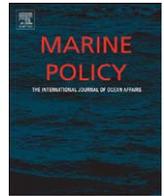




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Fisheries observers as enforcement assets: Lessons from the North Pacific

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ABSTRACT

Fisheries observers can both collect scientific data and report on compliance with fisheries regulations. Observers are used only for scientific purposes in most US fisheries. However, North Pacific groundfish fisheries observers are required to report violations of fisheries regulations that they witness. Based on evaluation of historical enforcement incidents and survey data, this paper considers the effects of mandatory reporting in the North Pacific. The goal of this analysis is to determine whether and how observer enforcement in the North Pacific differs from observer enforcement in other US fisheries and to determine what benefits observer enforcement might yield if adopted in other fisheries.

Mandatory observer reporting increases incident reports compared to fisheries without mandatory reporting requirements. Observers also report violation types, including illegal discard and retention, that otherwise are rarely identified by traditional dockside or at-sea enforcement resources. However, observer-reported cases are prosecuted less often than cases directly identified by fisheries enforcement officers. The reasons for lower prosecution rates are unclear but do not appear to result from incorrect identification of violations.

In the light of recent studies indicating that noncompliance with fisheries regulations is an increasing concern in some fisheries due to decreasing total catch limits, this paper concludes that observers represent a unique enforcement resource that can facilitate detection and penalization of violations. However, increased prosecution of observer-reported data is needed to reduce incentives for noncompliance when observers are onboard. The substantial benefits of observer enforcement may outweigh concerns regarding data biases and observer safety that have limited observer reporting to date.

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1. Introduction

Globally, fisheries observer programs play an important role in fisheries science and enforcement. The relative importance of these roles differs by country. In Canada and elsewhere, observers play a dual role in enforcement and data collection, and enforcement may be their primary mission [1,2]. However, US observer programs initially were created to provide scientific data and generally resist requirements that might “taint” the independence of or introduce bias into those data [2]. The exception is the North Pacific groundfish fishery, where observers are required to report violations that they witness. This paper compares historic data on enforcement of observer cases in this and other US fisheries to determine whether other mandatory observer reporting should be adopted in other fisheries.

Fishers and scientists reportedly believe that observers should not play an explicit enforcement role due to the resultant influence on fisher behavior; for example, fishers may avoid their

normal fishing grounds or change their gear to stay in compliance while observers are on board [2]. Studies also have found an effect on logbook reporting of halibut bycatch in the North Pacific groundfish fishery, observers were found to deter under-reporting of prohibited species catch both during and for a short time after the observer was present [3,4]. A second argument against observer enforcement is the danger to observers from crew members who resent the presence of enforcement personnel on board. As a result, although US fisheries observers may record violations in their logbooks, they are rarely required to report incidents to OLE for prosecution. Few studies have evaluated the benefits of using observers for enforcement. However, recent studies suggest that expanded observer enforcement may be warranted.

First, the observer program already may yield tainted data due to systematic biases. Observers may deter noncompliance by their mere presence, regardless of their formal enforcement role [5]. If so, “Fishing activity in the subset of (essentially) compliant vessels with onboard observers would not be representative of activity by the remainder of the fleet if regulatory noncompliance is significant” [1]. Such biases may be particularly problematic where only a subset of the fleet is subject to observer coverage,

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but the data from that subset are used to make management decisions for the fleet as a whole, as in the North Pacific groundfish fishery [6]. Non-random placement of observers on vessels and during a fishing season presents a second source of potential bias on data [1,7].

Second, recent evidence suggests that noncompliance in US fisheries is more significant than previously recognized [8–10]. Economic and normative factors in many fisheries are trending toward less compliance and are putting more burdens on enforcement [9]. Enforcement actions can be carried out via dockside inspection, by boarding vessels at sea, or by remote sensing, including vessel monitoring systems (VMS). Dockside inspection is inexpensive and effectively detects some violation categories, but it cannot detect violations that occur entirely at sea [1,11]. At-sea boarding by state and USCG vessels is expensive, and complete coverage by enforcement agents is impossible. In addition, recent studies have questioned the effectiveness of boardings at detecting and deterring violations [10]. VMS and other forms of electronic surveillance can detect and enforce a limited number of violation categories—notably, area closures—but cannot detect more complex violations. These studies suggest a need to enhance at-sea enforcement. Observers may provide enforcement benefits that are not available via other means at little additional cost, especially where they are already aboard vessels for scientific purposes.

More research is needed to determine and predict the implications of observer enforcement. This study considers the historical effect of observer enforcement in US fisheries in order to better evaluate the arguments for and against observer enforcement. Using National Marine Fisheries Service (NMFS) enforcement data, this paper compares observer reporting of enforcement incidents and the prosecution of those incidents in the North Pacific groundfish fishery, the only federal observer program that requires observers to report violations they witness, to reporting and prosecution in other US fisheries.

1.1. Federal fisheries observer programs

The Magnuson–Stevens Fisheries Conservation and Management Act (MSA) governs US federal fisheries management. Under the MSA, regional fisheries management councils create a fisheries management plan (FMP) for each fish stock. Each FMP must be consistent with 10 national standards established in the Act. NMFS approves each FMP that complies with the MSA and incorporates it into federal regulations. The NMFS Office of Law Enforcement (OLE), the US Coast Guard, and state fisheries agencies enforce federal fisheries regulations [8].

The MSA authorizes FMPs to include observer programs. Specifically, “one or more observers [may] be carried on board a vessel of the United States engaged in fishing for species that are subject to [an FMP], for the purpose of collecting data necessary for the conservation and management of the fishery” [12]. Section 118 of the Marine Mammal Protection Act [13] and Section 10 of the Endangered Species Act [14] provide additional observer program authority.

Observer programs are developed and implemented independently by regional fisheries management councils and administered separately by each NMFS region. The National Observer Program (NOP), established in 1999 and housed in the NMFS Office of Science and Technology, coordinates programs across regions [14]. Because each observer program is independently created and run, programs differ by fishery with respect to observer duties, funding mechanisms, and oversight [6]. Observer programs expanded in the last decade, due in part to changes to the MSA [15]. Forty two fisheries currently mandate the use of

observers on commercial fishing vessels [16]. By comparison, only 20 US fisheries included observer programs in 2000 [18]. About 674 observers logged approximately 67,030 days at sea in fiscal 2005 [14].

Observer data are placed in a database system and used to support fisheries management decisions, including projection of total allowable catch, monitoring fishing activity, estimating mortality, and developing stock assessments and rebuilding targets [14]. Observer logbooks are available to OLE for enforcement purposes under the MSA (402(b)(1)(A), 311(b)(1)(A)(v)). In 2003, the NOAA Office of the Inspector General cited a need for improved coordination between observer programs and enforcement staff and recommended creation of a policy statement or directive clarifying: observers' role in monitoring and compliance; how observer data will be made available to OLE; and how OLE will use observer data [2].

1.2. North Pacific Groundfish Observer Program

The North Pacific Groundfish Observer Program (NPGOP) is unique among US fisheries: By law, North Pacific groundfish observers must “report accurately any observations of suspected violations of regulations relevant to conservation of marine resources or their environment” [19]. North Pacific observers reported 590 violations from 2000 to 2002, leading an OLE representative to conclude that “the importance of documenting and reporting [violations] cannot be overemphasized and should be included in all regulatory regimes” [18]. As a result, the NPGOP provides a case study for the effects of an explicit enforcement role in US fisheries.

The North Pacific groundfish regulations apply to species managed under North Pacific Fishery Management Council (NPFMC) [20] and the International Pacific Halibut Commission (IPHC) FMPs [21]. Together, these FMPs set total allowable catch for all commercially-important species in the North Pacific. These species are harvested by pelagic and non-pelagic trawl, pot, jig, and longline vessels ranging from <60 to more than 300 feet in length.

North Pacific groundfish regulations have required the use of observers since creation of an observer plan in 1990 [22]. The regulations require vessels > 125 feet length overall (LOA) to carry observers 100% of the time, and vessels between 60 feet and 125 feet LOA must carry an observer during 30% of their fishing time. Vessels < 60 feet LOA are not required to carry observers. Vessels over 125 feet LOA using pot gear are required to carry observers 30% of the time. Vessels participating in limited access and individual quota based fisheries may be subject to enhanced observer coverage requirements.¹ Observers are also required at shoreside and floating processors that process more than 500 metric tons (mt) in a calendar month [6]. NPGOP vessels pay the direct costs and contract directly for observer coverage from among a NMFS-certified pool of observer providers. With the exception of the Pacific hake and Atlantic scallop observer programs, all other federal observer programs are entirely federally funded, and NMFS determines observer coverage by vessel and trip [6].

The NPGOP is currently undergoing review for possible revision. In 2006, the North Pacific Fishery Management Council determined that the quality and utility of data are suffering due to current observer coverage requirements, lack of NMFS control

¹ Community Development Quota (CDQ) fisheries were also subject to enhanced requirements until passage of the 2007 amendment to the MSA. The MSA now requires that CDQ programs can be regulated no more restrictively than for other participants in the sector (Section 305(i)(B)(iv)). As a result, enhanced CDQ observer requirements no longer apply.

over deployment, and limitations on observer availability and coverage. The Council also determined that costs to small vessels are disproportionately high relative to earnings. The Council commissioned a restructuring analysis to address these problems. The analysis identified legal obstacles that were fatal to restructuring, including lack of statutory authority to implement a fee-based observer plan and Fair Labor Standards Act limitations on alternative payment systems. In late 2008, NMFS revisited its analysis and concluded that most, but not all, obstacles to restructuring have been eliminated [6]. The Council has not yet acted on this conclusion.

2. Methods

The data in this paper were collected as part of a multiyear study [8]. Information sources include enforcement data for all cases closed between January 2001 and May 2006 obtained from the NMFS Enforcement Management Information System (EMIS) database and a survey carried out in 2007. Complete information on these data is available in Lenfest Ocean Program [8].

For this study, the author used a modified EMIS database containing 8015 records of enforcement incidents relating to commercial fisheries, excluding records related to marine mammals, recreational or charter fishing, and vessel safety (other than observer safety). These 8015 records include 1114 records of enforcement incidents identifying “NMFS observer” in the “source” field. These incidents form the basis for comparisons between observer-sourced and other incidents.

The EMIS database is organized geographically by field office. NMFS field offices may report incidents from vessels fishing in multiple fishery management council regions. For example, the NMFS Seattle office enforces violations of both North Pacific Fishery Management Council and Pacific Fishery Management Council FMPs. As a result, direct attribution of cases to the North Pacific groundfish fishery cannot be based on field office. Instead, geographical classification of records is based on the Part of the Code of Federal Regulations applicable to the specific regulation cited in each record. The research team assigned all records where the Part equals “EEZ off Alaska Multispecies” to the North Pacific Fishery Management Council. These incidents totaled 897 of the 1114 total observer incidents and 3914 of the 8015 records in the total data set, primarily encompassing enforcement incidents related to the pollock, cod, sablefish, and halibut fisheries operated by trawl, pot, and longline sectors. The remaining records were considered “other”. This method of geographic allocation is likely under-inclusive as to North Pacific records; some records were not specified to a particular Part or alleged generalized violations of the MSA. The author considered and rejected using additional fields to more completely capture observer incidents originating from North Pacific fisheries because of uncertainty as to the origin of these incidents.

Analysis was based on author-created fields for violation category and resolution. Both of these fields were derived from record-by-record review of NOAA-originated fields. Violation category is based on a review of the enforcement incident description identified by NOAA. The author allocated each record to one of the following categories: closed area/season; discard/retention (including illegal discard of bycatch or target species, i.e. highgrading, or retention of prohibited species of individuals, such as undersized fish or prohibited species); gear; miscellaneous; no valid permit (including fishing without a permit or IFQ/DAS card or with an expired permit); observer program; overage (including both bycatch and target species overages); recordkeeping and reporting; and VMS violations (failure to properly operate VMS, but not violations detected via VMS). Observer program incidents

are cases in which observers record direct interference with their activities, such as through equipment tampering, failure to notify observers of hauls, or interference with or biasing hauls, as well as violations involving indirect interference, as through observer harassment, intimidation, or failure to provide adequate accommodation. Each record was allocated to a general resolution category based on the NOAA “resolution” field, which included 39 distinct entries. Each of these resolutions was identified as: penalty; no violation; declined to prosecute; merged/transferred to another jurisdiction; or other. Cases resolved through a penalty were further subdivided to be a warning; forfeiture; or financial penalty or settlement (including summary settlements and issuance of a NOVA or judicial decree).

In 2007, the Lenfest Ocean Program project team surveyed fishers, enforcement staff, scientists, and others involved in three representative domestic fisheries. The questionnaire included both closed- and open-ended questions. Most questions were generic and could be used in all fisheries and were supplemented by fishery-specific questions. The survey protocol strictly followed Dillman [23]. Case study fisheries included the Northeast multispecies groundfish trawl fishery, the Gulf of Mexico commercial red snapper IFQ fishery, and the Pacific groundfish limited entry trawl fishery. A total of 1295 fishers were surveyed, including 708 from the Northeast, 396 from the Gulf of Mexico, and 191 from the Pacific. Response rates ranged from 40.4% (Northeast) to 47.6% (Pacific). Fishery enforcement staff, managers, researchers, and others completed an online version of the survey.

3. Characterization of observer-sourced incidents

Overall, the North Pacific produced 3914 of the 8015 total records (48.8%) in the data set. Multiple sources contributed these records, including NMFS, USCG, states, observers, the public and other agencies. Both within and outside the North Pacific, NMFS shoreside enforcement produced the largest number of records. In the North Pacific, observers produced the second largest number of records (22.9% of total), but they accounted for only 5.3% of records elsewhere. USCG/NMFS at-sea enforcement produced the second-most records outside the North Pacific (20.6%), but only 5.1% of records in the North Pacific (Fig. 1). North Pacific observers produced 897 of the 1114 total (80.2%) observer-sourced records in the database. Of the remaining 217 observer-sourced records, an additional 35 originated from NMFS's Alaska region but cannot be matched to a particular fishery. As a result, the data presented on North Pacific observer-sourced incidents likely under-represents the total number of observer-initiated enforcement incidents.

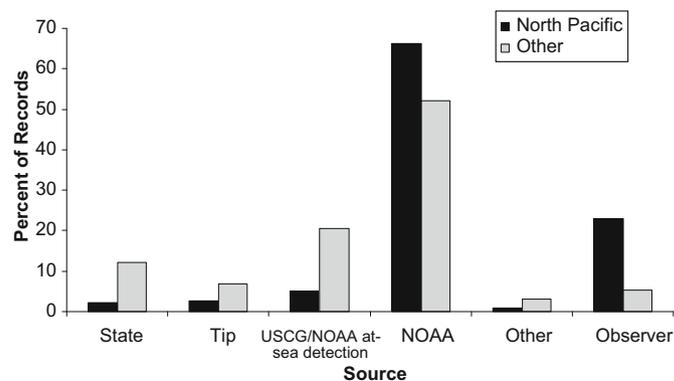


Fig. 1. Recorded violations by source. Dark bars represent data from the North Pacific fishery and light bars depict data from other fisheries.

Table 1
Enforcement incidents and resolutions by location and observer presence.

Resolution	Source	Violation category ^a				Total
		Discard/Retention	Gear	Observer Program	Recordkeeping/Reporting	
Total Cases	All observer	285	95	616	83	1114
	North Pacific observer	274	49	486	72	897
	Non-observer	445	510	107	1600	6901
% prosecution declined (N)	All observer	48.8 (139)	29.5 (28)	41.9 (258)	30.1 (25)	41.4 (461)
	North Pacific observer	50.0 (137)	28.6 (14)	41.2 (200)	30.6 (22)	42.5 (381)
	Non-observer	22.9 (102)	16.5 (84)	33.6 (36)	7.69 (123)	14.8 (1018)
% resulting in penalty (N)	All observer	28.8 (82)	47.4 (45)	36.5 (225)	54.2 (45)	36.2 (403)
	North Pacific observer	28.1 (77)	55.1 (27)	36.4 (177)	56.9 (41)	36.1 (324)
	Non-observer	59.8 (266)	62.2 (317)	43.9 (47)	62.5 (1000)	61.6 (4252)
% dismissed (N)	All Observer	11.2 (32)	16.8 (16)	15.6 (96)	10.8 (9)	14.6 (161)
	North Pacific observer	10.9 (30)	14.3 (7)	15.0 (73)	8.3 (6)	13.3 (119)
	Non-observer	6.1 (27)	10.6 (54)	20.6 (22)	22.2 (355)	15.3 (1053)

^a Less than 10 observer incidents recorded for all other violation categories.

In all regions, the majority of records originating with observers alleged violations of the observer program, such as observer harassment and interference (Table 1). North Pacific observers reported incidents differently from their colleagues in other regions for other violation categories. North Pacific observers reported 274 discard/retention violations (30% of North Pacific observer-reported records), while cases were sourced from observers in only 11 cases (5.1% of observer incidents) in other regions. North Pacific (49 records) and other-region observers (46 records) produced similar numbers of gear-related incidents, representing 5.5% of observer records in the North Pacific and 21.2% of records in other regions. Forty five of the 46 observer-sourced gear incidents outside the North Pacific originated in the Hawaii and Guam NMFS field offices and primarily relate to seabird mitigation measures aboard longline vessels. These incidents comprise 48% of the gear-related incidents in that region for all sources. North Pacific observers reported 72 recordkeeping and reporting incidents (8.0% of North Pacific observer records), while observers in other regions recorded 11 such incidents (2.1% of observer records). Incidents relating to other violation categories are less common across all regions.

Differences in the relative frequency of violation categories as a percent of *observer* records notwithstanding, observer-sourced records comprise a distinct proportion of *total* records in the North Pacific as compared to other regions (Fig. 2). In all fisheries, observer cases provide a large majority of total alleged observer program violations—86.8% in the North Pacific and 79.8% elsewhere. In the North Pacific, observers reported 70.1% of all discard/retention incidents, 30.2% of all gear incidents, 7.61% of all seasonal and area closure incidents, and 6.28% of all recordkeeping and reporting incidents. In other regions, 10.4% of all gear incidents were observer-sourced, and all other categories were < 5% observer-sourced.

Analysis of the EMIS database is supplemented by survey data [8]. The survey included one question on the effects of observers on fisher compliance behavior (Table 2). Respondents differed in their assessments by category. Majorities of most respondent groups agreed with the premise that the presence of observers is likely to reduce violations. Exceptions include enforcement respondents in the northeast (29.4% agreement) and fishermen in the Pacific groundfish trawl fishery (41.2% agreement). The Northeast enforcement response contrasts strongly with enforcement responses in the other two fisheries, in which more than 80% of respondents agreed. Agreement rates for

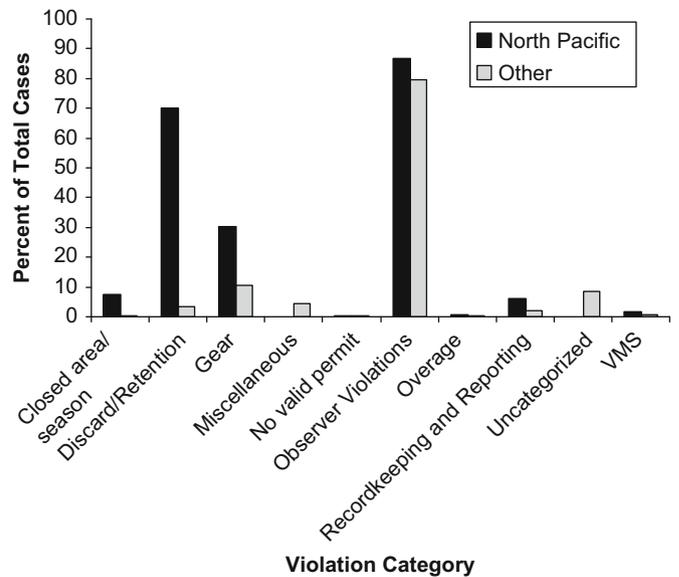


Fig. 2. Observer reports as percent of total records. The frequency at which different types of violations reported in the North Pacific, where observers are required to report violations, vary from the types of violations reported in other fisheries. Dark bars represent data from the North Pacific fishery and light bars depict data from other fisheries.

fishermen outside the Pacific groundfish trawl fishery were also high, at 70.8% and 64.4% for the Northeast and Gulf of Mexico, respectively.

3.1. Discussion

NMFS fishery enforcement records reveal that observers play a significantly larger role in enforcement in the North Pacific than in other regions. Comprising over 20% of the total records from the North Pacific, observers are an important tool for detecting potential violations in the North Pacific’s far-flung fisheries. Legal requirements to report violations [19] and explicit enforcement training [24] likely contribute to the frequency of observer-sourced records in the North Pacific. The data suggest that North Pacific observers are more likely than their colleagues in other regions to consider enforcement part of their job and to report every violation they witness. Conversely, observers in other

Table 2
Survey responses on the effect of observer presence on fishing behavior.

Question: The presence of observers on vessels helps reduce violations of fishery regulations (% agree) ^a				
	Northeast	Gulf of Mexico	Pacific	Total
Fishermen (N)	70.8 (262)	64.4 (170)	41.2 (81)	63.8
Regulators (N)	70.3 (42)	88.9 (10)	54.5 (12)	70.2
Enforcement (N)	29.4 (44)	83.2 (16)	81.8 (13)	50.8

^a The wording of the question differed slightly by fishery. In the Northeast and Gulf of Mexico, the question read “Although observers are not involved in enforcement, their presence aboard a vessel affects fishery practices in ways that reduce violations of fishery regulations.” In the Pacific, the question read “The presence of observers effects [sic] fishery practices in ways that reduce violations of fishery regulations.”

regions are relatively unlikely to report violations they witness for prosecution. Nonetheless, a majority of all fishers surveyed agreed that the presence of observers already affects their behavior.

North Pacific observers produce different types of cases than do other sources or observers in other regions. North Pacific observers report the majority of discard/retention, gear, and observer program incidents in the North Pacific. Discard, retention, and gear violations occur at sea and often leave little trace upon return to shore, making them difficult to enforce without large investment in at-sea enforcement. Prior research suggests that these violation types are not effectively detected or deterred at sea [10]. Observers are also uniquely positioned to detect, and motivated to report, observer program incidents. Except for observers reporting gear-related incidents on Pacific longline vessels,² observers outside the North Pacific are less likely to report violations other than these observer program incidents.

As a whole, a comparison of North Pacific observer-reported enforcement data against data from other regions supports the hypothesis that a mandate to report observed violations of fisheries laws and regulations produces increased rates of reporting. More importantly, this reporting does not appear to duplicate detection of violations that would otherwise be detected by dockside or at-sea enforcement personnel. Observers therefore appear to represent a unique source for enforcement of regulations governing discarding, retention of prohibited species, gear usage, and onboard processing of fishery resources. As a result, expansion of mandatory enforcement reporting by observers in all fisheries and regions would likely increase OLE's ability to detect violations of fisheries laws that occur at sea, notwithstanding potential effects on data quality. While this study does not evaluate the effects of observer enforcement on data collection, survey data indicate that observer presence on vessels already affects fisher behavior, potentially biasing current data collection. These results are consistent with prior work considering the reliability of observer data [1,3,4,15].

4. Incident resolution

Observer-sourced records are less likely than records produced by other sources to result in penalty assessment (Table 1). In total, 61.6% of non-observer enforcement incidents resulted in a final penalty action, whether a warning, forfeiture, settlement, or judicial action. In comparison, 36.2% of observer-sourced incidents resulted in a final penalty. This difference largely is due to differences in financial penalty assessment and forfeiture rates.

² The Pacific longline observer program was established to collect data on sea turtle, marine mammal, and seabird interactions, as well as fishing effort (Allen & Gough, 2007) [26]. Observers must indicate specific measures undertaken by vessel operators (NOAA Pacific Islands Regional Office, 2006) [27], potentially causing high rates of observer reporting for gear-related incidents.

Enforcement agencies issued verbal and written warnings in 340 observer-sourced cases (30.5%) and in 1836 non-observer records (26.6%). Observer-sourced records resulted in zero forfeitures, compared to 649 total forfeitures for other sources (9.4%). Financial penalties (including summary settlements, other settlements, and judicial resolutions) were issued in 1767 non-observer records (25.6%). By contrast, observer-sourced records were resolved through financial penalties in only 63 cases (5.7%). Prosecutors also declined to prosecute observer-sourced records more often than for other violations. OLE or the NOAA General Counsel for Enforcement and Litigation (GCEL) declined to prosecute 41.4% of observer-sourced cases, compared to 14.8% of non-observer-sourced incidents.

Observer-sourced incidents are more likely to be declined by prosecutors and less likely to result in a penalty than incidents reported from other sources, across all violation categories. For all violation categories with significant numbers of observer-sourced incidents, prosecution was declined at consistently higher rates in observer-sourced incidents than in other incidents, and penalties were assessed at a consistently lower rate in observer-sourced incidents than in non-observer-sourced incidents (Table 1). For example, OLE or GCEL declined to prosecute in 22.9% of non-observer-sourced discard/retention incidents, while 59.8% resulted in penalties, including 28.5% in financial penalties. On the other hand, only 28.8% of observer-sourced discard/retention incidents resulted in a penalty and only 13 (4.6%) resulted in a financial penalty, but prosecution was declined in 48.8% of these incidents.

The rates of penalization and prosecution differ by violation category for observer-sourced incidents. Prosecutors were most likely to decline to prosecute discard/retention incidents (48.8%) and least likely to prosecute gear incidents (29.5%). Conversely, penalty assessment in observer-sourced incidents was least common in discard/retention cases (28.8%) and most common for recordkeeping and reporting records (54.2%) (Table 1).

Differences in resolution between observer and non-observer cases are unlikely to result from the grouping of observer-sourced cases in violation categories that are particularly difficult to enforce. Observer-sourced discard/retention cases are prosecuted and penalized less often than gear and recordkeeping/reporting cases, but this relationship does not hold for cases derived from other sources. When not derived from observer reports, discard/retention, gear, and recordkeeping and reporting cases were penalized with similar frequency, in approximately 60% of cases (59.8%, 62.2%, and 62.5%, respectively), echoing the mean frequency of penalty assessment for all violation categories (61.2%). Prosecution was declined in these categories at more erratic rates: 22.9% of discard/retention cases, 16.5% of gear cases, and 7.7% of recordkeeping and reporting cases were declined, compared to a mean of 14.8%. These data suggest that the substantially lower rates at which penalties are assessed in observer-sourced discard/retention cases, compared to gear and

record-keeping cases, is unlikely to result from systemic difficulty in prosecuting discard/retention cases. However, observer program cases were most likely to be declined and least likely to be penalized in all cases. Observer program incidents thus rarely are prosecuted or penalized regardless of whether they are derived from observer reports.

Rates of prosecution and penalty assessment for observer-sourced incidents were generally consistent between the North Pacific and other regions. 42.5% of observer-sourced cases were declined in the North Pacific, compared with 36.9% in other regions. North Pacific observer-sourced cases result in penalties 36.1% of the time, while 36.4% of cases sourced from observers in other regions resulted in a penalty. Differences appear for some specific violation categories. Specifically, gear violations in the North Pacific were declined in 28.6% of cases and resulted in a penalty in 55.1%. In other regions, 30.4% of these cases were declined and 39.1% were penalized. Rates for observer-sourced cases in other violation categories differed substantially between the North Pacific and the other regions, but sample size limitations prevent meaningful comparison or conclusions.

Enforcement agencies closed cases for “no violation” in similar rates in observer-sourced records and non-observer cases (Table 1). Of non-observer sourced cases, 15.3% of cases were closed or dismissed for lack of a violation, while 14.6% of observer-sourced incidents were similarly dismissed. Among observer-sourced cases, North Pacific records resulted in dismissal in 13.3% of incidents, while 19.4% of observer-sourced incidents were dismissed in other regions. Finally, 7% of all records were merged or transferred to another jurisdiction.

4.1. Discussion

Observer reporting of alleged fisheries violations cannot effectively promote compliance unless enforcement agencies actively investigate and prosecute reported claims. This analysis of NMFS data shows that observer-reported incidents are prosecuted less often and are less likely to result in financial penalties than incidents reported by other sources. Observer-sourced incidents may not be prosecuted for three reasons:

- The incident is not a fisheries violation.
- The incident may be a violation but is inadequately substantiated to support prosecution.
- The incident is a violation and is supported by sufficient evidence, but is not prosecuted for discretionary reasons.

As to the first case, enforcement data show that North Pacific observers produce a lower proportion of “no violation” incidents than the population as a whole, suggesting that observers are capable of correctly determining when a violation has occurred. However, incidents sourced from observers in other regions yielded a higher dismissal rate, suggesting that training in enforcement and fishery regulations may improve the accuracy of observer reports.

As to the second case, three factors may conspire to make prosecution of observer cases particularly difficult. These include: (i) observer availability, (ii) evidentiary limitations, and (iii) inherent difficulty of enforcing violation categories detected by observers. NMFS [25] has noted that observers have been unable to participate at trial due to financial hurdles and that high contractor and observer turnover make prosecution difficult. Similarly, evidence collection may be a factor in prosecution rates in observer-sourced cases because reliance on testimony from a single individual may be contested by the vessel owner and crew and because observer logbooks may not provide all the

information required to support successful prosecution. There is some evidence that standardized protocols for handling compliance issues may increase success in prosecution; conviction rates of approximately 80% were reported in Canada based on adaptive sampling protocols that focus on evidentiary needs for enforcement when a violation is detected [25]. Finally, violations detected at sea may be inherently difficult to detect and enforce [10]. The data discussed in this study do not address availability or evidentiary issues. However, this study shows consistent differences in the resolution of observer- and non-observer cases: observer sourced incidents are prosecuted less often and with less success both in each individual violation category and across all violation categories. The challenges of prosecuting violation categories detected by observers thus are unlikely to explain differential prosecution rates.

As to the third case, prosecutors may not enforce observer-sourced incidents because these cases are less severe than those detected by traditional enforcement resources. Fishers are less likely to blatantly disregard fishing regulations when observers are aboard, particularly when they know observers are trained in and required to report those violations [3,4]. As a result, the violations that observers do witness may more likely be minor and may not pose a severe threat to fisheries resources in comparison to violations detected by NOAA or USCG. If so, the use of prosecutorial discretion to decline observer-sourced cases is rational in the light of funding constraints [10].

This study indicates that increased investment in evidence collection and prosecution of discard/retention and observer program violations may be warranted regardless of the reasons for current prosecution rates, because observers report large percentages of the total cases in each category. Low prosecution rates may enable rational noncompliance in these categories, which is problematic from an environmental perspective for discard/retention violations and from an observer safety perspective for observer program violations. In particular, increased prosecution of alleged observer program violations could mitigate the concerns about observer safety that currently limit observer enforcement.

5. Conclusion

The debate over whether to expand the role and training of US fisheries observers to include detecting and reporting fisheries violations largely has focused on potential bias to scientific data collection that may result from enforcement activity. Less attention has been paid to the need for and potential benefits of using observers as an enforcement tool. In the light of rapid expansion of federally-funded observer programs and recent research suggesting that conventional methods for detecting and deterring noncompliance in US fisheries may not be effective, the time is ripe to reconsider both the benefits and costs of using observers for enforcement.

This paper suggests that observers outside the North Pacific represent a substantial, but underutilized, enforcement resource. Mandatory observer reporting substantially increases the number of enforcement incidents reported by fisheries observers, and observers detect different types of violations than traditional enforcement resources. Insofar as fisheries enforcement may be less effective at deterring noncompliance than previously thought [9,10], observer enforcement may offer a unique and important tool to reduce noncompliance. However, effective deterrence may require an increase in the rate at which fisheries agencies prosecute violations reported by observers.

This paper also presents survey data suggesting that the presence of observers already affects fisher compliance behavior,

even in fisheries where observers are not subject to mandatory reporting requirements. This finding is consistent with past results and suggests that some observer data currently used for scientific assessment already may be biased. In addition, it suggests that mandatory observer enforcement might not significantly increase the bias that already affects the quality of observer-collected scientific data.

These factors suggest that an expansion of mandatory observer enforcement reporting regulations in US fisheries could increase the effectiveness of fisheries enforcement and would increase the incentives for fisher compliance. While additional research is needed on the effects of mandatory observer reporting on specific vessel types and fisheries and on the reasons for low prosecution rates in observer-reported cases, this study indicates that mandatory observer reporting would have salutary effects on the sustainability of US fisheries.

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