "The bottom line is New Bedford is the richest port in the U.S. The loss of his groundfish boats won't devastate the port."

NOAA is reportedly working with Rafael's legal team on an agreement that would have him selling off his vessels and permits and leaving fishing forever, including scallop and lobster vessels not involved in the fish smuggling scheme.

At least 13 vessels are scheduled to be forfeited to the government as part of the plea deal and Giacalone thinks NOAA may be trying to maintain the value of the assets by keeping them fishing.

"I think it would be clumsy of the sector to cause collateral damage that could be excessive to innocent third parties," Giacalone said.

— Follow Doug Fraser on Twitter: @DougFraserCCT.

May 4, 2017

Dear Governor Baker:

We request your support of our position on the dissolution of fishing rights associated with groundfish permits that have been, or will be, seized by the government in the case of *United States* v. *Carlos Rafael,* as well as any subsequent civil action carried out by the National Marine Fisheries Service Office of Law Enforcement.

Rafael has a history of egregious fishing violations spanning two decades (attached). In *United States* v. *Carlos Rafael,* he has pled guilty to falsifying fish catch reports, cash smuggling, and tax evasion. While other fishermen were complying with steep reductions in fishing quotas, Rafael decided the rules don't apply to him

Rafael's violations have set back groundfish rebuilding requirements, and forced others to compete with his illegal activity on the fishing grounds and in the market. Rafael has harmed the entire groundfish industry, and fishermen from Maine to New York deserve to be compensated.

The City of New Bedford has launched a campaign claiming that the permits issued to Rafael and seized by the government should stay in the control of the City. We disagree.

Existing regulations describe a process regarding fishing privileges associated with groundfish permits that are cancelled or otherwise removed from the fishery. Those privileges are to be redistributed to the entire fleet. This policy was developed by the New England Fishery Management Council, in a transparent public process, and was approved by the National Marine Fisheries Service in 2011 (attached).

It is our firm position that the National Marine Fisheries Service should cancel all of Rafael's groundfish permits, and redistribute the fishing privileges associated with those permits to the entire fleet. We request that you convey your support of our position to the National Marine Fisheries Service.

Sincerely,

John Pappalardo
Cape Cod Commercial Fishermen's Alliance

Maggie Raymond
Associated Fisheries of Maine

Christopher Brown
Rhode Island Commercial
Fishermen's Association

Ben Martens
Maine Coast Fishermen's Association

Hank Soule
Sustainable Harvest Sector

Cc: George Peterson, Jr., Commissioner, Fish and Game
David Pierce, Director, Marine Fisheries

ITEM	VIOLATION DATE	SETTLEMENT DATE	VIOLATION TYPE	CORPORATION	NOVA AMOUNT	SETTLED AMOUNT
1	3/95	8/94	NO OPERATOR PERMIT	JOAO-CARLOS	$2,000	$1,500
2	7/94	6/97	PURCAHSED FISH IN EXCESS OF TRIP LIMIT	CARLOS SEAFOOD	$39,000	$9,000
3	5/95	11/97	FALSE DAS DECLARATION	JOAO-CARLOS	$10,000	$1,000
4	5/95	12/97	FALSE DAS DECLARATION, NO/LATE VTR REPORT	C&J FISHING	$35,000	$3.500, 7-DAY OPERATOR SUSPENSION
5	1/98	12/98	EXCEEDED TRIP LIMIT, FAILED TO FILL OUT VTR, CONCEALED FISH	P&S FISHING	$35,000	$2,500
6	4/96	6/99	EXCEEDED DAS LIMIT	C&V FISHING	$15,000	$1,000, 2 DAS
7	6/95, 11/95	3/00	EXCEEDED TRIP LIMIT, INACCURATE VTR	IVONLIDE FISHING	$55,000	$10,000
8	2/00	8/01	CLOSED AREA VIOLATION, TOWED THROUGH GEAR	C&V FISHING	$65,000	$22,500
9	4/97, 8/97	3/02	FALSE LANDING REPORTS IN PERMIT APPLICATION	C&B FISHING	$220,000	$10,000, SOME SMB FISHING RIGHTS REVOKED
10	3/03	10/03	EXCEEDED TRIP LIMIT	IVONLIDE FISHING	$50,000+$135,113	$30,000+$110,000
11	12/02	UNKNOWN	EVADED BOARDING	R&P FISHING	$25,000	UNKNOWN
12	5/04	10/04	NO VMS, FISHING IN CLOSED AREA WITH NO DECLARATION	AJ&C FISHING	$40,000+$26,146	$517+$26,146
13	12/05	2/08	MESH SIZE	C&D FISHING	$70,000+$23,781	$30,000+$23,781
14	11/06	11/08	EXCEEDED TRIP LIMITS	C&B FISHING	$7,500	$3,800
15	8/12	UNKNOWN	EXCEEDED TRIP LIMIT	VILA FISHING	$6,000	UNKNOWN
16	11/11-11/12	UNKNOWN	INCORRECT DAS DECLARATIONS	APOLLO FISHING	$1,000	UNKNOWN
17	9/14	UNKNOWN	IMPEDED LAW ENFORCEMENT	LADY PATRICIA	$6,000	UNKNOWN
18	10/13	10/15	FALSE CATCH REPORT	IVONLIDE FISHING	$100,000, PERMIT SANCTION	$70,000, PERMIT SANCTION
19**	7/02	5/03	EXCEEDED TRIP LIMIT, DAS NOTIFICATION VIOLATION	MARINALDO FISHERIES**	$30,000+16,183	$30,000+16,183, 30-DAY OPERATOR SUSPENSION

Summary of fishery violations committed by Carlos Rafael prior to *United States* v. *Carlos Rafael*

decrease costs to the affected vessel owners. Groups of vessel owners, however, may elect to contract with the same service provider to help lower the costs associated with such requirements.

Exemption of the Dockside/Roving Monitor Requirements for Certain Permit Categories

Vessels issued a limited access NE multispecies Handgear A, Handgear B, and Small Vessel category permit are exempt from any dockside/roving monitoring requirements when operating in the common pool. Given this exemption, it is not possible for dockside/roving monitor service providers to provide statistically random coverage of all common pool trips, as required under Amendment 16, because not all common pool trips are subject to dockside/roving monitoring requirements. Therefore, the dockside/roving monitoring coverage regulations have been revised to accommodate this exemption, and specify that service providers must provide random coverage of all trips subject to the dockside/roving monitoring requirements.

Trip-End Hail Requirement

To facilitate dockside intercepts by both state and Federal enforcement personnel, beginning in FY 2011, all sector vessels and common pool vessels fishing under a DAS must submit a trip-end hail report via VMS prior to returning to port on each trip. Vessels subject to dockside monitoring (i.e., sector vessels starting in FY 2010 and common pool vessels starting in FY 2012) are required to submit both a trip-start and a trip-end hail report for that trip, consistent with current practice. The trip-end hail report must contain the same information as the trip-end hail report implemented by Amendment 16.

Inspection of Fish Holds

Amendment 16 established approval requirements for entities providing dockside/roving monitoring services. These standards included hiring individual dockside monitors that were capable of climbing ladders and inspecting fish holds. For FY 2010, NMFS developed operational standards necessary to implement the Amendment 16 dockside monitoring provisions, based on a pilot dockside/roving monitoring program conducted during the summer of 2009. These standards did not require dockside monitors to inspect fish holds for FY 2010. However, based on further evaluation of the performance of the dockside monitoring program and consideration of concerns expressed by enforcement personnel, this action now requires that dockside monitors inspect the fish holds for any trip that is assigned a dockside/roving monitor beginning in FY 2011. This requirement will enhance the enforceability of existing provisions and minimize the incentives to under-report/misreport the amount of regulated species landed.

11. Sector Measures

Distribution of the PSC From Cancelled Permits

As described in Amendment 16, a PSC represents an individual permit's portion of the total historical landings of each regulated species or ocean pout stock during FYs 1996–2006 by all permits, including those in confirmation of permit history (CPH), that were eligible to participate in the NE multispecies fishery as of May 1, 2008. If a permit had been cancelled after May 1, 2008, its historic landings between FYs 1996–2006 have still been used to calculate the total landings by eligible permits.

As noted above, the current regulations calculate the ACL available to sector and common pool vessels based on the cumulative PSCs of each permit participating in each sector. By default, if the owner of a particular permit has not elected to participate in a sector, that permit is considered to be participating in the common pool, and its PSC contributes to the sub-ACL available to the common pool at large. Similarly, if a permit or CPH is permanently cancelled for any reason, that permit or CPH cannot participate in sectors, or any fishery, and the PSC is used to contribute to the sub-ACL available to the common pool. Thus, the PSCs of cancelled permits artificially inflate the PSCs of those permits operating in the common pool and are not equitably distributed among all permits remaining in the fishery.

Beginning in FY 2011, the PSC of all valid permits, including those held in CPH, that are eligible to participate in the fishery must be recalculated as of June 1 of each year, unless another date is specified by the RA, to redistribute the landings histories of cancelled permits to all remaining eligible permits. To do so, the PSCs for each stock calculated pursuant to the process specified in Amendment 16 must be multiplied by a factor of "1/PSC of the remaining permits." These recalculated PSCs shall then be used to calculate ACEs for each sector during the following FY. For FY 2012 and beyond, a PSC that is calculated on June 1, shall affect sector ACE for the FY that begins on May 1, of the following year.

This provision means that each permit's PSC may increase on a yearly basis to reflect its higher portion of the historic landings of each regulated species and ocean pout stock due to the removal of the landings histories of any permits that were cancelled by June 1 of each year. This will ensure that the yearly PSC calculations reflect eligible permits at the beginning of each FY (May 1), and allow NMFS time to process such renewals. On or about July 1 of each year, NMFS will inform permit holders of updated PSCs through a permit holder letter sent to owners of a valid limited access NE multispecies permit or CPH.

The FW 45 proposed rule specified that the RA would recalculate FY 2011 PSCs for each permit using valid permits as of May 1, 2011, to update PSCs for FY 2011 and reflect permits cancelled through FY 2010. However, to ensure that permit owners had sufficient information to make informed decisions about whether or not to participate in sectors before the start of FY 2011 on May 1, 2011, the RA recalculated FY 2011 PSCs for each permit using valid permits as of February 11, 2011, to reflect permits cancelled through that date. This information was sent out to permit holders on February 11, 2011, to facilitate their decision to join a sector based on measures proposed in FW 45. The RA will recalculate PSCs for each permit as of June 1, 2011, to account for permits cancelled through FY 2010 and determine the PSCs that will be used to calculate FY 2012 sector ACE for each stock, consistent with the procedures outlined above.

Operations Plan Requirements

Amendment 16 specified that sectors must submit final rosters, proposed operations plans, including rosters and associated environmental analyses by September 1, so that NMFS could review such documents as part of the process to approve sector operations for the following FY. Based on industry input, this action increases the flexibility of these deadlines by requiring sectors to submit preliminary rosters and proposed operations plans to NMFS by September 1, and final rosters by December 1 of each year. Following further industry input submitted during the public comment period for this action and ongoing discussions with industry participants, NMFS will allow for a limited opportunity for additional changes to FY 2011 sector rosters to accommodate changes in vessel ownership that occurred after the submission of final sector rosters on

THE GENERAL COURT OF MASSACHUSETTS
STATE HOUSE, BOSTON 02133-1053

August 14, 2017

The Honorable Charlie Baker
Governor, Commonwealth of Massachusetts
Room 360, State House
Boston, MA 02133

Dear Governor Baker:

We are contacting you to state our interest regarding groundfish permits currently held by Mr. Carlos Rafael following the conclusion of the case, **United States v. Carlos Rafael.** Mr. Rafael has already plead guilty to criminal conspiracy, false labeling and fish identification, falsifying federal records, tax evasion and bulk cash smuggling. As a condition of his guilty plea, he will also forfeit thirteen fishing vessels and their associated groundfish permits. It is our understanding that under the Magnuson-Stevens Act, his actions would justify the permanent revocation and redistribution of these permits back to the National Marine Fisheries Service (NMFS) as part of the criminal case.

Mr. Rafael's blatant disregard for the law and sustainable fishing practices is a challenge to the beleaguered groundfish industry and has greatly harmed the vast majority of law abiding Massachusetts fishermen. Our fishermen, who have complied with federal quotas and regulations have been forced to compete with his illegal activities and further suffer the consequences on their future stock assessments. We urge you to contact NMFS to urge them to cancel each of his groundfish permits and redistribute the fishing privileges to all eligible permit holders in the Massachusetts fleet.

In addition to the redistribution of permits we strongly feel that any financial settlement of this case must take into account the collective harm caused by Mr. Rafael's criminal actions and seek to repair that damage. Responsible management of the groundfish stocks remains an ongoing issue, with compliance being the major challenge. While fishermen may agree or disagree about monitoring, the challenge is constant, and that is who pays for it. This concern could be alleviated if 100% electronic monitoring were to be implemented with the settlement from this case.

Mr. Rafael has been flouting the rules for decades. His fishing enterprises have accounted for hundreds of millions of dollars of economic impact over those decades, but he has gained at the expense of his fellow fishermen, federal regulators and even the researchers who have been

unknowingly using data fouled by his criminal schemes. With the hope of a significant financial penalty handed down in this case, implementation could be achieved without being burdensome to the fleet.

We thank you for your attention on this important matter.

Sincerely,

Sarah K. Peake
State Representative
4th Barnstable

Patricia A. Haddad
State Representative
5th Bristol

Bradford R. Hill
State Representative
4th Essex

Julian Cyr
State Senator
Cape & Islands

Timothy R. Whelan
State Representative
1st Barnstable

Patrick O'Connor
State Senator
Plymouth & Norfolk

Bruce E. Tarr
State Senator
First Essex & Middlesex

Mathew M. Muratore
State Representative
1st Plymouth

Tackey Chan
State Representative
2nd Norfolk

William Crocker
State Representative
2nd Barnstable

Vinny M. deMacedo
State Senator
Plymouth & Barnstable

James M. Cantwell
State Representative
4th Plymouth



LENFEST OCEAN PROGRAM

RESEARCH SERIES

JUNE 2009

Fishing violations in New England could jeopardize fish population recovery.

NEW ENGLAND FISHERIES ENFORCEMENT

A SUMMARY OF NEW SCIENTIFIC ANALYSIS:

King, D. and Sutinen, J. 2009. Rational noncompliance and the liquidation of Northeast groundfish resources. *Marine Policy.*

IN NEW ENGLAND, government officials enforce fisheries regulations developed to prevent overfishing and allow recovery of depleted fish populations. However, the number of times that fishermen have violated regulations has doubled since the 1980s, and a substantial number of fishermen, managers, scientists and enforcement officials believe that noncompliance levels are high enough to jeopardize fisheries rebuilding programs and the health of the resources.

In a nationwide study, Drs. Dennis King and Jon Sutinen examined fisheries enforcement compliance rates and their associated financial implications. In a case study of the Northeast multispecies groundfish (NEGF) fishery, they found that given the conditions in the fishery and current levels of enforcement, there are high economic incentives for fishermen to violate regulations. They also found evidence that social factors that usually support voluntary compliance, including moral obligation and community pressure, are declining as the credibility of fisheries regulations among fishermen decreases and economic pressures increase. The authors call for a smart compliance program that focuses enforcement and penalties on frequent offenders, while strengthening the basis of moral obligations to comply. This *Lenfest Ocean Program Research Series* report is a summary of the scientists' findings.

ILLEGAL FISHING IS SIGNIFICANT

The authors examined noncompliance by analyzing enforcement records and surveying affected stakeholders such as fishermen, researchers, fisheries regulators and enforcement officials. Based on their survey results, the authors estimate that between 12 and 24 percent of the NEGF fishery catch is illegal. From enforcement data, they calculated that the financial gains from illegal fishing are five times greater than the expected penalty, taking into account 1) the likelihood of a violation being caught (Figure 1), 2) the percent of violations that are prosecuted and 3) the size of the typical penalty. For example, a captain on a mid-size trawler could expect to increase his profit on average by $4,334 per trip, by fishing illegally.

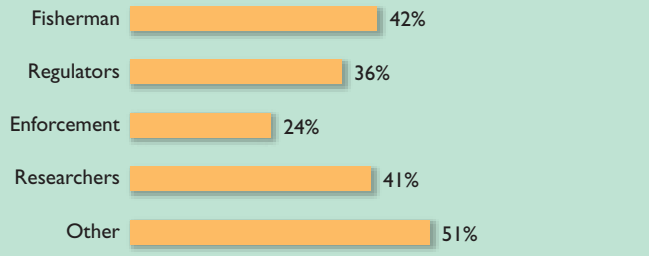
A substantial fraction of violations are accidental, rather than intentional (Figure 2). Chronic, intentional violators constitute a smaller number of fishermen (Figure 3). These chronic violators, who account for most of the illegal harvest, are motivated by the clear economic gain and low likelihood of being caught or penalized.

FISHING VIOLATIONS JEOPARDIZE FISHERY HEALTH

Significant percentages of survey respondents believe that illegal fishing currently undercuts the biological and economic health of the fishery. Large majorities of respondents believe that one or more of the possible types of violations are significantly harming the fishery. While there appears to be a near consensus on this matter, opinions about the relative impacts of specific types of violations are more varied (Figure 4).

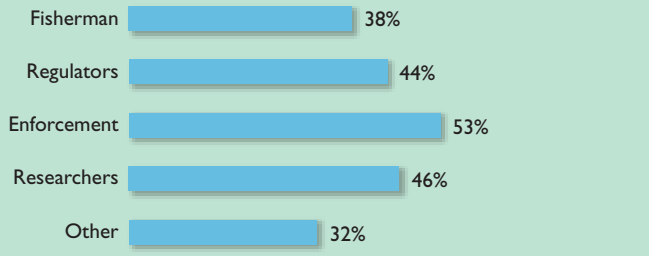
At current levels of noncompliance, a large majority of enforcement agents and approximately a third of fishermen believe that illegal fishing reduces long-term economic gains for fishermen who follow the rules (Figure 5). Similarly, 68 percent of enforcement personnel and a third of fishermen believe that illegal fishing will prevent law-abiding fishermen from benefiting from population rebuilding programs.

FIGURE 1: WHAT PERCENT OF VIOLATIONS OF U.S. FISHERY LAWS DO YOU THINK ARE DETECTED?



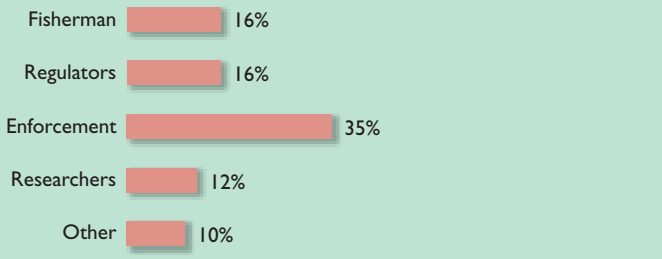
NOTE: RESPONSE ROUNDED IN MEAN PERCENTAGES LUCIDITY INFORMATION DESIGN, LLC

FIGURE 2: WHAT PERCENT OF VIOLATIONS IN THE NEGF FISHERY ARE INTENTIONAL AS OPPOSED TO ACCIDENTAL?



NOTE: RESPONSE ROUNDED IN MEAN PERCENTAGES LUCIDITY INFORMATION DESIGN, LLC

FIGURE 3: WHAT PERCENT OF COMMERCIAL FISHERMEN DO YOU THINK ROUTINELY VIOLATE FISHERY LAWS?



NOTE: RESPONSE ROUNDED IN MEAN PERCENTAGES LUCIDITY INFORMATION DESIGN, LLC

FIGURE 4: PERCENT OF GROUP RESPONDING THAT SPECIFIC TYPES OF VIOLATIONS HAVE A SIGNIFICANT, OR GREATER THAN SIGNIFICANT, ADVERSE IMPACT ON THE HEALTH AND MANAGEABILITY OF NE GROUNDFISH RESOURCES

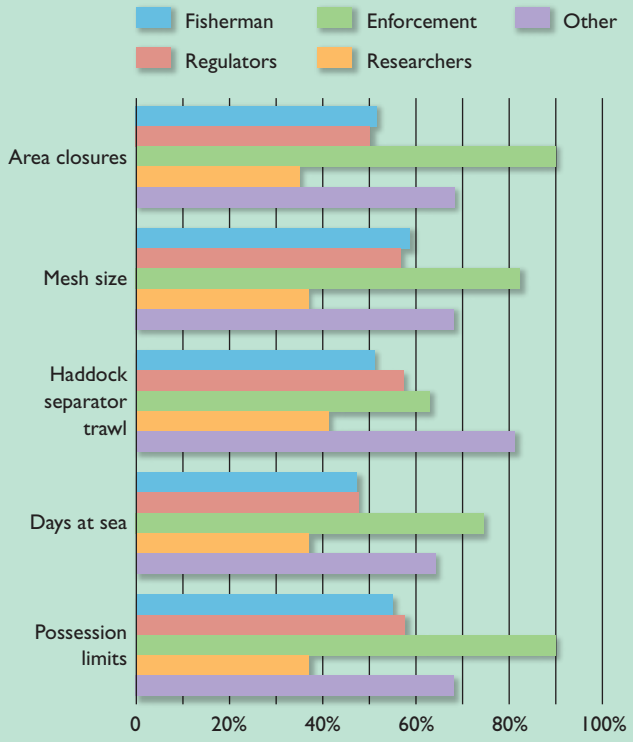


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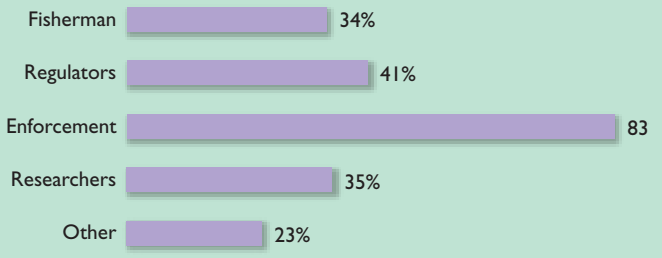
FIGURE 5: AGREE OR STRONGLY AGREE THAT THE ADVERSE EFFECTS OF FISHING VIOLATIONS ON FISH STOCKS ARE SIGNIFICANT ENOUGH TO REDUCE LONG-TERM ECONOMIC RETURNS FROM FISHING



NOTE: RESPONSE ROUNDED IN MEAN PERCENTAGES LUCIDITY INFORMATION DESIGN, LLC

Significant percentages of survey respondents believe that illegal fishing currently undercuts the biological and economic health of the fishery.

FUTURE ECONOMIC AND SOCIAL FACTORS WILL LIKELY ENCOURAGE INCREASED ILLEGAL FISHING

Other studies indicate that most fishermen comply with fishery regulations most or all of the time because of a sense of moral obligation and social pressure, despite economic incentives to do otherwise. Unfortunately, the influence of these factors is diminishing in the NEGF fishery. The U.S. Magnuson Stevens Act requires managers to end overfishing of all fish stocks and rebuild them over time. This will require tightening fishing restrictions which will increase economic pressure on fishermen and incentives not to comply. Moreover, illegal fishing undermines fishermen's trust in the legitimacy of fishery management decisions because fishermen know that illegal fishing makes it harder for populations to recover and that unreported catches make it harder for managers and scientists to get accurate data on catch levels. When fishermen disagree with a regulation or question the legitimacy of the management institutions, they are more inclined to violate fishing rules. As more individuals question the validity of rules in the NEGF fishery, the social norm may shift in favor of noncompliance.

IMPLEMENT SMART COMPLIANCE POLICIES

Stronger economic incentives to fish illegally, combined with weaker legitimacy of the management process in the eyes of fishermen, suggest that a smart compliance and enforcement process is needed to prevent further biological and economic decline in the NEGF fishery. A Smart Compliance program:

- **Targets frequent offenders with severe penalties that sufficiently deter violations.** Focusing enforcement more heavily on frequent offenders increases the chances that offenders will be caught and prosecuted. In addition, it can prevent other fishermen from concluding that violators are immune from punishment, and that the rules are not being applied fairly and will not have the intended effects on fish stocks.
- **Provides enough deterrence to discourage occasional offenders.** Uniformly severe penalties for all offenders can lead to questions about the legitimacy and fairness of management systems and reduce voluntary compliance. To avoid this, penalties for occasional offenders should be less than for chronic repeat offenders.
- **Strengthens the basis for voluntary compliance by improving how regulations are developed, implemented and enforced**.
- **Considers how changes in fishery management, including possible shifts to "rights based" fishing, such as dedicated access privileges, "individual fishermen quotas", or "sector" quotas, will influence compliance and enforcement requirements.**

Focusing enforcement on frequent offenders increases the chances that offenders will be caught and prosecuted.

About the Authors

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JON G. SUTINEN is a Professor Emeritus, Department of Environmental and Natural Resource Economics, University of Rhode Island, 209 Seacliff Way, Point Richmond, California, 94801, USA.

This study was initiated and supported by the Lenfest Ocean Program.

The Lenfest Ocean Program was established in 2004 by the Lenfest Foundation and is managed by the Pew Environment Group. For more information about the Program or Marine Policy paper, please visit www.lenfestocean.org or contact us at info@lenfestocean.org.

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Rational noncompliance and the liquidation of Northeast groundfish resources

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ABSTRACT

The results of a 2007 survey of fishers, managers, scientists, and enforcement officials indicate that noncompliance is a significant problem in the Northeast multispecies groundfish (NEGF) fishery, as it has been for at least 20 years. The percent of total harvest taken illegally is estimated to be 12–24%, which is significantly higher than estimates of 6–14% in the 1980s. Thirty-seven percent of fishers, 61% of fishery managers and 80% of fishery enforcement staff believe that "the combined adverse impact of all violations on the health and manageability of fish resources" is significant, highly significant, or extremely significant. Many fishers believe that illegal fishing will prevent them from ever benefiting from stock rebuilding programs.

The deterrence effect of the existing enforcement system in the NEGF fishery is weak because economic gains from violating fishing regulations are nearly 5 times the economic value of expected penalties. For example, by fishing illegally a midsize trawler in the NEGF fishery is estimated to increase expected earnings per trip by $5,500. Fishing violations have a 32.5% probability of being detected, and enforcement data show that a detected violation has a 33.1% probability of being prosecuted and resulting in a penalty. The average penalty assessed for a violation is $20,455 and the settlement amount averages 53% of the assessed penalty. The expected cost of a violation, therefore, is $1,166. When compared with the illegal gain, the economic incentive not to comply is $4,334 per trip.

Normative factors, such as moral obligation and peer and community pressure often induce fishers to be law-abiding despite potential illegal gains. However, normative factors favoring compliance in the NEGF fishery are weak because many fishers believe recent fishery management decisions were not justified and that planned stock rebuilding targets and schedules are arbitrary and unfair. Until this situation changes, more enforcement and more certain and meaningful penalties will be needed to improve compliance. Fishing restrictions will need to be tightened to achieve new legally mandated stock rebuilding targets. This will increase economic incentives for noncompliance in the fishery and require even more enforcement and more significant penalties to achieve adequate compliance rates.

This article recommends that a "smart compliance policy" be implemented in the NEGF fishery that employs different types of enforcement strategies and penalties with different groups of fishers identified based on their compliance histories. This should include aggressive targeting of frequent violators and criminal penalties and the forfeiture of all fishing privileges for certain types of violations. Funds should be redirected toward incentive programs to support collaborations between other fishers and enforcement staff to increase the number of violations that are detected, reported, and successfully prosecuted.

1. Introduction

This article provides an overview of noncompliance in the Northeast multispecies groundfish (NEGF) fishery; presents an assessment of how it contributes to overfishing and could prevent successful fish stock rebuilding plans in that fishery; and provides recommendations regarding what can be done to improve the situation.

This assessment is based primarily on the results of a recently completed study of enforcement and compliance in the NEGF fishery which draws on data from: (a) a mail survey of fishermen; (b) an online survey of federal and state enforcement staff, regulators, and scientists; (c) in-person and phone interviews

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with fishermen and fishery enforcement staff; and (d) analysis of 6 years of National Oceanic and Atmospheric Administration (NOAA) enforcement statistics (2001 through 2006) for the Northeast (NE) region.[1]

Study results are used to determine the extent and significance of noncompliance in the fishery and to test hypotheses about what can be done to improve compliance. The hypotheses are derived from what has become known as an "enriched theory of compliance" that is based on the influence of both deterrence and normative factors on fishers' decisions to comply or not.[2] Deterrence factors are based on the difference between the expected benefits of noncompliance and the likelihood of detection and the expected penalty or sanction if detected. Normative factors include: fishers' moral standards and perspectives about whether the fishery management regime is legitimate and competent, and developed fishing regulations in ways that are fair and equitable; and whether they believe that complying with fishing regulations is likely to make a difference. Based on this "enriched theory of compliance," the level of enforcement required to achieve a given level of compliance is lower when normative factors have a positive effect on compliance and higher when they have a negative influence.

The research results indicate that noncompliance is a significant problem in the NEGF fishery. Whether used to test deterrence or normative factors influencing compliance, the research results further indicate that unless there is more enforcement and/or more certain and meaningful penalties facing violators, noncompliance problems in this fishery can be expected to increase in the years ahead.

These results confirm the outcomes of previous studies of enforcement and compliance in this fishery [4–6].[3] These studies, like the current study, show that the economic payoff to fishermen from noncompliance is relatively high and the expected likelihood of being detected, and the penalties if detected, are relatively low.[4] This more recent study, however, was conducted during a time when deteriorating biological conditions increase the adverse impacts of noncompliance on fish stocks; while simultaneously there are growing incentives for noncompliance due to deteriorating economic conditions in the fishery, more restrictive fishing regulations and more contentious fishery management targets and timetables.

In most fisheries normative influences result in most fishers complying with fishing restrictions despite potential economic gains from doing otherwise. The survey results show this to be true in the NEGF fishery except that a significant number of fishers have formed an unfavorable and distrustful view of fishery management, which is having an adverse affect on their willingness to comply with fishing restrictions. One-third of fishermen in the fishery believe illegal fishing is already significant enough to prevent them from ever benefiting from fish stock rebuilding programs. From the perspective of these fishermen, the most "sustainable" strategy is to earn as much income as possible from fishing as soon as possible before the fishery collapses or is shut down. Under these circumstances, further tightening of restrictions on legal fishing increases the likelihood that normally law-abiding fishermen will engage in illegal fishing for economically rational reasons.

The policy implications of this research are significant because they indicate that: (1) strategies to meet new federal mandates to reduce overfishing and to meet fish stock rebuilding targets in this fishery[5] will not succeed until enforcement and compliance problems in the fishery are addressed and (2) a robust "smart compliance policy" [7] needs to be implemented to effectively control illegal fishing in the fishery.

Smart compliance policy deals explicitly with the fact that the influence of compliance drivers on behavior varies among fishers; and that compliance problems presented by those fishers who are not influenced by moral obligation and social influence need to be addressed differently than compliance problems presented by other fishers. Smart compliance policy involves developing strategies that: (a) target and meaningfully penalize frequent, routine violators; (b) provide adequate deterrence to discourage occasional violators; and (c) strengthen the basis for achieving voluntary compliance. Evidence regarding compliance in the NEGF fishery and the different factors that motivate compliance among different types of fishers strongly support developing and implementing a robust smart approach to compliance in this fishery.

Research results also indicate that it is important to address noncompliance problems soon. Fishermen know that additional fishing restrictions needed to meet new federal fish stock rebuilding mandates will create more economic incentives for fellow fishers to engage in illegal fishing. They also know that more illegal fishing may prevent stock rebuilding targets from being met and force regulators to tighten regulations further, or perhaps even shut down the fishery. Fishers also recognize that increases in the illegal harvest mean fishery scientists and managers receive less reliable catch and effort statistics with which to assess conditions in the fishery. As a result, fishers have less trust in the scientific basis and legitimacy of fishery management decisions. The stronger incentives to fish illegally, combined with the weaker legitimacy of the management process, indicate that a robust smart compliance and enforcement program needs to be implemented soon to prevent further economic and biological decline in the NEGF fishery.

The following sections include an overview of the NEGF fishery (Section 2) and the prevailing theories and models that can be used to assess enforcement and compliance in this fishery (Section 3). Section 4 provides an overview of the survey results and uses them to address three critical questions: Is

[1] A complete description of the study and results are available from the study sponsor (Lenfest Ocean Program). A summary of the study and results is available from the authors.

[2] The conventional "theory of compliance" [1] focuses on economic incentives and how potential violators compare the relative costs and benefits of violating the law. The "enriched theory of compliance" [2,3] includes both economic incentives and "normative" factors associated with moral convictions of fishers, peer pressure, attitudes regarding the legitimacy of regulations, and other factors that result in most fishers complying with the law even when there are economic gains from not complying.

[3] Results from Sutinen et al. [5] indicate that potential illegal gains in the NEGF fishery are high and the expected penalties are low. The rates of noncompliance and the amounts of illegal harvests are similar to those reported here from our 2007 survey. The results of the Shaw [6] study were: "(1) fishermen do not perceive fishery management agencies and the fishery regulations to be holistically legitimate; (2) participants (fishers) maximize their personal benefits; and (3) the National Marine Fisheries Service (NMFS), United States Coast Guard (USCG), and NOAA General Council need to coordinate their data maintenance programs to provide for greater data consistency and integrity."

[4] For example, Sutinen et al. [5] report that during 1987 in the Georges Bank portion of the NEGF fishery "a quarter to half of all groundfish vessels were identified as frequent violators, committing closed area violations on about one-third of their trips and using illegal mesh on nearly all trips [and] illegal earnings by a typical frequent violator…amounted to approximately $225,000 per year."

[5] The 2007 reauthorization of the Magnuson-Stevens Act (MSA), the US law that governs fishery management, mandates science-based definitions of "overfishing" for all fisheries and requires regional fishery management councils to set clear targets and timetables for "preventing and ending overfishing and rebuilding US fisheries."

Table 1
Size of the New England groundfish (NEGF) fleet.

State	Number of vessels[a]
Connecticut	182
Delaware	184
Maine	1,656
Maryland	32
Massachusetts	695
New Hampshire	109
New Jersey	397
New York	N/A
Rhode Island	344
Virginia	261
Total	3860

Source: NOAA, 2002, fisheries of the United States.

[a] Includes only permitted vessels greater than 5 net registered tons.

noncompliance a serious problem in the NEGF fishery? What factors affect noncompliance in the NEGF fishery? How does the current system of enforcement and penalties need to change to improve compliance? Section 5 provides conclusions and recommendations for improving compliance in this fishery.

2. The Northeast multispecies groundfish (NEGF) fishery

2.1. Fishery overview

The Northeast multispecies groundfish (NEGF) fishery consists of 24 species targeted by a fishing fleet of nearly 3,400 vessels that range from small hook-and-line vessels, operating in near-coast waters; to large offshore trawlers[6] (Table 1 and Fig. 1). The fishery has been the mainstay of New England's fishing industry for three centuries but overfishing over the past 50 years has resulted in an alarming decline in the abundance of fish resources and in the economic value of this fishery (Fig. 2).[7] A 2008 report to congress by the National Marine Fishery Service (NMFS) listed 13 of the 24 species in this multispecies complex as "already overfished," 8 as being "subject to overfishing," and 4 as experiencing "unknown" levels of overfishing.[8] For this reason, the NEGF fishery is generally considered to be one of the most mismanaged and seriously threatened fisheries in the country.[9]

Attempts by regulators to reduce overfishing in the fishery have involved frequently changing and increasingly complex combinations of gear restrictions, by-catch limits, days at sea restrictions and fishing area closures. These regulations have not reduced overfishing sufficiently to allow fish stocks to rebuild. They have imposed economic hardships on many fishers and resulted in a relatively hostile relationship between fishery regulators and some fishers. Currently, regulators are considering entirely new ways of managing the fishery, including "sector based management" which involves granting dedicated access privileges to what are essentially fishermen cooperatives.[10] Sectors are favored by some fishers and opposed by others. However, as of early 2009, details have not yet been developed regarding how liability will be shared among fishers operating within sectors, how many fishers are likely to join sectors or how the allowable harvest from the NEGF fishery might be shared by sector and non-sector vessels.[11] Until these issues are resolved it is not clear how widespread sectors will be, or how they might affect enforcement and compliance in the fishery.

There is also increasing concern among fishery scientists that some fish stocks in the NEGF fishery do not appear to be increasing in response to forced reductions in fishing effort as quickly as their models predict.[12] Fishery scientists are searching for explanations that focus on possible structural changes in ocean ecosystems, imbalances in predator-prey relationships, ocean pollution, habitat loss, shifting ocean currents, ocean warming, etc. However, it is possible that forced reductions in legal overfishing are being offset by increases in illegal overfishing and unreported catches that are not taken into account in fishery models being used to predict fish stock improvements from forced reductions in (legal) fishing effort. Since deteriorating economic conditions and more restrictive regulations in the NEGF fishery strengthen economic incentives for fishermen not to comply, and normative influences on compliance are not strong in this fishery, this is clearly a hypothesis worth addressing.

2.2. Policy context

The 2007 reauthorization of the Magnuson-Stevens Act (MSA), the US law that governs fishery management, mandates science-based definitions of "overfishing" for all fisheries and requires regional fishery management councils to set clear targets and timetables for "preventing and ending overfishing and rebuilding US fisheries."[13] The NMFS, Northeast Fishery Center and New England Fishery Management Council (NEFMC) are now preparing to address three key challenges in implementing this law in the NEGF fishery: (1) how to establish scientifically defensible annual harvest limits that will meet mandated stock rebuilding targets for each of the 24 stocks; (2) how to find combinations of effort restrictions (e.g., days at sea limits and closed areas) and catch restrictions (e.g., fleetwide, sector, or individual harvest quotas and by-catch limits) that will minimize and equitably allocate the unavoidable and potentially catastrophic economic costs that achieving these harvest limits will impose on fishermen; and (3) how to reform fishery management institutions so they will respond to science and not to short-term economic and political pressures.[14]

[6] The 3,375 vessels had permits to operate in the NEGF fishery in 2007. Permit data are available at: http://www.nero.noaa.gov/permits/data/2007/. Discussions with NOAA economists at Woods Hole indicate that, based on permit type, approximately 1,665 of these vessels are active in the fishery and account for nearly all the harvest. We surveyed the permit holders associated with 708 of these 1,665 vessels and had a survey response rate of over 40%.

[7] A history of the NEGF fishery is available at: http://www.nefsc.noaa.gov/history/stories/groundfish/grndfsh2.htm.

[8] These figures are from the NMFS report to congress on the status of US fisheries [8].

[9] Fishery scientists and managers have written extensively about the various causes of fishery management problems in this fishery [9]. A 1996 report prepared for NOAA describes the perceptions of fishers about how fishery managers contributed to the decline of the fishery and is available at (http://www.nefsc.noaa.gov/read/socialsci/cultural-aspects/50-DGNF-5-00008.pdf).

[10] The New England Fishery Management Council (NEFMC) describes a sector as: "a group of persons holding limited access vessel permits who have voluntarily entered into a contract and agree to certain fishing restrictions for a specified period of time, and which has been granted a TAC(s) (total allowable catch) in order to achieve objectives consistent with applicable fishery management plan (FMP) goals and objectives."

[11] A description of how sectors are likely to operate in the NEGF fishery is provided in Turris and McElderry [10]. Descriptions of how various fishers and fishing industry representatives view "sectors" appear frequently in fishing industry publications, such as *National Fisherman* and *Commercial Fishing News*.

[12] A recent article by Rosenberg et al., examines various explanations for why some fish stocks do not appear to be recovering quickly, as most fishery models predict, after forced reductions in fishing effort [11].

[13] Information about the 2006 amendments to the MSA and planned implementation strategies are available at www.nmfs.noaa.gov/msa2007.

[14] Discussion papers that describe new mandates for NMFS and the fishery management councils to implement "science-based" management are available at http://www.nmfs.noaa.gov/msa2007/

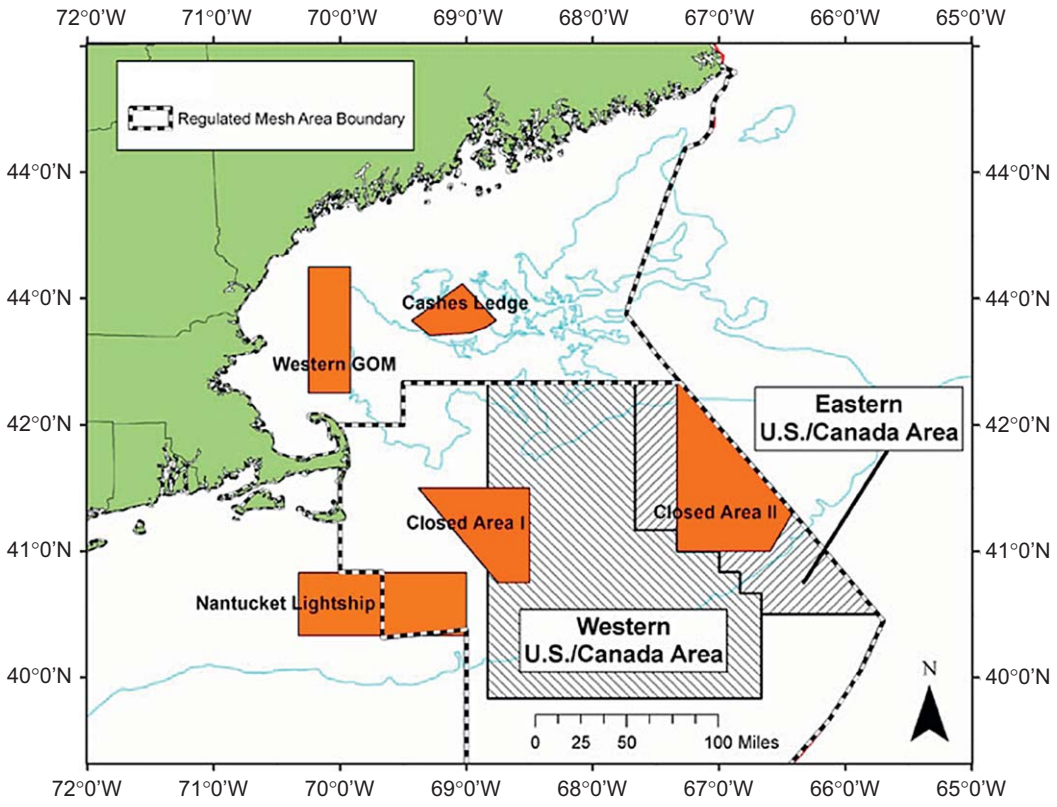

Fig. 1. Location of the NEGF Fishery. *Source*: NOAA, Northeast Regional Office.

Enforcement has always been recognized as an essential part of management in the NEGF fishery but it is not always a primary consideration when fishery managers make regulation decisions [12]. The NEFMC has a standing enforcement committee that meets regularly and provides the council with enforcement reports.[15] NMFS fishery enforcement staff and state fishery enforcement staff working with NMFS under Joint Enforcement Agreements (JEAs) also generate reports that summarize enforcement effort (e.g., number of enforcement man-hours, vessel-hours, or fishermen contacts) and the outcomes of that effort (e.g., number of citations, types and sizes of penalties, etc.). However, these reports only provide information about violations of fishing restrictions that are detected and reported.[16] Research focusing on the overall level of noncompliance in the fishery, detected and undetected, and how it may be affecting biological and economic conditions in this fishery, is rare. Also rare are studies that address whether the overall enforcement system that is in place in this fishery, including the combination of dock-side and at-sea inspections and associated procedures for prosecuting and penalizing violators, is adequate to deter illegal fishing.

The US coast guard (USCG) maintains records related to compliance in regional US fisheries that are based primarily on violations that are detected during at-sea boardings. However, these records are not generally available, and the aggregate compliance rates that are reported by the USCG based on these records do not seem credible.[17] Other evidence based on surveys and interviews indicates that the high compliance rates reported routinely by the USCG to demonstrate the success of its at-sea fishery enforcement program actually reflect the failure of current USCG at-sea enforcement activities to detect violations [13].

2.3. Compliance/Enforcement context

It is often reported that US fishermen who violate fishing restrictions fall into three general categories: chronic or frequent violators of fishing restrictions; those who usually comply but will violate fishing regulations occasionally when the economic incentive is high or the likelihood of detection is low; and those who fail to comply by accident because they misunderstand fishing restrictions, or have faulty electronics, etc. In a study of compliance and enforcement in the NEGF fishery during the 1980s, Sutinen et al. [5] determined that "passion, inadvertence,

[15] NOAA also maintains two enforcement databases, Enforcement Management Information System (EMIS) and Law Enforcement Accessible Database System (LEADS), which include records of reported violations. These databases are explained in the report cited in footnote 1. Summaries of EMIS data for years 2001 through 2006 are used in subsequent sections of this paper.

[16] A 2008 NOAA, Office of Inspector General, review of NMFS management of JEAs is available at www.oig.doc.gov/oig/reports/2008/IPE-19050.pdf. The study report cited in footnote 1 contains a summary of that report. A review of JEA data available for the Northeast region conducted as part of the study referenced in footnote 1 concluded that JEA data are not suitable for assessing or managing the performance of the JEAs in that region.

[17] The results of a 2006 review of USCG fishery enforcement by the Office of Management and Budget (OMB) are available at http://georgewbush-whitehouse.archives.gov/omb/expectmore/detail/10001072.2003.html. The USCG regularly reports compliance rates in US fisheries of 96–97% based on the percent of at-sea boardings where violations are detected. USCG notes in their reports, however, that since USCG targets likely violators, USCG observed and reported compliance rates probably overstate compliance rates that would be observed if the USCG were sampling randomly. The USCG uses these results to show that the USCG domestic fishery enforcement is highly successful at achieving the established USCG compliance goal of 97%. However, all other available evidence, including research results presented in this paper, indicates that the high compliance rates reported by USCG: (a) reflect the fact that USCG at-sea inspections fail to detect many actual fishing violations; (b) may actually reflect shortcomings of the USCG's $500 million per year fishery enforcement program rather than its success; and (c) may be preventing these shortcomings from being addressed and preventing the effective reallocation of fishery enforcement spending and effort [13].

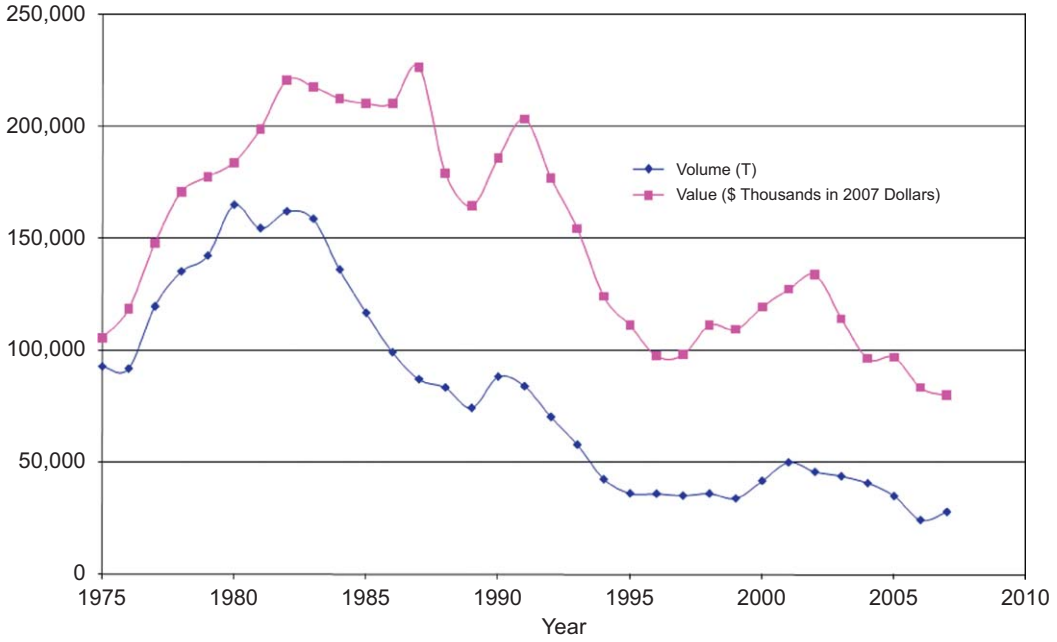

Fig. 2. Volume and value of annual harvest from the NEGF Fishery (1975–2007). *Source*: NOAA, office of Science & Technology, Fisheries Statistics Division—Annual Commercial Landing Statistics. http://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html.

and accident rarely cause a fishery violation." The conclusion of that study, in other words, was that most violations of fishing regulations in the NEGF fishery fall in the first two categories and are intentional.

However, in the 2007 survey conducted for this study, the portion of intentional violations in the NEGF fishery was estimated by fishermen to be 38%, by fishery regulators to be 44%, and by fishery enforcement staff to be 53%. These results indicate that as many as half of the violations in the NEGF fishery may be accidental. This relatively high portion of accidental violations recently reported is probably a result of more complex regulations and the decline in economic returns that has resulted in more part-time fishers and a high turnover rate.

However, earlier studies also determined that fishers who are chronic intentional violators contribute most significantly to the illegal harvest, so as that category grows there is a disproportionately higher increase in the illegal harvest. In the current survey, the percent of fishermen in this category is estimated by fishermen and regulators to be around 16% and by enforcement staff to be 35%. This is significantly higher than the roughly 12% of fishers estimated to be chronic violators in previous studies of this fishery [4].

Survey statistics presented in Section 3 show that the percent of the total harvest taken illegally in the NEGF fishery is estimated by fishermen to be about 12%, and by enforcement agents to be about 24%. If the actual percentage is somewhere between these two estimates, these results also indicate a significant increase in the illegal harvest compared with earlier surveys, which estimated the illegal harvest at 6–14% [4]. Because the size of the overall harvest has gone down, the size of the illegal harvest may have declined despite this percent increase. However, fish stocks are more depleted now which means the illegal harvest, although perhaps lower in terms of volume, can be expected to have more significant adverse effect on fish stocks than in previous years.

2.3.1. NOAA enforcement data

Table 2 lists the 1,689 violations of fishing regulations reported to NOAA in the NE region during the period of January 1, 2001 through May, 31, 2006.[18] Because the sources of some of these reports may not be reliable and some were never fully investigated and "proven," these reported violations are generally referred to as "incidents." Interviews with NOAA enforcement staff and others familiar with fishery enforcement indicate that government fishery enforcement agents often have "probable cause" to inspect for a violation, and if an inspection results in the decision to report a violation, give it a tracking number and enter it into the official NOAA enforcement database. That reported violation then probably reflects an actual violation.[19] Therefore, for the purpose of this analysis, only "incidents" where the reported violation source was NMFS, USCG, or state fishery enforcement staff were examined and were considered "probable violations."[20] Based on this criterion, 1,614 of the 1,689 incidents (95.6%) reported during this period probably are actual violations and, for purposes of this analysis, will be treated as actual violations.

Table 2 lists violations in the Northeast region contained in the NOAA enforcement database and the percentage of them that resulted in a financial penalty, forfeited catch or property, permit sanction, or any type of penalty at all.[21] Overall, 33% of violations reported by law enforcement resulted in one or more types of penalties. The remaining 67% of these cases were dropped or for various other reasons resulted in the violator facing no penalty or sanction. A breakdown of the resolutions of violations in the

[18] Enforcement data from NOAA's EMIS database were available to researchers only for violations reported from January 1, 2001 through May 31, 2006.

[19] For a variety of reasons, reported violations, whether they involve actual violations or not, may not be pursued by prosecutors and be "proven" or may not have resolutions that indicate that they were actual violations.

[20] Some of these were not fully investigated and "proven" to involve actual violations. However, interviews with NOAA enforcement staff and others familiar with this database indicate that in many cases enforcement officers have probable cause to inspect for a violation and, if after inspecting they decide to report a violation, it probably is a violation even though it may not be prosecuted or have a resolution that results in a penalty.

[21] These include only violations of commercial fishing restrictions, not safety or marine mammal violations or violations by recreational vessels. These commercial fishing violations in the NE region are not strictly limited to violations in the NEGF fishery.

Table 2
Reported incidents and probable violations[a] in NOAA's EMIS database.

Source	Incident		Probable violations		Violations resulting in one or more type of penalty		
	#	%	#	%	#	% of all violations that resulted in one or more type of penalty	% of violations by source that resulted in one or more type of penalty
Northeast region only (Jan 1, 2001 through May 31, 2006)							
US coast guard[b]	291	17.2	291	18.0	167	31.2	57.4
NMFS[c]	979	58.0	979	60.7	203	37.9	20.7
State[d]	47	2.8	47	2.9	24	4.5	51.1
NMFS/State	297	17.6	297	18.4	141	26.4	47.5
F/EN IFQ clerk[e]	0	0.0	0	0.0	0	0.0	0.0
Canadian referral	0	0.0	0		0		
Complaint directly through region or agent	10	0.6	0		0		
Conservationist organization	1	0.0	0		0		
Hotline complaint	7	0.4	0		0		
Marine sanctuary contractor	0	0.0	0		0		
Member of the general public	26	1.5	0		0		
NOAA general counsel	0	0.0	0		0		
Other	5	0.3	0		0		
Other federal agency initiated report	1	0.1	0		0		
U.S. customs	0	0.0	0		0		
U.S. fish and wildlife service	4	0.2	0		0		
U.S. fishing vessel	21	1.2	0		0		
Total	1689	99.9	1614	100.0	535	100.0	33.1

Source: NOAA Enforcement Management Information System (EMIS) Database (closed cases reported during January 1, 2001 through May 31, 2006).

[a] Violations are reported violations where the source of the report was coast guard, NMFS or State enforcement staff. Since not all of these reported violations were pursued and/or proven, these violations are considered "probable".
[b] Total CG includes: coast guard surface, coast guard aerial, NMFS/coast guard surface, NMFS/coast guard aerial, and other source of coast guard initiated report.
[c] NMFS includes: NMFS surface, NMFS observer, NMFS initiated, and NMFS initiated VMS only.
[d] State includes: authorized state agency/official initiated and state or local government agency.
[e] F/EN IFQ clerk sources are NMFS sources, but are shown separately here for clarity.

Table 3
Resolution of violations in NOAA's fishery enforcement database.

Year	Incidents	Violations	Violations resulting in payment of penalty		Violations resulting in forfeited property		Violations resulting in seized property		Violations resulting in permit sanction		Violations resulting in one or more type of penalty	
	#	#	#	%	#	%	#	%	#	%	#	%
Percent of violations resulting in penalties[a] *Northeast region only*												
2001	295	272	50	18.38	34	12.50	7	2.57	12	4.41	84	30.88
2002	313	296	83	28.04	34	11.49	12	4.05	5	1.69	119	40.20
2003	394	382	59	15.45	36	9.42	13	3.40	6	1.57	108	28.27
2004	306	290	66	22.76	31	10.69	25	8.62	9	3.10	116	40.00
2005	313	306	54	17.65	23	7.52	26	8.50	1	0.33	88	28.76
2006[b]	68	68	16	23.53	10	14.71	0	0.00	0	0.00	20	29.41
Total	1689	1614	328	20.32	168	10.41	83	5.14	33	2.04	535	33.15

[a] Penalties may include payment of fines, permit sanctions (e.g., loss of privileges) or forfeit of property (e.g., catch) or seizure of property (e.g., vessel or gear).
[b] Data ranges from Jan 1, 2001 through May 31, 2006.

Northeast region for each year during the study period is presented in Table 3 and shows a decline in the percentage of violations resulting in any type of penalty or sanction from 40% in 2004 to around 30% in 2005 and 2006.

Models of deterrence and compliance will be described and applied to the NEGF fishery in the following two sections. To put the above numbers in context, however, it is useful to point out here that within these models, when fishers consider violating a fishing regulation, they are assumed to consider both the probability of being detected and the probability of facing a penalty if they are detected. Survey results that will be presented later indicate that the probability of a violation being detected in the NEGF fishery is around 32%. If the likelihood that a violation of fishing regulations will be detected is 32%, and, as shown above, the likelihood that a detected violation will result in a penalty is 33%, the likelihood of a violation resulting in a penalty is about 11% (0.33×0.32). Whether this provides adequate deterrence depends on which theories and concepts of compliance apply in this fishery and the size of the expected illegal gain compared with the size of the expected penalty. These two factors are addressed in the following two sections.

3. Theories and concepts of compliance in fisheries

Although the problem of enforcement and compliance in fisheries has been recognized for decades, Sutinen and Andersen [14] published the first rigorous theoretical analysis of the

problem in 1985. Sutinen and Andersen combined Becker's [1] general model of enforcement/deterrence with a bioeconomic fishery model to theoretically and empirically investigate the implications of different levels and types of fishery enforcement on the outcomes of fisheries management.[22]

3.1. Deterrence

The Becker model assumes that decision-makers, such as fishers, who are deciding to comply or not with a regulation, such as fishing restrictions, tend to make rational economic decisions. Following Smith [17,18] and Bentham [19], Becker's model focuses on criminals and assumes they behave like other individuals in their attempt to maximize their net benefits, subject to budget and other constraints.[23] In Becker's model, a potential criminal will commit a crime if the expected illegal gain exceeds the expected penalty of getting caught. The higher the expected penalty and the lower the illegal gain, the less illegal activity should be expected, and vice versa. Although fishers are not criminals, Becker's basic model also applies to potential violators of regulations. Several studies have empirically demonstrated the deterrent effect of enforcement in fisheries and illustrated that the basic deterrence model is correct: higher probabilities of detection and/or penalties result in fewer violations [2,22–25].

However, the basic deterrence model does not sufficiently explain the available evidence about compliance in fisheries. Evidence from several studies indicates that despite strong economic incentives to violate some fishing regulations (high potential illegal gain and low expected penalty), a high proportion of fishers (50–90%) normally comply with regulations [5,22,26]. Results from the 2007 survey of the NEGF fishery confirm the results of these earlier studies and indicate 65–84% of fishers normally comply with regulations in the NEGF fishery. This is in the typical range estimated previously in this fishery and in other regulated fisheries.

The illegal gain or benefit in a commercial fishery can be measured as the amount of additional income that can be earned from violating a regulation and can be quite large. In the NEGF fishery Sutinen et al. [5] found an unusually high percentage of fishers (25–50%) operating illegally with individuals earning about a quarter of a million dollars more per year by doing so. In some cases, illegal fishing trips earned three times the revenue of legal trips. In an earlier report, Sutinen et al. [4] estimated that in 1988 illegal landings by frequent violators in the US Atlantic scallop fishery ranged from $75,000 to $105,000 per year. In the Rhode Island quahog fishery, Bean [22] estimated that illegal catches by frequent violators ranged from one-third to one-half of an average fisherman's income. The economic incentive to violate, in other words can be very powerful and can be difficult for fishers to resist, especially those facing economic hardships or unable to succeed by fishing legally.

Offsetting the expected illegal gain is the potential cost if the illegal fishing is detected. This cost is measured by multiplying the dollar value of the expected financial penalty, forfeiture, or permit sanction if detected and convicted by the probability of being caught and convicted. If this expected cost is large enough and certain enough it can offset the expected illegal gain and remove the incentive to violate. However, penalties facing domestic fishers for violating fishing regulations in US waters are generally not large relative to illegal gains. In the NEGF fishery, for example, Sutinen et al. [5] estimated flagrant violators grossed about $15,000 *per trip* from violating closed area and mesh size regulations, resulting in illegal earnings per vessel of approximately $225,000 during 1987.

Past studies estimated the probability of being caught violating a fishery regulation, in most fisheries, at near one percent, and often at or near zero [22,23,25,27]. Sutinen et al. [5] estimated that the typical penalty for a detected violation ranged from $3,000 to $15,000. With this range of potential penalty and an estimated likelihood of detection of close to 1%, these earlier studies concluded that the expected cost of violating fishing regulations during any given fishing trip is very small, perhaps in the hundreds of dollars, while illegal gains are relatively large, usually in the thousands or tens of thousands of dollars.

In the following section, the 2007 survey results and NOAA enforcement data are used to estimate that the net illegal earnings from violating fishing restrictions in the NEGF fishery are approximately $5,500 per trip. For a variety of reasons, perhaps associated with declining fish abundance and limits on days at sea, this estimate for 2007 is about a third of the amount estimated for 1988 by Sutinen et al. [5]. However, the analysis indicates that once the low probability of being detected and penalized and the expected size of the penalty are taken into account, this level of illegal gain is still high enough to provide an economic incentive not to comply. Deterrence effects of the enforcement system in the NEGF fishery, while stronger than estimated previously, are still relatively weak.

3.2. An enriched model of compliance

In addition to comparing the expected illegal gain and expected penalty, most individuals also consider the moral and social consequences of their actions when deciding whether to comply with a law or regulation. When asked why they usually comply with fishing restrictions even though illegal gains are much larger than the expected penalties, many fishers refer to the need to "do the right thing" [28,29]. That is, they express an obligation to obey a set of rules (either their own or an authority's). A sense of moral obligation is as common among fishermen as other people and has been shown in many previous studies to be a significant motivation that explains a great deal of compliance behavior among fishers.[24]

However, an individual's moral obligation to comply is the result of two forces: the individual's standard of personal morality and the individual's perceptions about whether rules and regulations are just and moral and are being applied fairly and equitably [30]. Where possible, these factors are built into policy formulation and implementation to build compliance. In general, individuals who believe complying with the regulation is the "right thing to do" will feel a moral obligation to comply regardless of the potential illegal gain. Individuals who disagree with the basis of a regulation, the way it is being imposed, or question the credibility or legitimacy of management institutions and procedures may be inclined to violate the regulation regardless of the size of the expected illegal gain.

Peer pressure, or the sentiments of people who matter to an individual, also influence most individual decisions regarding whether to comply. These social influences are known to play a significant role in fisheries, often taking subtle forms of ostracism or withholding of fishing information or other favors [3]. A group of fishers can reward and punish those who violate group norms

[22] Also see Anderson and Lee [15] and Milliman [16].

[23] Becker's framework became the basis for a series of subsequent studies on the economics of crime. See Heineke [20] and Pyle [21] for an overview of the theoretical models used in the economic literature of criminal behavior.

[24] See Kuperan and Sutinen [2] and Sutinen and Kuperan [3] for a detailed derivation of these factors; also see Hatcher and Gordon [24] and Gezelius [27] for reviews of the fisheries compliance research literature.

(i.e., a tacit agreement not to violate a particular fishing restriction) by withholding signs of group status and respect or even by direct threats. Social influence in fisheries is often manifested in forms of verbal and physical abuse (e.g., fist fights, destruction of gear and vessels). In the Massachusetts lobster fishery, for example, a strong form of social influence, commonly called "self-enforcement," is estimated to account for relatively high compliance in the fishery [26]. Other fisheries where social influence appears to be strong include the American lobster (Massachusetts and Maine), clam (Rhode Island), herring roe (Alaska, British Columbia, Oregon, and San Francisco Bay), saithe (Norway), and sakuri ebi (Japan). It is likely that there are several other fisheries where this phenomenon is operative [3].

Individuals tend to use the same standards to judge their own behavior and the behavior of others, so social influence and personal moral obligations are closely linked. The more widespread an individual sense of moral obligation is in the fishing population, the stronger the social influence to support that conviction. An important implication of this is that policies that strengthen the moral obligation to comply also strengthen social influence. Unfortunately, this works both ways; when normative factors begin to have an adverse effect on the moral commitments to comply among individuals it is often reflected in a corresponding decline in social obligations to comply.

This is important because individual moral influences and social influences can combine to create a situation where noncompliance is an accepted norm in a fishery. This was the case in the NEGF fishery during the late 1980s when pressure from crews and competition on the fishing grounds drove fishing captains to fish in closed areas and use illegal nets on most trips [5]. In such cases, compliance programs must not only strive to increase deterrence (i.e. the expected penalty), they must also attempt to build a stronger moral obligation to comply among fishers and to shift social influence to the side of supporting compliance.

3.3. Aggregate compliance behavior

Fishers are not all alike in their compliance behavior. For example, some fishers invest in methods to avoid detection and therefore face lower probabilities of detection than other fishers [15,22]. Others have a stronger moral obligation and face more social pressure to comply [28] but will violate when the expected gains are high or the probability of detection is low.

The available evidence suggests that within the typical population of fishers there is a small core subgroup of about 5–15% who tend to violate routinely, motivated primarily by the tangible financial gains from illegal fishing, and very little by moral obligation or social influence [4]. The only control mechanism that will influence the behavior of these fishers is changing the economic incentives. Aside from some kind of incentive program that involves paying them to comply (in which case they may take the money and still not comply), the only real option is increasing enforcement and the size and certainty of penalties.

At the other extreme is a small percentage of fishers, 5–15%, that is strongly influenced by moral obligation and comply most, if not all, of the time. In the middle is the large portion of fishers that normally comply and only occasionally violate. Their decision to comply or not depends largely on economic conditions and the degree of social influence they face. This group typically consists of about 70–90% of the fishing population.

The result is that a small number of fishers tend to account—directly and indirectly—for most of the noncompliance in a fishery and most of the risks that illegal fishing imposes on fish stock protection and recovery programs. Routine violators can only be controlled by strict enforcement and other tangible incentives. Smart compliance policy recognizes and exploits this critical feature of compliance behavior, while employing other methods to promote voluntary compliance among occasional violators [5,7].

4. Enforcement and compliance in the NEGF fishery

This section applies the concepts described in the previous section using the results of the research in the NEGF fishery to address the following three questions:

1. Is noncompliance a significant problem in the NEGF fishery?
2. Are enforcement factors associated with the probability of detection and size of penalties adequate to deter noncompliance in the NEGF fishery?
3. Are the effects of normative factors associated with fishers' perceptions about their moral obligations and the legitimacy, fairness, and competency of fishery managers increasing or decreasing the need to use deterrence to reduce noncompliance?

Because most illegal fishing is not observed, it is reasonable to assume that much illegal fishing is not detected or reported. As a result, conclusions about noncompliance in most fisheries must be based on surveys and interviews.[25] The 2007 survey of fishermen, enforcement officers and others involved in the NEGF fishery addressed many issues related to the frequency and significance of various types of fishing violations, the effectiveness of dockside and at-sea inspections, most and least important types of violations, the size of penalties, and so on. The following sections summarize survey results that address the three questions listed above.

4.1. Noncompliance in the NEGF fishery

4.1.1. What is the extent and nature of noncompliance in the NEGF fishery?

The survey results show that fishers and enforcement personnel had different views on the extent of noncompliance in the fishery, with fishermen estimating that about 12.5% of the commercial harvest is taken illegally and enforcement agents estimating that about 24.4% is taken illegally. For purposes of this analysis it is assumed that the actual level of noncompliance is reflected by the midpoint of these two estimates which means that 18.5% of total catch is due to fishing illegally. The estimate of illegal harvest provided by fishers in the survey is in the same range found in a survey of fishers by Sutinen et al. [4], suggesting that fishers believe the level of compliance today is similar to what it was in the fishery 20 years ago.

4.1.2. How significant is the level of noncompliance in the NEGF fishery?

Actual landings from the NEGF fishery in 2006 were 28,110 mt with a dockside value of $70.275 million. So at 18.5%, the illegal catch in that year amounted to about 5,202 mt, worth about $13 million. As a first approximation of the

[25] In general, statistics based on observations are preferable to those based on survey results. However, the available evidence in the NEGF fishery indicates that fishing violations at sea are not observable, even by USCG surveillance aircraft and vessels. So in this case estimates of compliance and noncompliance rates based on surveys are more reliable than those based on at-sea observations. (See footnote 18).

potential impact of this illegal harvest, consider how those 5,202 mt of fish would contribute to the health and economic value of the NEGF fishery over time if left in the sea to spawn and grow, instead of being harvested illegally. At an annual net biomass growth rate of 2–5%, for example, eliminating an annual illegal groundfish harvest of 5,202 mt per year would result, over 5 years, in an increase in groundfish stock biomass of about 28,000–30,000 mt, or an increase of around 60,000–70,000 mt over ten years.

Respondents estimated that 18% of commercial fishers *routinely* violate fishery laws, and 24% *occasionally* violate such laws. This is similar to the results of Sutinen et al. [5] who estimated that approximately 14–38% of commercial fishers frequently violate conservation regulations.

A strong majority (69%) of survey respondents in the NEGF fishery believe that compliance with fishery regulations is better than it was 5 years ago. This finding, together with the estimates of illegal catch rates and percent of routine violators in our 2007 survey, suggests that compliance has been worse at times during the past 20 years. As mentioned in Section 2.1, however, the health of fish stocks has deteriorated over the past 20 years so the problems associated with noncompliance may be worse now than in previous years.

4.1.3. What are the most common violations?

The survey asked respondents to estimate the percent of days at sea where particular types of violations took place. Overall (fishermen, enforcement, fishery managers, and others) estimated that the most common violations involve by-catch, possession limit, and catch reporting regulations (20–21% of days fished), followed by haddock separator trawl, mesh size and fish size violations (14–17%), and area closures, days at sea, and permit violations (10–11%). Sutinen et al. [5] reported much higher rates of noncompliance for area closures and mesh size regulations—the principal conservation regulations at the time. Respondents to the survey by Shaw [6] reported that violations of possession limits were the most common (72% of days at sea) during the fishing year of 2003, followed by violations of mesh size limits (45% of days at sea), area closures (38% of days at sea), and days at sea regulations (36% of vessels).[26] The rankings of most common violations in the 2007 survey were very similar to those in the Shaw survey; but the frequency of violations perceived by 2007 respondents is considerably lower than reported by Shaw's respondents in 2003. These findings support the claim by a strong majority of 2007 respondents that compliance has improved during the past 5 years.

Respondents who identified themselves as enforcement personnel reported very different perceptions about rates of compliance than fishers and others. For example, enforcement personnel, on average, estimated that 35% of commercial fishers routinely violate fishery laws, and that 38% occasionally violate the laws—higher rates than all respondents combined. Only 38% of enforcement personnel agree or strongly agree that compliance is better than 5 years ago—compared to 69% of all respondents and 73% of commercial fishers. Only 29% of fishery enforcement staff disagree or strongly disagree that compliance has improved. Enforcement personnel tended to rank the most common and most important violations similar to other respondents combined, but generally gave higher estimates of violation rates.

[26] The Shaw survey focused only on commercial fishers. Commercial fishers comprised approximately two-thirds of the respondents to our survey and their responses closely mirror the average rates reported by Shaw.

4.2. Impacts of noncompliance on the NEGF fishery

Majorities of most types of respondents believe that one or more types of violations are having either a moderate, significant, or major adverse impacts on the fishery[27] (Table 4 and Fig. 3). Thirty-seven percent of fishers, 61% of fishery managers, and 80% of fishery enforcement staff believe that "the combined adverse impact of all violations on the health and manageability of fish resources" is significant, highly significant, or extremely significant.[28] And only 27% of fishers, 12% of fishery managers, and 2% of fishery enforcement staff believe that the combined impact of all violations is having no significant impact on the health and manageability of fish resources. Although groups provided different responses in terms of the significance of impacts, a strong majority of all groups believe that violations are having at least some adverse impact on the fishery which seems to reflect a consensus on this critical matter. In addition, strong majorities of all respondents agree about the ranking of specific types of violations in terms of the significance of their impacts (Tables 4a–c and Fig. 3).

While there is general agreement about the ranking of specific violations in terms of impact, there is some diversity of opinion among groups of respondents about the degree of the impacts of specific violations. For example, enforcement personnel tend to think adverse impacts of specific violations are more significant (i.e., highly and extremely significant) than other groups of respondents. Larger proportions (*not* numbers) of researchers think some specific violations are not significant compared to other groups of respondents. For example, 40% of researchers responding to the survey think that violations of closed areas are not having an adverse impact on the health and manageability of the resource; only 22% of fishers and 20% of regulators believe this is the case. Interestingly, fishers and regulators tend to agree on the significance of various impacts, in terms of the proportions of each group. If respondents think that violations are having a significant impact on the health and manageability of the resources, do respondents also think that the nature and extent of violations are jeopardizing the *sustainability of stocks* in the NEGF fishery? Although a majority (55%) of all respondents think that violations are not threatening sustainability, it is relevant that many respondents do. For example, 67% of enforcement personnel, 31% of regulators, 25% of researchers, and 20% of fishers agree or strongly agree that "violations of fishing regulations are jeopardizing the sustainability of fish stocks in the NE groundfish fishery." Opinions are mixed about whether fishing violations are significant enough to "reduce long-term economic returns from fishing" and reduce fishers' expectations that they will gain in the future from stock rebuilding programs. A weak majority of fishers (51%) and of researchers (55%) disagree with these statements. However, it is significant that a strong majority of enforcement personnel (68%) agree, and many regulators (31%), researchers (30%), and even fishers (26%) agree or strongly agree that illegal fishing is reducing long-term economic returns and lowering fishers' expectations that they will benefit from rebuilding fish stocks.

[27] The types of violations include those related to mesh size, vessel upgrades, landing limits, fish size, closed areas, days at sea limits, reporting requirements, and fishing permits.

[28] Respondents could choose *not significant, barely significant, significant, highly significant*, or *extremely significant* in response to our questions about impacts of fishing violations.

Table 4
Responses to selected survey questions by type of respondent.

(a)

	29. What percent of fishing violations in the NE groundfish fishery are intentional as opposed to accidental?		33. What percent of commercial fishermen do you think routinely violate fishery laws?		35. What percent of violations of US fishery laws do you think are detected?		36. What percent of total catch is due to fishing in violation of fishery regulations?	
	Mean (%)	Median (%)	Mean (%)	Median (%)	Mean (%)	Median (%)	Mean (%)	Median (%)
Fishermen	37.7	30.0	16.4	10.0	41.7	40.0	12.5	10.0
Regulators	44.4	50.0	16.4	10.0	36.0	25.0	10.9	10.0
Enforcement	52.5	51.0	34.9	35.0	23.4	15.0	24.4	20.0
Researchers	46.1	50.0	12.2	10.0	41.1	50.0	9.3	10.0

(b)

	16. It is easy for those violating fishing laws and regulations to evade dockside detection by the NMFS and state agents	17. It is easy for those violating fishing laws and regulations to evade detection at sea by the coast guard	22. Too many detected violations that should have resulted in official notices of violation and assessment (NOVAs) and penalties result in warnings or other lesser sanctions	24. Penalties that are actually imposed for violating fishing restrictions in the NE groundfish fishery are sufficient to deter potential violators	41. Violations of fishery regulations are jeopardizing the sustainability of fish stocks in the NE groundfish fishery	47. The adverse effects of fishing violations on fish stocks are significant enough to reduce long-term economic returns from fishing	48. Violations of fishing regulations are significant enough to reduce fishermen's expectations that they will gain in the future from stock rebuilding programs	31. What impact do you think the frequency of all fishing violations combined has on the health and manageability of NE groundfish resources?
	Agree or strongly agree (%)	Agree or strongly agree (%)	Agree or strongly agree (%)	Agree or strongly agree (%)	Agree or strongly agree (%)	Agree or strongly agree (%)	Agree or strongly agree (%)	Significant, highly significant or extremely significant (%)
Fishermen	28.5	16.0	27.8	88.0	25.2	34.0	32.9	36.7
Regulators	56.7	30.5	45.2	63.6	38.3	40.6	44.5	61.0
Enforcement	81.8	72.7	32.3	51.5	78.3	82.8	67.7	80.5
Researchers	31.6	12.5	30.0	75.0	29.4	35.3	20.0	45.0

(c)

	Question 49: Percent of group responding that specific types of violations have a moderate, significant or major adverse impact on the NEGF fishery								
	49a. Mesh size (%)	49b. Illegal vessel upgrades (%)	49c. Exceeding landing limits (%)	49d. Undersize fish in landings (%)	49e. Closed area (%)	49f. Days at sea (%)	49g. Misreporting in logbooks (%)	49h. Misreporting in dealer reports (%)	49i. Permit violations (%)
Fishermen	65.0	40.9	58.1	49.8	54.7	48.0	46.5	49.3	41.7
Regulators	59.5	42.5	61.0	42.9	54.8	45.3	64.2	64.6	26.8
Enforcement	82.5	55.2	87.5	82.5	85.0	87.5	71.8	76.4	61.5
Researchers	47.4	44.5	47.4	31.5	31.6	27.8	52.7	36.4	22.3

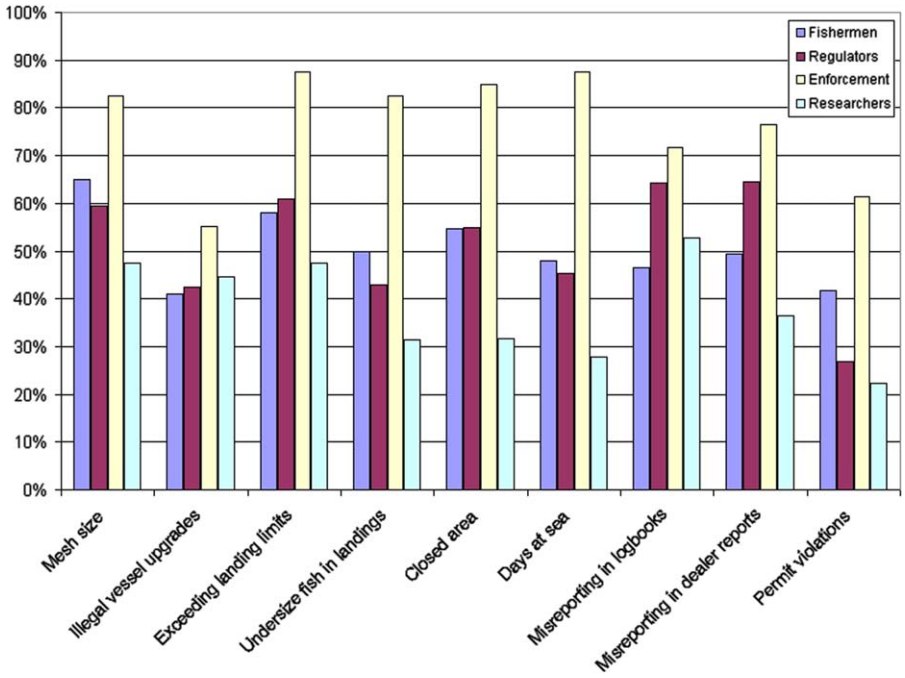

Fig. 3. Responses to survey question #49 by type of respondent: Percent of respondents in each group answering that the adverse impacts of specific types of violations on the NEGF Fishery are: major, significant or moderate. Respondents were given option to answer: no impact, small impact, moderate impact, significant impact or major impact.

4.3. *Enforcement and deterrence*

As with compliance, a strong majority of all respondents (62%) believe that the overall enforcement program in the NEGF fishery is better now than 5 years earlier. Although this is encouraging, it does not imply that the adverse effects of noncompliance on fish stocks and economic conditions is better now than 5 years earlier, or that the enforcement program is adequate to achieve the rate of compliance that will be necessary to prevent overfishing and allow stock rebuilding programs to succeed.

4.3.1. *Do the respondents see weaknesses in dockside and at-sea enforcement and prosecution?*

4.3.1.1. Detection and prosecution—resources and effectiveness. There is considerable divergence of opinion on some aspects of the *dockside enforcement* program. For example, 75.1% of fishers, but only 46.3% of regulators and 26.9% of enforcement officers believe that there are an adequate number of NMFS and state enforcement agents for detecting landings violations.

Fishers and enforcement personnel also have different opinions about whether it is easy for violators to evade dockside detection by enforcement agents. A majority of fishers (59%) think it is not easy to evade detection and a strong majority of enforcement personnel (64%) think it is.

Similar patterns of agreement and disagreement appear with respect to the number of dockside inspections and the presence and coverage of dockside enforcement. Majorities of all respondent groups and strong majorities of fishers view as adequate or more than adequate the number of dockside inspections and the presence and coverage of the dockside enforcement program. Regulators and enforcement personnel disagree or strongly disagree that these are adequate.

On other aspects of the dockside enforcement program, however, views are similar among groups of respondents. Strong majorities of each group view as adequate or more than adequate: the effectiveness of dockside inspections, methods and use of equipment, response time to tips from fishers, follow through on investigations and dedication to effective enforcement.

With respect to *at-sea enforcement* by the USCG, strong majorities of all groups of respondents view as adequate or more than adequate the numbers of USCG equipment, personnel, at-sea boardings and inspections, presence and coverage, effective methods and use of equipment, response time to tips from fishers, and dedication to effective enforcement. Significant minorities of enforcement personnel and researchers (47% and 46%, respectively) believe that the USCG's follow through on investigations has been poor or less than adequate, a result also found by Shaw [6].

As with evasion of dockside detection, there are differences of opinion about how easy it is for fishers to avoid detection of violations at-sea. A strong majority of fishers (84%) do not believe that "it is easy for those violating fishing regulations to evade being detected by the USCG at-sea," while a strong majority of enforcement personnel (73%) believe that evasion is easy.

There is strong agreement among all groups of respondents that the use of *vessel monitoring systems* (VMS) is an effective means of enforcing area closures and effectively deters violations of area closures. Strong majorities of all groups agree or strongly agree with the effectiveness of VMS. However, a strong majority of enforcement personnel (67%) believe that fishers "tamper with or turn off their VMS to avoid detection of violations." Strong majorities of fishers and other groups believe this to be rare. Majorities of all groups except enforcement personnel agree, or strongly agree, that the presence of *observers* on fishing vessels, though not playing an enforcement role, reduces violations. A majority of enforcement personnel disagrees or strongly disagrees with this view.

Questions regarding the *prosecution* branch of the enforcement program elicited differences of opinion, especially between fishers and enforcement personnel. Majorities of fishers think that the number of attorneys prosecuting fishing violations is sufficient, that enforcement officials focus more on minor rather than major

violations, and that more violations should have resulted in warnings instead of penalties. Majorities of enforcement personnel are of the opposite opinion on those three issues.

Many fishers (42%) and majorities of the other groups (from 51% to 69%) believe that attorneys effectively prosecute fishery violations. Generally, there is strong agreement among groups of respondents that the General Counsel's performance is adequate or more than adequate in terms of case processing effectiveness, timely processing of violations, settlement policy and practice, administrative court trials, and dedication to effective deterrence. An important exception is that a strong majority of enforcement personnel (66%) and many fishers (47%) and regulators (44%) view the timely processing of violations as poor or less than adequate. Respondents to Shaw's [6] survey also reported long delays in processing cases where fishers were charged with violations. This result is important because delays in prosecution, especially when combined with relatively small penalties, can weaken incentives to comply and lead to more violations.

4.3.1.2. Penalties and deterrence. Strong majorities of all groups of respondents think that financial penalties, permit sanctions and confiscation of catch are effective (somewhat or very) deterrents against violating NE groundfish regulations. All groups also believe that lost fishing privileges (permit sanctions) are a more significant deterrent than financial penalties. Majorities of all groups—except enforcement personnel—agree or strongly agree that the penalties actually imposed are sufficient to deter potential violators. Enforcement personnel are about evenly split on this issue.

4.4. Combined analysis of survey results and NOAA enforcement data

As an exercise to assess the effectiveness of deterrence in the fishery the 2007 survey results summarized above were combined with NOAA enforcement statistics for 2001 through 2006 in a "deterrence model" that compares the expected benefits of not complying with fishing restrictions on a typical trip with the expected costs.

4.4.1. Expected benefits

Using the midpoint between the numerical estimates provided by fishermen and enforcement staff, as discussed in Section 4.1.1, the percent of the total harvest that is taken illegally in the fishery is 18.5%. A large trawler operating in this fishery during 2006 landed about $30,000 per trip. If the added revenue from fishing illegally during this trip is estimated to be 18.5%, a first approximation of the expected benefits from noncompliance would be about $5,500 ($0.185 \times \$30{,}000$).[29]

This is approximately 1/3 of the $15,000 in expected earnings per trip from illegal fishing estimated by Sutinen [31]. The difference is probably explained by declines in stock abundance and limits on days at sea that have significantly reduced actual and expected revenues per trip from illegal as well as legal fishing. Sutinen [31] may also have focused primarily on the large Georges bank trawlers, which tend to make longer trips and harvest more fish per trip than average vessels operating in NEGF fleet.

Expected benefits from noncompliance=$5,500.

[29] Fishing illegally, in some instances, may reduce trip costs rather than, or in addition to, increasing trip revenues. It is assumed here that fishing illegally results in 18.5% in trip revenues that would not be earned otherwise, but does not affect fishing costs.

4.4.2. Expected costs

A first approximation of expected costs of noncompliance can be estimated by using survey results and NOAA enforcement data to estimate the following equation:

Expected cost of noncompliance=$A \times B \times C \times D$ where:

A=Probability of being detected.
B=Probability of being prosecuted and having to face a penalty, if detected.
C=Average "assessed penalty" for this violation (e.g., Notice of Violation (NOVA), penalty assessment).
D=Average "final settlement" amount; the % of the average "assessed penalty" paid.

Based on survey results summarized above, the midpoint between the estimates provided by fishermen and enforcement staff of the likelihood of a violation being detected was 32.5%.

So, A=0.325.

Based on the summary statistics from the NOAA's EMIS database (Table 2), 33.1% of detected violations resulted in any type of penalty (e.g., NOVA, summary judgment, permit sanction).

So, B=0.331.

Data are not available to determine the nature of permit sanctions imposed on violators or their economic cost to them. However, NOAA enforcement data show that the average NOVA penalty assessment was $20,455, and the average percent of NOVA penalty that was actually paid (settlement amount) was 53%.

For purposes of this exercise it is assumed that the average NOVA amount, adjusted by the average percent of the NOVA amount paid, reflects the dollar value of expected penalties and other sanctions for all violations,

So C=$20,455 and, D=0.53.

For purposes of estimating expected noncompliance costs, therefore, the following values are used:

$$A = 0.325, \quad B = 0.331, \quad C = \$20{,}455, \quad \textit{and} \quad D = 0.53$$

This means the expected cost of noncompliance:

$$= A \times B \times C \times D$$
$$= 0.325 \times 0.331 \times \$20{,}455 \times 0.53$$
$$= \$1{,}166$$

Expected net payoff for noncompliance=expected benefits less expected costs

$$= \$5{,}500 \textit{ less } \$1{,}166 \textit{ per fishing trip}$$
$$= \$4{,}334 \textit{ per fishing trip}$$

Based on the above analysis, a typical fishing skipper in this fishery can expect to increase net earnings per trip by approximately $4,300 by not complying with fishing restrictions.

4.4.3. An illegal fishing deterrence index

This exercise can be carried one step further by using the ratio of the expected cost of noncompliance to the expected benefits as a metric of the cumulative deterrence effects in the NEGF fishery, called here the Illegal Fishing Deterrence (IFD) Index for the fishery.

- IFD Index > 1: *Strong deterrence*—conditions where the expected costs of noncompliance exceed the expected benefits.
- IFD Index=to 1: *Moderate deterrence*—conditions where the expected costs and benefits of noncompliance are more or less identical.
- IFD < 1: *Weak deterrence*—conditions where the expected cost of noncompliance is below expected benefits.

In the NEGF fishery the IFD is 0.21 ($1,166/$5,500) which is low and reflects benefits from noncompliance that are about 5 times higher than expected costs.

4.4.3.1. Extraordinary deterrence challenges in the NEGF fishery. In the modern NEGF fishery low catch rates and very restrictive fishing regulations mean that some fishers are facing significant economic hardships and may not be able to generate sufficient earnings to remain in business by fishing legally. For such fishermen the potential cost of compliance can be higher, more certain, and more permanent than the expected cost of noncompliance. Sutinen [31] reports, for example, that some crewmen, concerned about their ability to earn a decent livelihood, have refused to work on fishing vessels with skippers who are not willing to ignore fishing regulations. In such a situation, even otherwise law abiding skippers have powerful incentives to violate fishing regulations or, alternatively, to leave the fishery and sell their vessels to others who are willing to violate fishing regulations in order to remain solvent.

This conventional economic model of deterrence and the IFD index ignore the need for extraordinary enforcement to provide adequate deterrence in circumstances where the cost of complying is unusually high and, for some fishers, may include bankruptcy. The long-term costs of not being able to cover trip expenses and vessel payments by fishing legally may provide far more incentive to not comply than illegal gains themselves. If this condition exists or is expected in the NEGF fishery the above analysis may vastly understate the incentives that exist for fishers to not comply and understate the level of enforcement required to deter prospective violators.

4.5. Social influence and moral obligation

As Section 3 described, fishers also consider the moral and social consequences when deciding whether or not to comply with fishery laws. Shaw [6] performed a survey of NEGF fishers that was designed to assess their attitudes towards NEGF fishery management and enforcement, and the extent to which moral and social considerations shape their compliance behavior. Her survey and analysis examined the theory [30] that, enforcement effects aside, people tend to comply with regulations when the regulatory authority is perceived to be legitimate.

Shaw organized the results of her survey around the four factors that determine perceptions of legitimacy: procedural fairness, procedural efficiency, outcome fairness, and outcome effectiveness. Her survey results showed that fishers in the NEGF fishery gave fishery management institutions low ratings on all of these factors. Fishers view management procedures in the NEGF fishery as both unfair and inefficient, and management outcomes to be both unfair and ineffective.

Possession limits are perceived to be both unfair and ineffective because fishers are required to discard fish that exceed the limit. In their view the discarded fish are dead and cannot contribute to rebuilding the stocks. Shaw quotes one fisher who wrote that "throwing dead fish overboard doesn't do anyone any good—not the fish stock and not the fishermen." Answers to open ended questions in the 2007 survey support Shaw's results. A significant number of fishers, for example, reported that they viewed regulations that force them to throw back fish that will die anyway and could be used to feed people as "immoral."

Shaw found that fishers feel managers victimize them with complex regulations that do not work and impose unnecessary hardships on them. The rule-making processes are also unfair in the views of fishers. As an example, fishers claim that regulations tend to favor larger vessels and impose disproportionate hardships on smaller fishing operations. The 2007 survey confirms these perspectives—a number of fishers reported that regulations are designed to drive small boats out of the fishery because fewer larger vessels would be easier for fishery institutions to manage.

Fishers' views about the enforcement program in the NEGF fishery are somewhat better, but are not positive overall. The processing and prosecution of violations is inefficient in the opinion of fishers. Shaw reports fishers believe that, when they are charged with a violation, the case is not processed in a timely fashion. She quotes one respondent who claimed it took up to a year for the charges against him to be processed. In addition, many of her respondents felt that enforcement agents are not always fair and neutral, treating some fishers differently for similar violations. The analysis of NOAA enforcement data for years 2001 through 2006 confirm Shaw's findings. The average length of time between the date of a reported violation and a resolution that resulted in the payment of a penalty was 320 days.

Shaw concludes that NEGF fishers find the legitimacy of the management and enforcement programs weak. While this implies that more enforcement may be needed to achieve a given level of compliance, Shaw indicates that voluntary compliance also could be significantly strengthened by improving how fishery regulations are developed, implemented and enforced. Efforts to make such improvements to promote more compliance may be more cost-effective than investing in more surveillance and inspection resources to detect violations. For example, adding more attorneys to expedite enforcement case processing is expected to greatly improve the efficiency and effectiveness of the entire enforcement program.

5. Conclusions and recommendations

The survey results indicate that a significant number of fishers, managers, enforcement personnel and researchers believe that that the extent and nature of noncompliance in the NEGF fishery is comparable now to 20 years ago. However, they also believe that illegal fishing is currently a serious problem because it: reduces the ability of the fish stocks to rebuild; jeopardizes sustainability; reduces long-term economic returns from legal fishing; and lowers fishers' expectations that they will benefit in the future by supporting and cooperating in fish stock rebuilding programs.

The results show that: (1) many fishers operating in the NEGF fishery cannot take a long-term economic perspective and are focused primarily on near-term economic returns from fishing; (2) fishers, on average, can earn higher economic returns by violating rather than complying with fishing regulations because the illegal gain exceeds the expected penalty for violating; and (3) the forces of moral obligation and social pressure that normally cause fishermen to comply, despite the economic incentives, are weak because fishers (and other survey respondents) view the fishery management process at work in the NEGF fishery to be unfair and ineffective.

Because stock rebuilding targets and schedules associated with new congressional mandates are viewed by some fishers as not being justified on scientific, economic, biological, or moral grounds; implementing them will further weaken normative factors that favor compliance. At the same time, expected changes in fishing restrictions aimed at achieving these new targets and mandates will increase fishers' economic hardships and generate more incentives for them to fish illegally. The enforcement program in the fishery needs to prepare to react to these challenges.

Respondents to the survey believe that the enforcement program—dockside and at-sea inspections and prosecutions—is

basically sound and has improved during the past 5 years. However, there are specific areas where they believe improvements should be made. For example, regulators and enforcement personnel believe improvements in compliance could be achieved by increasing the number of dockside enforcement agents, the number of dockside inspections and the presence and coverage of the dockside enforcement programs. In addition, they believe strengthening investigations associated with reported violations by the USCG, increasing the number of attorneys in the General Counsel's office and reducing case processing time would be helpful. Other improvements involve increasing the certainty and magnitude of penalties and making greater use of permit sanctions which are generally perceived to be a more effective deterrence against illegal fishing than financial penalties.

Many respondents questioned the effectiveness of USCG at-sea enforcement and the method the coast guard uses to measure its effectiveness. Survey results indicate that fishers are not in compliance during 10–20% of days at sea. Twelve to sixteen percent of fishers and regulators, and 35% of enforcement agents, agree or strongly agree that "it is easy for those violating fishing regulations to evade USCG at-sea detection." Yet annual reports by the USCG to congress state that compliance rates, based on the number of violations observed during at sea boardings, are near or exceed 97%, the target rate used by the USCG as a measure of enforcement success. Instead, they may actually reflect the failure of at-sea boardings to detect most violations [13 and footnote 18]. In any case, these high compliance rates are generally viewed as being inaccurate, misleading and harmful because they prevent federal policymakers from appreciating the significance of non-compliance problems in the NEGF fishery and other fisheries.

This hypothesis should be examined to determine if insufficient data and data management and misinterpretations of data are preventing the effective allocation of effort and spending on dockside and at-sea enforcement.

Because economic incentives for noncompliance are increasing and normative factors favoring compliance are relatively weak, a robust "smart compliance policy" [7] needs to be implemented soon in the NEGF fishery to effectively control illegal fishing. Smart compliance policy deals explicitly with how the influence of compliance drivers on behavior varies among fishers. In particular, compliance problems presented by those fishers who are not influenced by moral obligation and social influence need to be addressed far more aggressively than compliance problems presented by other fishers. Smart compliance policy involves developing strategies that: (1) target and meaningfully penalize frequent, routine violators; (2) provide adequate deterrence to discourage occasional violators; and (3) strengthen the basis for achieving voluntary compliance. Evidence regarding compliance in the NEGF fishery and the different factors that motivate compliance among different types of fishers strongly supports developing and implementing a robust smart approach to compliance in this fishery.

It is possible that maximizing the deterrence effect of enforcement in the NEGF fishery can be achieved most effectively by applying the game theory-based "heaven, hell, and purgatory approach" to compliance [32,33]. This has been recommended for other types of environmental enforcement programs [7] and involves placing individual fishers in specific compliance categories with graduated sanctions (in terms of privileges and obligations). These graduated sanctions will produce more deterrence for a given probability of detection and penalty.[30]

[30] See chapter III in Olsen et al. [7] for an explanation of how this approach can be used in fisheries.

Previous studies of fishery enforcement and compliance conclude that there are multiplier effects from aggressively controlling frequent violators [2,7,34]. When frequent violators appear to be immune to punishment, their behavior sends signals to fishers who normally comply that the regulations are unfair and will not have the intended effects on fish stocks. This, in turn, weakens their confidence in the legitimacy of the fishery management program and erodes their willingness to comply with fishing regulations. Targeting frequent violators, besides putting them at higher risk of facing penalties and providing a more potent deterrent to their violations, has a positive multiplier effect because it strengthens compliance among other fishers. Penalties for the routine, frequent violators should be severe, especially for those who have multiple citations. Chronic violators should also face more stringent reporting and monitoring requirements or be prohibited from fishing. On the other hand, Sutinen [34] determined that imposing severe penalties uniformly to all fishers, including those who violate only occasionally, can result in fishers questioning the legitimacy and fairness of fishery management and reduce voluntary compliance.

Unless enforcement effort is increased to achieve compliance rates high enough to allow fish stock rebuilding efforts to succeed, it is economically rational for an increasing number of fishers in the NEGF fishery not to comply with fishing restrictions. The "optimal" harvest strategy for an increasing number of fishermen will be to earn as much income as possible as soon as possible from fishing, either legally or illegally, before fish stocks collapse or the fishery is shut down.

Under these conditions increasing enforcement, especially against chronic or frequent violators, is necessary not only to deter violations, but to create fishing conditions and expectations that promote compliance and support for fish stock rebuilding programs. Recent MSA amendments will require tighter fishing restrictions that will impose additional costs on fishers. These restrictions are currently designed to achieve fish stock rebuilding targets that many fishers do not support on scientific, economic, and moral grounds. The economic and normative forces at work in the NEGF fishery, therefore, are trending against compliance. To prevent further biological and economic decline in the fishery these forces will need to be offset by more enforcement and more certain and meaningful penalties for all fishers; a special emphasis on identifying and penalizing chronic violators; and a dedicated effort to improve the fishery management institutions and processes so that they are viewed as being more legitimate.

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