

A Review of Observer and Monitoring Programs in the Northeast, the West Coast, and Alaska

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Prepared by



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Abbreviations

AC	Area Coordinator
ACE	Annual Catch Entitlement
ACL	Annual Catch Limits
AFA	American Fisheries Act
AOI	Alaska Observers Incorporated
ASM	At-Sea Monitor
BC	British Columbia
BSAI	Bering Sea and Aleutian Islands
CP	Catcher Processor
CSOP	Catch Share Observer Program
CV	Catcher Vessel
DAS	Days at Sea System
DR	Dealer Report
DSM	Dock Side Monitor
EA	Environmental Assessment
EMS	Electronic Monitoring System
EPIRB	Emergency Position-Indicating Rescue Beacon
FLSA	Fair Labor Standards Act
FMP	Fish Management Plan
FY	Fishing Year
GB	Georges Bank
GHLCMP	Groundfish Hook and Line Catch Monitoring Program
GMRI	Gulf of Maine Research Institute
GOA	Gulf of Alaska
GOM	Gulf of Maine
IFQ	Individual Fishing Quota
IRFA	Initial Regulatory Flexibility Analysis
ISER	Institute of Social and Economic Research
MS	Mothership
MSA	Magnusen-Stevens Act
mt	Metric Tons
NEFO	Northeast Fishery Observer
NEFOP	Northeast Fishery Observer Program
NEFSC	Northeast Fishery Science Center
NEMSF	Northeast Multispecies Fishery

NERO	Northeast Regional Office
NMFS	National Marine Fisheries Service
NPFMC	North Pacific Fishery Management
PACFIN	Pacific Fishery Information Network
PSC	Potential Sector Contribution
PSMFC	Pacific States Marine Fisheries Commission
PTNS	Pre-Trip Notification System
RIR	Regulatory Impact Review
SBRM	Standardized Bycatch Reporting Methodology
SCA	Service Contract Act
SNE/MA	Southern New England / Massachusetts
VMS	Vessel monitoring system
VTR	Vessel Trading Report
WCGOP	West Coast Groundfish Observer Program

Executive Summary

Amendment 16 to the Northeast Multispecies Fishery Management Plan significantly increases observation of fish harvesting and delivery operations on most of the vessels participating in the fishery. Fishery managers at the National Marine Fisheries Service (NMFS) and the New England Fishery Management Council required the higher levels of observation because of concerns that the new sector-based management regime, coupled with annual catch limits (ACLs), increase incentives to under-report discards and landings. The regulations implemented with Amendment 16 create two new components of the fishery observation program—At-Sea Monitors (ASMs) and Dockside Monitors (DSMs). Initially, under the new management regime, the ASM Program will be paid for and directed by NMFS, and the DSM program will be funded through a NMFS grant to the Gulf of Maine Research Institute (GMRI). The costs and majority of management of both programs are scheduled to be transferred to the sectors beginning in 2012. NMFS Northeast Fishery Science Center estimates that the costs of the ASM/DSM program, excluding reimbursable travel and training costs, are \$630 per sea-day. Data provided by GMRI indicates that that DSMs cost about \$103 per monitored offload.

There are significant concerns about the costs of the ASMs and DSMs; specifically that many vessels, particularly smaller “day boats”, may not be economically viable once they have to bear these costs. Concerns regarding monitoring costs are exacerbated when the \$630 per sea-day estimate for the northeast is compared to the nominal costs of observers per sea-day in Alaska (\$323) and West Coast (\$365) groundfish fisheries. This report addresses these concerns by examining observer programs in all three areas (the Northeast, the West Coast, and Alaska), and detailing how the Northeast Multispecies Fishery observer and monitoring program differs from the other two.

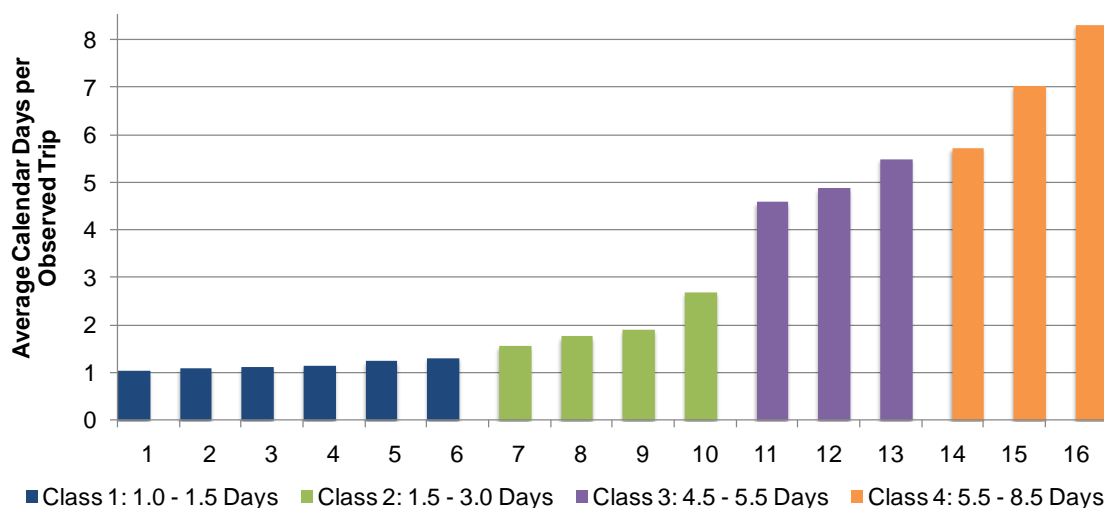
In FY 2010 overall at-sea observer coverage by regular Northeast Fishery observers (NEFOs) combined with ASMs was estimated to have been 33 percent of sector trips. While the NE Fishery Observer Program has a goal assigning NEFOs and ASMs equitably across sectors, we conclude that coverage levels in 2010 of all at-sea observers (NEFOs + ASMs) were not distributed proportionally. Based on statistical testing, there is an extremely low probability that the actual coverage levels could have been the result of random sample with a normal distribution, if the target sample rate was 33 percent.

Other key findings of the report are:

- ASM costs including reimbursable travel and training costs were estimated to have been over 5 percent of total ex-vessel revenues generated by sectors.
- ASM costs as a percent of ex-vessel revenue, would be borne disproportionately by sectors with average trip-lengths of less than 1.5 calendar days.

In Figure ES-1, we show average trip lengths of individual sectors during observed trips (NEFOs and ASMs) in FY 2010. Nine of the sixteen sectors have average trip lengths of less two calendar days, one has average trip lengths of 2.5 calendar days, and the remaining six have average trip lengths of 4.5 days or more. Figure ES-1 groups the sectors into four classes based on trip lengths.

Figure ES- 1. Average Trip Lengths of Sectors in FY 2010



Source: Chart developed by Northern Economics, Inc. from information provided by Van Atten (2011h).

In Tables ES-1 and ES-2 we provide an overall summary of participation and ASM coverage and costs in the NEMSF by sector. The tables combine the sixteen sectors into four classes on the basis of trip lengths, so that there are three or more sectors in each class and confidential information is thus protected. The trip length classes were introduced in the previous figure. We note that much of the data in the tables are estimates developed by Northern Economics, based on data made available during the course of the analysis. In particular the estimates of ex-vessel revenue are approximations using Sector ACEs and net transfers, along with industry-wide discard rates, exploitation rates and ex-vessel prices.

Table ES-1. Trips and Days, ASM Coverage and Cost, and Revenue in FY 2010 for Sectors in Trip Length Classes

Trip Length Classes (days)	Sectors in Class	Trips in Class	ASM Trips in Class	Observed Trips in Class	Days in Class	ASM Days in Class	Observed Days in Class	Total ASM Costs in Class (\$)	Ex-Vessel Revenue in Class (\$)
Class 1 : 1.0 – 1.5	6	6,373	1,657	2,091	7,533	1,976	2,482	1,383,575	14,030,802
Class 2: 1.5 – 3.0	4	2,688	732	941	4,933	1,324	1,718	927,052	17,948,402
Class 3: 4.5 – 5.5	3	664	143	193	3,210	692	934	484,531	11,753,147
Class 4: 5.5 – 8.5	3	1,488	345	477	9,491	2,156	3,002	1,509,610	36,737,649
All Classes	16	11,213	2,877	3,702	25,167	6,148	8,136	4,304,768	80,470,000

Source: Table developed by Northern Economics using information from previous tables.

Table ES-2. Participation and ASM Coverage Percentages in FY 2010 for Sectors in Trip Length Classes

Trip Length Classes (days)	Class Trips / All Trips	ASM Trips / Class Trips	ASM Trips / All Trips	Class Days / All Days	ASM Days / Class Days	ASM Days / All Days	ASM Costs / Class Revenue	ASM Costs / Total Revenue
Class 1: 1.0 – 1.5	57%	26%	15%	30%	26%	8%	9.9%	1.7%
Class 2: 1.5 – 3.0	24%	27%	7%	20%	27%	5%	5.2%	1.2%
Class 3: 4.5 – 5.5	6%	22%	1%	13%	22%	3%	4.1%	0.6%
Class 4: 5.5 – 8.5	13%	23%	3%	38%	23%	9%	4.1%	1.9%
All Classes	100%	26%	26%	100%	24%	24%	5.3%	5.3%

Source: Table developed by Northern Economics using information from previous tables.

In combination, Tables ES-1 and ES-2 provide a summary of sector activities and ASM coverage in FY 2010. Overall, we estimate that there were 11,213 sector trips and an estimated 25,167 sector sea-days. Sectors that take mostly single-day trips (Class 1) accounted for 57 percent of all sector trips, but only 30 percent of the sea-days. Sectors in Class 4 with average trip lengths from 5.5 - 8.5 took only 13 percent of the trips, but had 38 percent of the total sea-days, more than any other class of sectors.

In the tables, ASM coverage levels do not appear to vary all that much, because much of the variation is masked by the grouping of sectors into classes. Overall, we estimate sectors carried ASMs on 26 percent of their trips, but on only 24 percent of their sea-days. Classes 1 and 2 with relatively shorter trips, had ASMs on a greater percentage of their sea days (26 and 27 percent respectively) than sectors in Classes 3 and 4 where trips were longer.

Sectors in Class 4 had the greatest overall ASM costs accounting for \$1.5 million of the \$4.3 total.¹ For this class, ASM costs comprised 4.1 percent of the estimated ex-vessel revenues, which we estimate at \$37.6 million. ASM costs were a similar percentage of revenues for Class 3, while ASM costs for sectors in Class 2 were estimated at 5.1 percent of their ex-vessel revenues. However, ASM costs of Class 1 came to 9.9 percent of the \$14.0 million estimated to have been earned by the six day-boat sectors comprising the class.

Revenues and Observer Costs in Alaska

In the Alaska groundfish fishery, ex-vessel revenue in 2009 was estimated at \$627.2 million, while observer costs were at \$7.95 million over 24,462 sea-days. Observer costs were just 1.2 percent of ex-vessel revenue.

While observer coverage costs in Alaska appear much lower than costs in the Northeast, the comparison is akin to comparing apples to oranges. Unlike the Northeast, Alaska observer costs are paid by the vessels on which the observers are deployed. Vessel owners, generally working through vessel-owner associations or cooperatives, contract with NMFS certified observer providers. Also, observer coverage is limited to vessels greater than 60', and in most years, observed vessels account for one-third or fewer of the vessels that participate in the fishery.

The overhead costs of deploying observers in Alaska are significantly lower than in other regions; in part because approximately 80 percent of the observer days occur on catcher processors (CPs) that catch and then process and freeze their fish on board. Trip lengths for CPs range from 14 – 30 days or longer, and observers stay onboard these vessels for the entire trip. Because the observer is on a single vessels for weeks at a time, the observer providers incur very few costs, and the ratio of revenue generating sea-days to non-revenue days (port days or travel days) are very high. Observer deployment costs on catcher vessels (CVs) are also lower than in the Northeast because 100 percent coverage is required on many of the larger CVs. These account for an additional 7 percent of the sea-days, and like CPs, have very consistent and predictable fishing patterns, and will often carry the same observer in successive trips. The consistent deployment to a single vessel reduces the overhead costs of the observer providers.

There is additional evidence that the current low cost per sea-day of observers in Alaska is not comparable to costs in the Northeast. In 2010, the North Pacific Fishery Management Council approved an Amendment that will require observer coverage on all components of the groundfish fleet including vessels that have never before had coverage. The Amendment does not affect vessels that currently carry observers 100 percent of the time. However, the Amendment Document (NPFMC, 2010a) estimates that coverage costs for the remaining vessels will increase to approximately

¹ ASM costs include sea-day cost plus travel and training costs. Training costs include only those amounts that NEFOP reimbursed to ASM providers.

\$467 per sea-day because of federal contracting rules that require that observer providers use wage levels determined by the Service Contract Act (CSA). A careful review of the estimation process used to estimate this rate concludes that the \$467/sea-day underestimates the number of un-paid port and travel days under the new program. Because the contractor will need to pay observers for these days, but will not generate revenue—their overhead costs relative to revenue will increase and the result will be higher sea-day charges. We estimate that these additional overhead costs are likely to push the cost per sea-day to rates in excess of \$500.

Revenues and Observer Costs in the West Coast IFQ Program

In 2011 the West Coast groundfish trawl fishery began operations under an Individual Fishing Quota (IFQ) management regime. The new regime requires 100 percent observer coverage on all vessels operating in the IFQ fisheries. For this first year, NMFS agreed to pay 90 percent of the observer costs, but by 2014 vessel operators in the fishery will be required to pay 100 percent of the observer costs. The reimbursement schedule is based on current Alaska observer costs (with travel) of \$365/sea-day. Interviews with observer contractors in the fishery indicate that reimbursements, at least in this first year of the program, may not be sufficient for providers to cover their costs. Preliminary estimates from the IFQ fishery through June 2011 indicate that observer costs in the IFQ fishery are likely to range from 5 – 9 percent of ex-vessel revenues. The document also notes that sea-day costs in other fisheries in the West Coast Observer Program are estimated at \$450/day.

1 Introduction

This paper examines the fishery observation and monitoring programs in the Northeast Multispecies Fishery (NEMSF) and compares aspects of these programs with similar programs in the groundfish fisheries of the West Coast and Alaska. There are significant differences in apparent costs of observers in the Northeast, the West Coast and in Alaska. The Environmental Defense Fund, working in close coordination with the Gulf of Maine Research Institute (GMRI) and industry members of the monitoring working group, has sponsored this project. The primary goal is to compare and contrast the observer programs in the groundfish fisheries in the three regions with a particular emphasis on understanding why and how the differences in cost arise, and ways in which costs in the NEMSF might be mitigated.

Background

In response to the 2006 reauthorization of the Magnusen-Stevens Act (MSA) which mandated that every fishery management plan (FMP) establish Annual Catch Limits (ACLs) to end overfishing and to meet rebuilding timelines, Amendment 16 to the Northeast Multispecies FMP was developed and imposed ACLs on each of the managed groundfish stocks. As a means to meet new requirements, groundfish vessels had the option to continue operating under the old days at sea system (DAS) or join a sector.

Sector management is an approach to fishery management developed around the idea of self-organized harvesting cooperatives managing the fishing activities of their members. It was first adopted in New England in 2004 by a small group of fishermen in Cape Cod to manage their catch of Georges Bank (GB) Cod. In 2010, new rules for sector management were implemented and additional sectors were approved that include participants from the entire region and all stocks regulated under the Northeast Multispecies Fishery Management Plan.

Each sector receives an Annual Catch Entitlement (ACE) for each stock, based on the catch history of the member vessels. Sectors determine collectively how best to fish their ACEs. In general, sectors have chosen to distribute their ACEs to their vessels in proportion to the amount the vessels brought into the sector. The vessels can then fish their shares to maximize their economic return from the fishery, without significant concern that they need to race the clock and without being held to trip limits. By regulation, all vessels in a sector are “jointly and severally liable” if the sector exceeds its ACE for a given species. In turn, each vessel in a sector is supposed to harvest only the amount of fish allocated to it by the sector—also known as the vessel’s potential sector contribution or PSC.

In theory, sector management allows fishermen to work cooperatively to attain the goal of sustainable harvesting. If sectors divide the allowable catch among their members, each individual should have greater freedom and flexibility in their fishing activities than they would have under regulations that try to indirectly control the total catch with rules that limit fishing days, trip limits, and fishing areas. This flexibility depends on the ability of fishermen to match their quota holdings to their catch and assumes that there is an active quota trading market, and that there is quota available to trade. Sectors have the option of making trading more fluid or restrictive by outlining protocols in their sector operation plans and other binding agreements.

The increased flexibility of sector management relative to other management strategies could increase efficiency because sectors can eliminate rules that create a higher harvesting cost per pound of fish, particularly if fishermen work together to make use of their collective knowledge of the fishery. Sharing best practices and information about avoiding bycatch hotspots, applying selective fishing

techniques and pooling ACE are techniques that have been used by fishermen to access abundant stocks while avoiding constraining stocks.

Because each vessel is limited in how much of each species it may land over the course of the year, there may be increased incentives to discard catches of constraining species, or to misreport amounts landed and sold to buyers. In order to ensure that vessels and sectors are accurately reporting harvests and discards, Amendment 16 increases levels of fishery observation and monitoring in the NEMSF. The Northeast Fishery Observer Program (NEFOP) was charged with augmenting the at-sea observation system so that it could reliably track catch and estimate the amount of discards. Statisticians and analysts at the Northeast Fishery Science Center (NEFSC)—the NEFOP is a division of the NEFSC—made an initial determination that to reliably estimate discards and harvests at-sea coverage on sector vessels would need to approach 38 percent—30 percent with ASM coverage and 8 percent with Northeast Fishery Observers (Thompson and Kurkul, 2009).

The observation system in place prior to implementation of Amendment 16 included at-sea observers, but coverage was limited to approximately 8 percent of the trips. Further, observers from NEFOP—hereafter in this document referred to NEFOs (Northeast Fishery Observers), had a focus on biological sampling necessary for stock assessment and evaluation of fishery resources, and were also regularly assigned to vessels in other fisheries throughout the Northeast Region including the scallop fishery, the monkfish fishery, and others. The cost per sea-day of NEFOs approaches \$900 per day.

The New England Fishery Management Council (NEFMC) recognized that imposing 38 percent observer coverage onto a fishery that had gross revenues of less than \$100 million would be costly. In order to reduce costs, the NEFMC approved the use of At-Sea Monitors or ASMs. The role of the ASMs would be limited to the estimation of discards and harvests—ASMs would not be required to undertake many of the biological assessment duties of the NEFOs. Because of the reduced duty set, ASMs could be exempted from requirements for a college degree, and could in theory be paid less than NEFOs. Both NEFOs and ASMs would be provided to the fishery by NMFS-certified observer contractors.

Under Amendment 16, the ASM program would be administered and paid for by NEFOP for the first two years of the program, but in the third year the sectors would manage the program and be responsible for covering its costs. In fishing year (FY) 2010—FYs in the NEMSF run from May through April—three companies were approved to provide ASMs to NEFOP for their monitoring program at an average cost of \$663 per sea-day including reimbursable travel expenses (Van Atten, 2011j). While the cost per sea-day of ASMs was considerably lower than the costs per sea-day of NEFOs (\$801 with travel per sea-day), the total costs (excluding training) of the ASM program in FY 2010 were \$3.99 million—five percent of the \$80 million in ex-vessel revenue generated by the fishery. In FY 2011, the target coverage levels remain at 38 percent, and in FY2012, coverage levels will decrease to 25 percent (17 percent with ASMs and 8 percent NEFO) (NMFS-NERO, 2011c).

The cost of the NEFO and the ASM program also appear to be quite high when compared to sea-day costs for observers in other regions of the country. In Alaska, a recent study documented the current costs per observer day to be \$366 including travel (NPFMC, 2010a). Similar cost levels have been reported in the Pacific groundfish trawl fishery. In 2011, the limited entry groundfish trawl fishery converted to an individual fishing quota (IFQ) management regime. There, regulations implementing the program require all participating vessels to carry observers on every trip. Observer costs will eventually be paid by the participants, but in the initial years costs will be shared with NMFS. In 2011, NMFS set \$365 as the basis of the daily observer cost. While it is not entirely clear how that figure came about, it is believed to reflect the costs of observer coverage in Alaska, rather than the \$460 per observer that is reported as the norm in the West Coast Groundfish Observer Program (WCGOP).

1.1 Document organization

The remainder of this document is organized by region beginning with the Northeast (Section 2), followed by the West Coast (Section3), and then Alaska (Section 4). Section 5 compares programs across regions and draws conclusions. Section 6 and 7 contain, respectively, a list of persons contacted and interviewed during the course of the study and the references cited.

2 Fishery Observer Programs in the Northeast Multispecies Fishery

2.1 Introduction

As part of Amendment 16 to its Groundfish Plan, the New England Fishery Management Council developed a comprehensive sector management program. Framework (FW) 44 was developed by the NEFMC to address further measures needed to protect overfished groundfish stocks in New England. Together Amendment 16 and FW 44 implement a new management system that establishes ACLs restricted gear areas, sector management programs, and new accountability measures for the fish stocks managed by the Fishery Management Council. The measures are intended to end overfishing, rebuild overfished stocks, and mitigate the economic impacts of the latest stock assessments.

One of the principal means of mitigating impacts of ACLs and protecting and rebuilding overfished stocks is through the development of sectors. According to the definition in Amendment 16:

A sector is a group of persons (three or more persons, none of whom have an ownership interest in the other two persons in the sector) 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) in order to achieve objectives consistent with applicable FMP goals and objectives.

The fishermen in each sector pool together their permits and receive as a sector a portion of available groundfish catch based on their combined fishing history (1996 – 2006²). The pooled catch history is translated into an Annual Catch Entitlement (ACE) for each stock for each sector. The sector's ACE is calculated by combining each sector member's potential sector contribution (PSC), which equals a percentage of each stock, based on their history, multiplied by the annual ACL. Sectors are voluntary and must be re-established annually. Vessels within a sector are allowed to catch a pre-set percentage of their sector's ACE during the fishing year, and may roll over up to 10% of uncaught ACE. The vessels individual percentage is generally based on the amount of each stock the vessel brings to the sector from its catch history.

Transfers of ACEs for each stock are allowed across sectors and portions of a sector's ACEs may be traded among vessels within a sector. Vessels fishing under a sector are exempt from many previous regulations based on their agreement to work under the sector's ACE for each stock, and to be "jointly and severally" liable with other members of the sector if any of ACEs are exceeded. The provision from which sector members are exempt include: groundfish trip limits, groundfish days-at-sea (DAS) requirements, Georges Bank (GB) seasonal closure areas, portions of Gulf of Maine (GOM) rolling closure areas, and mesh requirements when using specific gear on GB. If a vessel opts not to join a sector they can continue to fish under the DAS regulations with a 32 percent reduction from the 2009 DAS (NEFSC-FSB, 2010a). Both landings and discards are counted against the sector's ACE for individual stocks. Assumed discard rates are used and applied against a sector's share unless a sector can provide other accountability for the discards and obtain an exemption.

Vessels operating in sectors are required to carry one of two types of observers or monitors:

- NEFOs: These are observers assigned by NEFOP who are charged with estimating catch and discards, and who also collect biological and economic data required for stock assessments and resource evaluations. NEFOs are required to have college degrees. NEFOs are assigned to

²For permits that were participating in either of two pre-existing sectors, the catch history period for Georges Bank Cod was 1996 – 2001.

approximately 8 percent of the trips taken in the NEMSF. NEFOs are also assigned to vessel in other fisheries throughout the NE Region.

- ASMs: At-sea monitors are charged with estimating catch and discards, but are not required to collect biological and economic data. ASMs may be exempted from requirements to have a college degree and are expected to be assigned to approximately 30 percent of the trips taken by sector vessels in the NEMSF.

In addition Amendment 16 specified that dock-side monitors (DSMs) would be required to be present at 50 percent of all deliveries and offloads of sector harvests in FY 2010 and 20 percent in subsequent years. DSMs are charged with verifying that dealers are accurately weighing the fish that are offloaded. The requirements for DSM coverage and the program's design have been in flux since the initial implementation in 2010. On July 18, 2011 NMFS announced that they will terminate funding for the DSM program effective September 19 until the end of the 2011 fishing year, and for the entire 2012 fishing year (Kurkul, 2011). In 2013, the regulations stipulate that industry will have to bear the costs of the DSM program, and unless the regulations change, the DSM program will be operational once again.

Sectors are responsible for developing annual Operations Plans that outline how the sector will monitor their catch. For FY 2010 and FY 2011, Amendment 16 proposes that each sector should have an assumed discard rate applied to their landings, unless the sector voluntarily chooses to fish under a NMFS-approved at-sea monitoring program. At-sea monitoring programs will be mandatory for all sectors in fishing year 2012 with a minimum of 17 percent ASM coverage in addition to the NEFO coverage levels implemented to support the Standardized Bycatch Reporting Methodology (SBRM) developed by NEFSC. The 2010 and 2011 NEFO and ASM programs were funded directly by NMFS, but beginning in 2012 sectors will be responsible for the costs of the ASM programs, while NMFS will continue to fund NEFOP and their observers.

2.2 Historical Overview

A sector management plan was adopted by the Northeast Multispecies Fishery as of May 1, 2010. Fishery sectors are a form of fishing cooperatives. In the northeast system, the fishery quota is divided among the qualifying vessels within a formed sector. The sectors must report catch to NMFS. This is to be accomplished in part by relying on a new at-sea and dockside catch monitoring program to collect data on catch, discards, and protected species interactions to ensure that annual catch limits are not exceeded. This level of reporting is facilitated by recent stock assessments results that indicated the additional depleted listing of several groundfish species and the need for further reduction in fishing mortality for stocks currently classified as being overfished in order to rebuild these populations within existing rebuilding periods.

ASMs are deployed on fishing vessels and collect catch data that is provided within 48 hrs to the Northeast Regional Office for monitoring of ACL and sector ACE. ASMs are expected to cover approximately 30 percent of all sector trips. In addition, DSMs were required to be present at 50 percent of offloads in 2010 in order to document and verify off loading of retained catch. As previously mentioned, the latter program was suspended in June and as of September 19, 2011 will be terminated at least through 2012.

To date the NEFOP has been operated as a division of the NEFSC in Woods Hole, Massachusetts. Observers from NEFOP (NEFOs) and now ASMs and DSMs are recruited, employed, and deployed through independent observer contractors under a competitive contract with the Federal Government. Observed trips are mandatory under many of the region's fishery management plans, and by other Federal laws such as the Marine Mammal Protection Act, the Endangered Species Act,

and the Magnuson-Stevens Fishery Conservation Act. NEFOP deploys the NEFOs, and now also deploys ASMs, on vessels with Federal or State commercial fishing permits operating in inshore state waters within 3 miles of coast and offshore Federal waters within the United States' EEZ from Maine to North Carolina. The size of vessels on which observers are deployed varies by fishery. Generally, vessels range between 20 feet and 180 feet. Many small vessels have limited facilities, such as bunk space, running fresh water, bathrooms, or fish holds and therefore it is more difficult to accommodate NEFOs and ASMs.

2.3 Programs Goals

2.3.1 Northeast Fishery Observer Program

The goal of NEFOP is to provide fisheries managers with the data needed to ensure sustainable fisheries and healthy marine populations for generations to come. This is done by collecting unbiased fishery-dependent data related to:

- fisheries economics (revenue, costs);
- biological parameters of kept and discarded catch;
- gear characteristics and fishing performance;
- takes of protected species;
- monitoring of catch in special access areas; and
- evaluative experiments and experimental fisheries.

The objectives of the fishery observer program are to obtain data from commercial fishing operations in order to estimate stock levels, protect endangered species and manage the fisheries. The NEFOP is primarily a science-driven program.

2.3.2 At-Sea Monitors

The primary stated goal of the ASM program is to verify catch and discards (or total volume) by species, gear type, and area fished, in order to facilitate the accurate monitoring of and compliance with ACEs for each of the managed stocks (Thompson and Kurkul, 2009). Since dealer reports (DRs) also estimate landed volumes, the emphasis of the ASM program is to estimate the weight of discards.

We note that some discards are required by regulation in the NEMSF. Table 1 lists the following minimum size limits that are specified in regulations. Fish that are smaller than these limits may not be retained. Unless there is a biological imperative for these discards, it may be possible to reduce the overall discards relative to total catch, if these minimum size restrictions were reduced or eliminated.

Table 1. Minimum Size Limits in the Multispecies Fishery

Species	Minimum Size (inches)	Species	Minimum Size (inches)
Cod	22	American plaice	14
Haddock	18	Atlantic halibut	41
Pollock	19	Winter flounder	12
Witch flounder	14	Redfish	9
Yellowtail flounder	13		

Source: 50 CFR § 648.83 Multispecies minimum fish sizes.

2.3.3 Dockside Monitors

Amendment 16 states the goals of the DSM program are to verify landings of a vessel at the time it is weighed by a dealer, and to certify the landing weights are accurate as reported on the dealer report (NEFMC and NMFS, 2009). The DSM is intended to provide an independent estimate of what buyers are reporting to NMFS via DRs on estimated catch levels. A second goal of the DSM program is to provide a means by which sectors can get real time data to monitor their landings levels especially when sectors are approaching their ACE.

According to sector managers interviewed during the course of this study, the DSM reports are not serving the function that was originally intended. Sector managers are using the DR in the tracking of ACE, and data from DSMs is not currently being used. This may be due to the fact that the DSM data is not reported in a standard spreadsheet form (making it difficult to use) and also because NMFS uses the DR data to track harvest and attainment of ACE. If a sector manager used the unofficial source—the DSM data—and there was a discrepancy in the sector's tracking of harvests, it is perceived as unlikely that NMFS would allow the DSM data to prevail.

There is, in addition, a less often stated objective of the DSM program—the DSM program can serve as a check on buyers and dealers to ascertain if they are reporting fish landings accurately. According to interviews conducted during the course of the project, there are ways by which buyers and dealers can manipulate reported weight of landings such as overstating a tare (the weight of empty containers) leading to an underestimate of actual weight. This is to the detriment of the vessel and results in under reporting of catch to NMFS. For the most part fishermen state they know exactly how much fish they catch by weight and species as recorded in their Vessel Trip Report (VTR).

As it stands, this secondary objective of the DSM program is not being met as there does not appear to be any analysis being done to compare DSM and DR data in order to validate whether there is in fact systematic buyer and dealer misreporting. If in fact there is no difference between the DSM and DR data, then the DSM program is redundant and creating inefficiencies in the monitoring program. If, on the other hand, the DSM and DR data was compared and yielded evidence of misreporting, then the use of DSM would be of value to fishermen and NMFS. However, this would also suggest that this may be an enforcement issue rather than an observer issue and that the cost burden for the DSMs should not be borne by the sectors.

A final objective of the DSM program is to discourage vessels from offloading their harvest surreptitiously to unregistered buyers who would not complete a DR and thus the harvest would not be reported. According to NFMS enforcement officials this type of activity has taken place in the past, and they believe that there may be increased incentive to do so with the sector program. From the perspective of NMFS enforcement, a DSM program with 100 percent coverage of all offloads in conjunction with hold inspections by DSMs to verify that all fish have been offloaded would be a preferred system to curb these types of behaviors (Williams and Moro, 2010). It is not clear, however, that a DSM program with less than 100 percent DSM coverage could meet this objective. Attainment of this goal was made even less likely by a determination of NMFS early in FY 2010 that DSMs would not be allowed (for insurance reasons) to inspect vessels holds as part of their monitoring duties.

2.4 Coverage Level Goals

2.4.1 Coverage Levels Goals for Northeast Fishery Observers

NEFO trips are counted from the day that a vessel sets sail from a port until the day the vessel lands at port to offload its catch. NEFOP refers to this as “days absent”. This is the time that the observer is paid for sea-days and how the observer sea-day schedule is allocated. A vessel must be away from the port for at least six hours or have retrieved gear for the sea-day to be counted as a day absent.

NEFOP is in operation continuously and year round. Some fisheries, such as the herring mid-water pair trawl, are seasonal while others, such as groundfish bottom trawl, hook and line, and coastal gillnet, are year round. Many of the fisheries are managed with geographical, rolling, or seasonal closures. NEFOP remains flexible to adapt to the dynamic fishing trends though the overall observer coverage need is constant throughout the year. The percent of coverage is variable depending on the fishery and the availability of funds as well as the statistical analyses needs. The sampling design is established by the group funding the coverage, i.e. the Protected Species Branch for marine mammal and sea turtle bycatch analysis, the Population Dynamics Branch for fish stock assessments, and the Social Science Branch for economic impact analysis, among others. Historically, coverage levels have ranged from less than 5 percent up to 50 percent. With the new ASM program, NEFO coverage levels may change depending on the ability of the ASM program to meet the required 30-38 percent total coverage for FY 2011.

It must be noted that the definition of a sector trip is complicated by that fact that many of the vessels that participate in sector fisheries are likely to participate in other also fisheries such as fisheries for monkfish, skates and dogfish.

2.4.2 Coverage Levels Goals for At-Sea Monitors

For FY 2010 and 2011 the sector and common pool coverage goals are 38 and 30 percent of days-at-sea, respectively. Actual levels attained in FY 2010 are described later in the document. This coverage is to be accomplished through a combination of ASMs and NEFOs. In theory, ASMs are randomly assigned to a vessel to ensure that coverage is fair and even based on the Pre-Trip Notification System (PTNS). Due to the additional monitoring coverage fishermen are subject to additional reporting requirements regarding their fishing plans. Notification that a trip is planned is required for all groundfish vessels no less than 48 hours in advance, with the option to report fishing intentions for a time period of 9 days if fishing operations last less than 48 hours. Sector fishermen are also required to issue trip-start hail reports when they begin fishing and a trip-end hail report 6 hours before they are expected to land in order to facilitate dockside monitoring coverage.

2.4.3 Coverage Levels Goals for Dockside Monitors

In 2010 the coverage goal of DSMs was 50 percent. The DSM program was funded by the commercial fishing industry through a NMFS grant. The funds were administered by the GMRI, which acted as a pass-through to the sectors. As indicated above, issues with the DSM program, particularly the inability for DSMs to verify that all fish had been offloaded from a vessel (due to insurance issues), led NMFS to reduce DSM coverage levels and eventually to terminate the program at least through FY 2012.

2.5 Observer Duties

Table 2 describes the duties of observers and monitors in the NEMSF. The table is taken from the duties chapter of the “Observer and Sector Program Material Notebook” (NEFSC-FSB, 2011c).

Table 2. Observer and Monitor Duties

Tasks/ Requirements	NEFO	ASM	DSM
Bachelor's Degree	Yes	Yes; although this requirement can be waived on a case-by-case basis (Van Atten, 2011i).	No
NMFS Training Duration	16 days	10 days	4 days
Data Collection	Advanced Ex: sighting logs	Basic	Catch estimates
Biological Sampling	Mammals, turtles, birds, fish, and crustaceans	None	None
Amount of Gear Issued	83 items	44 Items	Minimal
Gear Characteristics Information	Advanced Ex: record intricate gear configurations	Basic	Basic
Performance Based Bonus Program	Yes	No	No
Supplemental Research Projects	Yes	No	No
Recording Data	Paper + Electronic (Paper logs, iPad, Rugged Laptops)	Electronic (Paper worksheets, iPad)	Nothing Noted
Training Trip Requirements	Yes, 4 are required	Not required, however added to training and shadow trip program	None
Training Provider	NEFSC	NEFSC	NEFSC
Data Processing	NEFSC Data availability= 90 days	NEFSC Data availability = 7 days	Nothing Noted
Cost	\$800 per Sea-day	\$650 per Sea-day	\$40-50 per hour

Source: “Duties: Observer and Sector Program Material” (NEFSC-FSB, 2011c).

2.5.1 Duties of Northeast Fishery Observers

The list below describes the duties of NEFOs. Note that bolded items are duties that are above and beyond the basics duties of ASMs.

NEFOs are required to:

1. conduct a pre-trip safety inspection;
2. ask the captain and/or owner of the vessel for some economic information, such as trip costs (price of fuel, ice, etc.);

3. collect information on fishing gear, such as size of nets and dredges, mesh sizes, and gear configurations;
4. collect tow-by-tow information, such as depth, water temperature, wave height, and location and time when fishing begins and ends;
5. record all kept and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls and record kept catch on unobserved hauls, which includes species, weight, and disposition reason;
6. collect actual weights of catch whenever possible, or estimate or extrapolate weights by sub-sampling;
7. **collect whole specimens, photos, and biological samples, such as scales, ear bones, and/or spines from fish, invertebrates, and incidental takes;** and
8. collect **detailed** information on interactions with protected species, such as sea turtles, porpoise, dolphins, whales, and birds (also called incidental takes). **A data information debrief is included in the trip responsibilities of the NEFO.**

2.5.2 Duties of At Sea Monitors

ASMs collect scientific, management, compliance, and other data through interviews with captains and crew, observations of fishing operations, photographing catch, and measurements of selected portions of the catch and fishing gear as directed by the NEFSC. The primary responsibility of the ASM is to collect accurate actual weights on the discard portion of the catch, as well as account for all catch (kept and discarded) during selected fishing trips. The duties of ASMs are the first six items in the list of NEFO duties shown above.

According to the observer providers interviewed, monitors are considered full-time employees if they average 12 sea-days a month. Full time employees are paid land hours to meet with captains, arrange trips and to review logs after trips and send them to NEFSC. Land hours include time for communication with the Area Coordinator (AC), data editors, or other NMFS staff. Additional details regarding ASM providers duties are found in Section 2.9.

In contrast, the ASM's job is not a 40 hour a week job. They typically log 30 land hours a month along with their 12-15 sea-days. The ASM reports directly to their AC. All of their land hours are amortized into the daily fee that is charge to NEFOP by the provider for ASM coverage. The AC introduces the new ASM to the port, boats, and some captains. The AC may also arrange some of the initial trips for the monitor. Then it becomes the ASM's duty to become familiar with the port and contract captains and arrange their own trips.

2.5.3 Duties of Dockside Monitors

DSMs meet selected boats at the fishing port where the vessel will be offloaded. Offloads occur at dockside facilities with processing and weighing capability or at remote ports where fish are offloaded to a truck and weighed at a later time. During the offload, as the catch is being transferred, the DSM documents the weight, species and market category of the landed fish on data logs that have been developed by the contractor. The DSM will also record vessel specific data to allow managers to accurately track the trip and link it to other reports. The catch information collected during the offload will be entered into an electronic format by the monitor and sent to the dockside monitoring data management system.

2.6 Hiring Qualifications for Observers and Monitors

2.6.1 Hiring Qualifications for Northeast Fishery Observers

The following minimum qualifications to work as a NEFO are taken from the qualification section of the "Observer and Sector Program Material Notebook" (NEFSC-FSB, 2011d).

A NEFO must:

- possess a Bachelor's degree with a major in one of the biological sciences from an accredited four-year college or university with at least 30 semester hours in any combination of scientific or technical courses such as biology, chemistry, statistics, entomology, animal husbandry, physics or mathematics, of which at least six semester hours are in marine science or fisheries;
- have one year of specialized experience, performed at an acceptable level, may be substituted for the six semester hours of marine science or fisheries course work. The specialized experience must have been in the field of fisheries and included functions such as:
 - a. observing ocean fishing activities
 - b. recording data for marine mammal sighting and fishing activities
 - a. tallying incidental takes of marine mammals, sea turtles and sea birds on fishing vessels
 - c. collecting biological specimens from postmortem animals

Note that this education requirement may be waived, on an individual basis, with approval by NMFS.

- be certified by a physician to be physically fit to work as an observer on a domestic fishing vessel. The physician must understand the observer's job and working conditions;
- pass the NEFSC Observer Training Course;
- be able to work independently, while following technical instructions;
- be able to get along well with others;
- maintain objectivity, and the appearance of objectivity. Observers must not have either direct or indirect financial or political interest in an organization that might be aided by the performance or non-performance of an observer's duties. This is described in Attachment I under the Standards of Conduct, which is required to be signed and submitted to the NMFS on the first day of training;
- be a U.S. citizen, or a non-citizen who has legally resided in the United States continuously for at least the past 2 years;
- have the capability and aptitude to conduct the required protected species (marine mammal and sea turtle) sampling;
- obtain and **maintain** current certification for CPR by the American Red Cross;
- completion of a basic First Aid class is also required before certification. A copy of CPR certification for all observers will be provided to the NMFS prior to the first day of training class and annually thereafter; and

- have never been terminated or decertified as an observer, due to problems with data quality or standards of conduct, in any other NMFS observer program. Observer's references of previous employment as NMFS observers shall be verified by the contractor as qualifying for this requirement.

2.6.2 Hiring Qualification for At-Sea Monitors

The following minimum qualifications to work as a NEFO are taken from the qualification section of the "Observer and Sector Program Material Notebook" (NEFSC-FSB, 2011d).

ASMs must:

- have a bachelor's degree from an accredited college or university with a major in the biological science and at least one class in math or statistics. **This requirement is waived in some circumstances;**³
- have experience with computers and data entry;
- be physically fit and cleared by a physician to work at-sea for extended periods of time, ability to lift and or drag heavy objects, climb ladders, tolerate stress, work long hours and live in confined spaces;
- be a U.S. Citizen or a non-citizen who has a green card, TN authorization, H1 visa or valid work visa and a social security card;
- have a current First Aid and CPR certification;
- have independence from fishing related parties;
- have no fisheries related convictions;
- have reliable transportation and a valid driver's license;
- be willing to commit to the program for at least a year; and
- be responsible, flexible, detail oriented, and strong ethics are desired traits.

2.6.3 Hiring Qualifications for Dockside Monitors

Requirements for employment as a DSM include:

- a high School diploma or equivalent and knowledgeable of the fishing industry;
- experience using Microsoft suite of programs and emails;
- being a U.S. Citizen or non-citizen who has a green card, TN authorization, H1 visa or valid work visa and a social security card;
- independence from fishing related parties;
- reliable transportation; and
- responsibility, flexibility, detail orientation, and integrity are necessary traits.

³ NEFOP's standard educational requirement for ASMs is that they have a BS in biological science. In practice this requirement may be waived by NEFOP (Van Atten, 2011i).

2.7 Training

2.7.1 Training of Northeast Fishery Observers

The Fisheries Sampling Branch staff of the Northeast Fisheries Science Center oversees observer training. NMFS provides housing and meals to trainees during the three-week training session. Observers are certified by NMFS after three weeks of training in Falmouth, MA followed by four training trips on commercial fishing vessels. The training covers the following major areas as reported in the training section of the “Observer and Sector Program Material Notebook” (NEFSC-FSB, 2011b):

- data collection protocols and data log completion;
- fish Identification;
- marine mammal and sea turtle identification;
- biological sampling requirements;
- safety instructions (flares, fire extinguishers, life rafts, immersion suits);and
- marine mammal necropsy;

In training, extensive instruction is given on how to record data on multiple data log formats, given different gear and sampling requirements. Lab sessions are provided to prepare trainees in fish, marine mammal, and sea turtle identification. Some labs teach trainees how to take biological samples from fish (scales, otoliths, and vertebrae), marine mammals, and sea turtles. Observers are also given two days of offshore safety training. This safety course includes survival techniques, fire safety, vessel stability, Coast Guard communications, and signaling devices. Trainees get firsthand experience in putting out fires, firing off flares, in-pool survival suit techniques and life raft deployment.

Trainees must pass four tests during training: two on sampling protocol, and two on species identification. The sampling protocol test covers how to fill out data logs and meet the sampling requirements for a statistical area. The fish identification test requires trainees to be able to identify 80 species of fish and invertebrates. This test is on actual fish in a ‘lab practical’ setting. The marine mammal and turtle exam covers about 24 species and is based on slides of animals in the wild and on vessel decks. Trainees must average 85 or over on all four tests to pass. If a trainee does not pass they must leave the program.

Shadow Trip Program of NEFOP

The primary goal of the shadow trip program is to provide an opportunity for the in-field exchange of information between observer program staff and the fishing industry. During a shadow trip, an FSB staff member accompanies a NEFOP observer on an observed commercial fishing trip. During the trip the FSB staff member observes the observer and interacts with the captain and crew. They assess the observer’s work load and sampling prioritization, as well as aid with sub-sampling to increase accuracy, and get feedback from the fishing industry regarding the observer program.

2.7.2 Training Programs for At-Sea Monitors

The New England Fisheries Science Center in Woods Hole, MA offers 10 day training courses to certify ASMs. Candidates must be committed to an approved ASM service provider company and meet qualifications and pass many of the same tests described above. The course covers vessel safety and survival, species identification, marine mammals, sub-sampling and catch estimates, conflict

resolution and computer reporting. A full security background check is performed as well. Contractors generally pay trainees a weekly salary during training, and arrange and pay for housing and upon successful completion of training. In the current program the costs of training ASMs are reimbursed by NEFOP. This is not the case in observer programs on West Coast and in Alaska. Although NEFOP will continue to fund and operate the ASM training program in the future, it appears unlikely that training costs will continue to be reimbursed by NEFOP once sectors begin contracting with providers directly (Van Atten, 2011g).⁴

2.7.3 Training Programs for Dockside Monitors

Eligible DSM candidates are required to complete a 4 day training course conducted by NEFOP staff. The course covers fish species identification, reporting requirements, safety training, and conflict resolution. A full security background check is performed as well. Candidates must pass all quizzes and tests with a score of at least 85 percent.

2.8 Deployment logistics

2.8.1 NMFS Observers and At-Sea Monitors

NEFOs coverage takes precedence over ASMs for vessel placement when deployment selections overlap. Deployment length can range from a few hours aboard inshore day vessels to 21 days aboard an offshore vessel.

An ASM's first three deployments are probationary. The resulting data of those deployments are immediately edited and approved after each trip by NMFS prior to any further deployment. If data quality is acceptable after these three trips the ASM becomes certified.

New England sectors are currently operating under the PTNS used by NEFOP to assign ASMs to vessels. This PTNS appears to be difficult to translate from the previous management regime into the sector based system. The PTNS system is in place to assure that vessels are selected for monitoring coverage on a random basis that will facilitate statically reliable estimates of discard rates. PTNS is a web-based system designed for fishermen to provide their pre-trip notification, select vessels, and inform observer service providers. According to the PTNS section of the "Observer and Sector Program Material Notebook" (NEFSC-FSB, 2011e) the system is designed...

- for the vessel to provide advanced notification to NMFS of a trip in a fishery that required observer or ASM
- for NMFS to perform even and fair vessel selection, stratified by gear type and area
- for NMFS to notify observer service providers of a trip selection
- for observer service providers to report on their assignment activities
- to estimate achieved coverage rates and compare to targeted rates
- to establish and report on vessel call-in compliance levels.

⁴ Observer providers on the West Coast and Alaska are not reimbursed for training expenses, nor are they charged by NMFS for training. Regardless of whether contractors are reimbursed by NMFS, in all of the programs examined, contractors paid wages and benefits to trainees by the contractors during training.

Under this program the service provider gets a call from NEFOP, the service provider then calls the captain and makes arrangements for the NEFO or ASM, the company then calls their employee who in turn calls the captain to set up the meeting place and time.⁵ This system may be altered in FY 2012, when the sectors have direct contracts with the monitoring providers.

2.9 Responsibilities of Observer Contractors

There are currently three observer contractors that employ and deploy ASMs for the New England multispecies groundfish fishery (A.I.S. Inc., East-West Technical Services, and MRAG Americas) and four service providers approved to provide DSMs to S\sectors (Atlantic Catch Data Ltd., A.I.S., MRAG Americas, and Saltwater Inc.) (NEFSC-FSB, 2011f).

2.9.1 Contractors for Northeast Fishery Observers

NEFOP has a contract with A.I.S. Inc. through 2011 to provide NEFOs. The contractor is responsible for hiring and managing observers in the field. The contractor deploys NEFOs to ports and assigns them sea-days.

Because the NEFO program is a federal contract and regulated by federal purchasing agreements and requirements, service providers are required to pay observers according to the Fair Labor Standards Act (FLSA) (USDOL, 2011b) and the McNamara-O'Hara Service Contract Act (SCA) (USDOL, 2011a). The National Observer Program Wage Determination from 2008 (USDOL, 2008)⁶ provides the following wage guidelines: Fishery Observer I, II, and III, must be paid hourly wages that are no less than \$14.24, \$15.88, and \$17.64 respectively. Other benefits include: Health and Welfare of \$3.24 an hour or \$129.60 a week or \$561.60 per month; 2 weeks of paid vacation after 1 year; and a minimum of 10 paid holidays per year (NEFSC-FSB, 2011d). Because the contractor needs to meet federal government minimum standards in hiring, it may try to exceed the standards at a cost in order to avoid the risk of not meeting standards. NEFOP has a stated goal of trying to build in observer retention incentives with bonuses for data quality. All of these issues tend to increase the cost of NEFOs. These incentives may not be feasible for the ASM program when they are funded by the sectors. A more detail assessment of NEFO costs is provided in Section 2.14.

2.9.2 At-Sea Monitors

NEFOP has ASM contracts with A.I.S. Inc., East-West Technical Services, and MRAG Americas to provide ASMs. The contractors are responsible for hiring and managing observers in the field. The contractor deploys ASMs to ports and assigns them sea-days. Because the ASM program is a federal contract and regulated by federal purchasing agreements and requirements service providers are required to pay observers according to the FLSA and the SCA. Because ASMs are considered to be fisheries observers they must be paid based on the same wage and benefits scale as NEFOs—see Section 2.9.1 (Van Atten, 2011h). Given that ASMs and NEFOs are paid using the same “wage determined” rates of pay, we have not been able to ascertain how personnel costs in the ASM program—as currently administered—can be significantly different from personnel costs in the NEFO

⁵ While the PTNS system was designed to provide statistically valid sampling of trips, its effectiveness in this respect appears questionable given the sector levels in FY 2010. In addition, the PTNS may not be an optimal system to allow observer contractors to work with sectors to minimize the cost of monitors. Additional discussion of these issues is provided in Section 2.14.

⁶ According to Van Atten (2011c), this is the wage determination currently in use, but that it should be updated shortly—presumably when the next federal request for proposals for observer services is released.

program.⁷ It is presumed that once sectors contract directly with providers, the requirement that contractors use SCA determined wage rules will no longer be applicable, and wage and salary differences between ASMs and NEFOs are likely to become more apparent. This also implies that once sectors contract directly with providers, the providers will need to renegotiate wage rates with existing ASM, or recruit and train all new ASMs in order to realize savings in the area of wage rates.

Currently NEFOP reimburses contractors for the costs of training ASMs. According to Van Atten (Van Atten, 2011g), it appears unlikely that NEFOP will continue to reimburse contractors for costs incurred during training once the ASM program is transferred to the sectors.

According to recent requests for proposals, contractors are responsible for collecting scientific, management, regulatory compliance, and economic data for fisheries by placing at-sea monitors about U.S. domestic fishing vessels participating in the groundfish multispecies FMP. Contractors post announcements for ASM training sessions and accept applications. As with the contract for NEFOs, AMS contractors, must follow labor guidelines and standards set by the FLSA and the SCA, and must pay ASMs and DSMs hourly wages based on a pre-determined schedule. They interview for the most qualified candidates and select the best for training. Trainees are contractor employees. Upon successful completion of the training class monitors will receive company briefing from the contractor. During this briefing management provides information pertaining to employment, benefits, policy and procedures. On a monthly basis, NEFOP requests the contractors to accomplish a certain number of sea-days by port, gear, and fishery. The contractors supervise, support, and monitor the sea-day schedule. Once NEFOP gives the sea schedule to the contractor, the contractor divides the monthly sea-days by area and assigns them to ASMs.

According to the NEFOP/ASM Contract Section in the "Observer and Sector Program Material Notebook" (NEFSC-FSB, 2011h), service providers must:

- not have a direct or indirect interest in a fishery managed under Federal regulations, including, but not limited to, fishing vessels, dealers, shipping companies, sectors, sector managers, advocacy groups, or search institutions and may not solicit or accept, directly or indirectly, any gratuity, gift, favor, entertainment, loan, or anything of monetary value from anyone who conducts fishing or fishing-related activities that are regulated by NMFS, or who has interests that may be substantially affected by the performance or non performance of the official duties of service providers. This does not apply to corporations providing reporting, dockside, and/or at-sea monitoring services to participants of another fishery managed under Federal regulations.
- report at-sea monitoring deployments to NMFS in a timely manner to determine whether the predetermined coverage levels are being achieved for the appropriate sector.
- be able to determine total catch and discard weights for each trip.
- ensure that ASM remain available to NMFS, including NMFS Office for Law Enforcement (OLE), for a debriefing for at least 2 weeks following any monitored trip/offload.
- support the ASM during each phase of their employment period including training, briefing, travel, accomplishing requisite land duties, data collection aboard fishing vessels, while working dockside and during debriefings.
- have all ASM complete Northeast Fisheries Training Standards, and submit to NMFS.

⁷ Additional analysis of ASM costs during FY 2010 is contained in Section 2.14.

- supply the ASM with rain gear, gloves, and an immersion suite. All measuring boards, scales, baskets, knives, data logs and other sampling equipment are also supplied. ASM are responsible for obtaining their own boots and warm clothes.
- locate vessels and deploy ASM to vessels, following NMFS vessel selection protocols. Specific vessel selection protocols will depend on target coverage levels but should be proportional to expected distribution of effort within the sector, by gear, mesh category, and season/quarter.
- reimburse ASM for travel greater than fifty miles from their primary port for deployment. "Primary port" here means the at-sea monitor's assigned port where they will be covering most of their trips. Total travel costs may not exceed 10 percent of billed sea-day costs.
- provide all logistical and administrative support necessary to deploy ASM to ports from which fishing vessels depart.
- make ASM available to NMFS Law Enforcement staff for the purpose of investigating the circumstances of alleged refusals or any other violation of law recorded by the ASM in the course of his/her duties.
- obtain adequate insurance to cover injury, liability, and accidental death for at-sea monitors during the contract period of performance. Maritime Employer's Liability insurance must be provided to cover the ASM, vessel owner and the contractor. Minimum Maritime Employer's Liability coverage required is \$5,000,000.¹ Current insurance certificate(s) shall be provided to NMFS within 10 days of contract award and updated annually or sooner if there is a change.
- ensure the ASM has notified NMFS within the required time frame for any refusals by a vessel owner or captain to accommodate an ASM.
- assure ASM are made available, when requested, for debriefing by NMFS staff. Ensure that the ASM has all NMFS required equipment with them for their debriefing.
- provide adequate documentation to determine travel expenses are in accordance with current federal travel regulations;
- obtain trip data from ASM at the conclusion of each deployment and transmit electronically; using NMFS supplied equipment, to NMFS within 48 hours of the completion of the trip. Paper data logs will not be accepted from the contractor; however paper worksheets may be mailed to NMFS. Paper should be mailed within three (3) days of landing to be received at NMFS within 5 days of the trip landing;
- report any complaints made by the industry regarding ASM activities, as well as any ASM injuries aboard vessels or on docks to NMFS; and
- report possible ASM harassment; discrimination; concerns about vessel safety or marine casualty; injury; and any information, allegations, or reports regarding at-sea.

2.10 Northeast Fishery Observer Program Responsibilities

NEFOP is responsible for the training, testing and certification of NEFO, ASM and DSM candidates. NEFOP also offers retraining, refreshing, and test certification to help monitors maintain skills and to provide updated methods, priorities, and protocols. The following outlines NEFOP responsibilities to vessels, observers and monitors, and service providers.

2.10.1 Northeast Fishery Observer Program Responsibilities with Respect to Observers

NEFOs are recruited, employed, and deployed through an independent firm under a competitive one-year with four-option-years contract with the Federal Government—AIS, Inc. is currently the sole provider. NEFOP staff oversees observer training, translates data requirements from the center's research programs into a detailed schedule of fisheries to be sampled and at what frequency, manages data collected by observers, debriefs observers, and provides qualified researchers with audited data files and summaries. Summaries of fishery observer data is appropriately aggregated so individual vessels cannot be identified. The data are provided to scientists and analysts for a variety of research projects and to help with meeting management goals. Trip logs submitted by observers are logged in and distributed to the appropriate data editor. The editor reviews the trip logs and looks for discrepancies, missing data or errors. In addition, they add code numbers to the species and port. The editor may contact the observer to clear up any data problems. From the data editor, the logs go to the data entry staff. They enter the trip data into a specially designed computer screen and database. After each month's data is entered, a series of audit programs are run to check for errors and anomalies. When all errors are fixed, NEFOP personnel review and approve the data. Then it is loaded into the main database and made available to the fisheries scientists.

2.10.2 Northeast Fishery Observer Program Responsibilities with Respect to At-Sea Monitors

NEFOP is responsible for the training, testing and certification of ASM candidates. NEFOP also offers retraining, refreshing, and test certification to help monitors maintain skills and to provide updated methods, priorities, and protocols.

In addition, according to the NEFO/ASM contracts section of the "Observer and Sector Program Material Notebook" (NEFSC-FSB, 2011h), NEFOP will:

- notify the contractor of candidates who have been certified;
- provide a letter of introduction, signed by the NEFSC Director, or his/her designee, for each at-sea monitor;
- decertify monitors who fail to abide by established standards of conduct and conflict of interest, or whose performance is determined to be unsatisfactory;
- reimburse the contractor for the costs of the at-sea monitor's initial training, all refresher trainings, travel for in-house debriefings, and meals and lodging during training;
- pay for the security background check;
- notify the contractor of government compliance debriefings with NMFS Enforcement or NOAA general counsel personnel. Notify also of depositions, hearings, and the contractor's personnel required to attend the debriefings, depositions, and hearings;
- communicate with the contractor to facilitate program operations and attainment of goals;
- provide scheduling of trips;
- provide an evaluation report for each active ASM twice a year;
- conduct exit interviews with each ASM leaving the monitoring;
- brief ASM prior to a deployment to a vessel using gear with which the ASM is unfamiliar;
- review and approve contractor developed standards of conduct;

- contact contractor to inform ASM who have been placed on pre-probation, probation, or have been decertified;
- provide all ASM equipment. Note that if gear is lost or damaged it must be replaced at the contractor's expense; and
- select trips and assign providers based on a random stratification scheme. A primary provider will be selected and a secondary provider may opt to take a trip that can't be covered by the primary provider assigned.

2.10.3 Northeast Fishery Observer Program Responsibilities with Respect to Dockside Monitors

NEFOP is responsible for providing a 4 day DSM training program. The applicant is required to pass two exams; a closed book exam on groundfish species identification, and an open book exam on other commonly landed species.

Under Amendment 16 the fishing industry was supposed to cover the costs of the dockside/roving monitor program beginning in FY 2010. To address the concerns regarding the ability of the fishing industry to cover such costs Framework 45 delays the industry responsibility for dockside/roving coverage until 2013. More recently NMFS has, at least temporarily, terminated the DSM program

2.11 Vessel Responsibilities with Respect to Northeast Fishery Observers and At-Sea Monitors

If requested by NMFS or by a designated contractor providing observer services to NMFS, a vessel owner/operator must take aboard an NEFO or an ASM to accompany the vessel on fishing trips. All vessels are subject to coverage. After being notified, the vessel owner/operator must comply with the notification by providing information requested within the specified time for scheduled or anticipated fishing trips. NMFS, or a designated contractor providing NEFO or ASM services to NMFS, may waive the requirement based on a finding that the facilities for housing the NEFO or ASM or for carrying out monitoring functions are so inadequate or unsafe that the health or safety of the monitor or the safe operation of the vessel would be jeopardized. The ASM Health and Safety Regulations hold the vessel out of compliance if they continue to fish without an NEFO or ASM due to safety inadequacies that have not been fixed [50 CFR § 600.746(d) (2)]. According to the duties section of the "Observer and Sector Program Material Notebook" (NEFSC-FSB, 2011c), the vessel owner/operator and crew must cooperate with the NEFO and ASM in the performance of their duties. This includes:

- providing, at no cost to the NEFO or ASM, the United States government, or the designated observer provider, food, toilet, bathing, sleeping accommodations, and other amenities that are equivalent to those provided to the crew, unless other arrangements are approved in advance by the Regional Administrator;
- Allowing for the embarking and debarking of the NEFO or ASM as specified by NMFS personnel or designated contractors. The operator of a vessel must ensure that transfers of observers at sea are accomplished in a safe manner, via small boat or raft, during daylight hours if feasible, as weather and sea conditions allow, and with the agreement of the observer involved;
- allowing the observer access to all areas of the vessel necessary to conduct observer duties;
- allowing the observer access to communications equipment and navigation equipment, when available on the vessel, as necessary to perform observer duties;

- providing true vessel locations by latitude and longitude, accurate to the minute, or by loran coordinates, upon request by the observer;
- sampling, retaining, and storing of marine mammal specimens, other protected species specimens, or target or non-target upon request by NMFS personnel, designated contractors, or the observer, if adequate facilities are available and if feasible;
- notifying the observer in a timely fashion of when all commercial fishing operations are to begin and end;
- not impairing or in any way interfering with the research or observations being carried out;
- complying with other guidelines or regulations that NMFS may develop to ensure the effective deployment and use of observers;
- ensuring the vessel has a current U.S. Coast Guard Commercial Fishing Vessel Safety Examination decal and other essential non-expired safety devices, provide the observer with a safety orientation, and maintain a wheel watch throughout the trip; and
- assisting the observer in obtaining EPIRB expiration dates that are mandatory for the Pre-Trip Vessel Safety Checklist.

Note as indicated above on multi-day trip, the fishermen must provide the monitor with comparable accommodations and food as if they were a crew member. This usually entails sharing a two bunk cabin with a crew member. On single day trips, no accommodations are necessary and the observer will provide his/her own food. The contractor provides the vessel or the monitor reimbursement for meals while deployed. If the vessel provides meals to the monitor a meal reimbursement form will be provided for the vessel. If the monitor must provide their own meals onboard, the contractor will provide a \$25 per diem for each deployed day.

2.12 Electronic Monitoring in the Multispecies Fishery

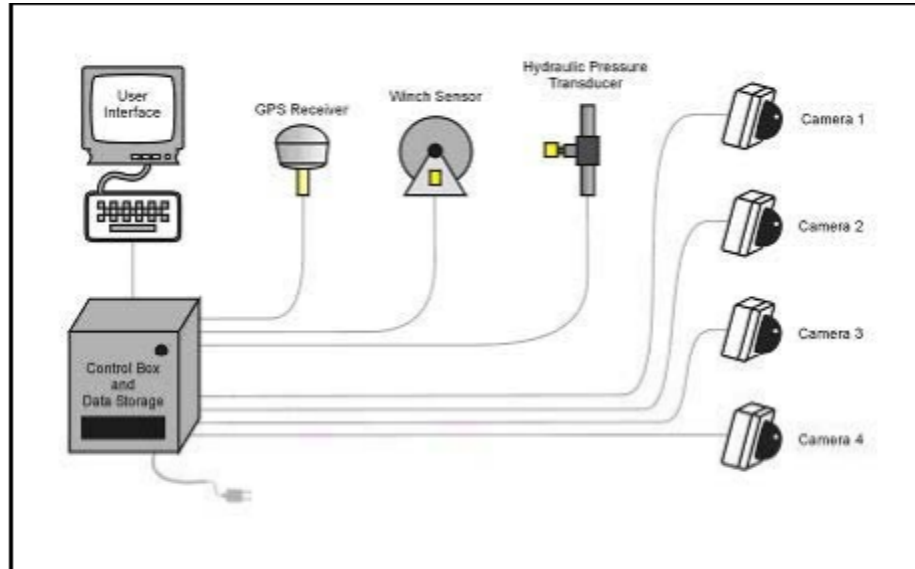
An alternative to the use of human observers and monitors (NEFOs and ASMs) may be the use of electronic monitoring equipment. Electronic monitoring systems (EMS) involve the utilization of cameras, sensors, and GPS on fishing vessels to record and evaluate fishing imagery, data, and events.

The Fisheries Sampling Branch of the NEFSC is conducting a multi-year pilot program in conjunction with Archipelago Marine Research Ltd., to test the applicability of electronic monitoring system technology to collect catch and fishing effort data aboard commercial vessels. The goal of this study is to evaluate the feasibility of electronic monitoring as a means to monitor catch in the Northeast groundfish sector fleet as a monitoring alternative to ASMs (Pria et al., 2011). Project objectives will test the ability of the technology to monitor bycatch in real-time effectively (among the 13 quota groundfish species), and obtain an estimated weight remotely utilizing length approximations. The electronic monitoring project includes 10 volunteer vessels in the trawl, longline and gillnet fisheries. Several fisheries throughout the world utilize EMS as a monitoring tool. Should EMS be found to be a suitable tool in the Northeast groundfish fleet, study results will help draft possible minimal standards for consideration in the development of future groundfish monitoring plans. Furthermore, participating fishermen will play a vital role in whether EMS is deemed a success and becomes a monitoring tool.

Electronic monitoring has evolved in step with technological advancement. Beginning roughly in 1992, electronic monitoring consisted mainly of a single camera tied to a VHS video recorder. Later on, more complex systems would emerge, which included higher data capacity and inexpensive hard drives along with high quality digital cameras, sensory software, and advanced GPS systems.

Archipelago Marine Research Ltd. currently uses what is known as the V4 (version 4) system. The V4 system captures and processes data using up to four closed circuit cameras, a GPS receiver, a hydraulic pressure sensor, winch sensors, a system control box, and a user interface.

Figure 1. Electronic Monitoring Technology



Source: (McElderry, 2008)

General issues that have encouraged the use of EMS arise from the limits to accommodations for onsite observers on smaller vessels. Smaller vessels that have only enough space for immediate crew have proven to be challenging in regards to information collection. Adding an observer to smaller vessels is more likely to impact observer duties, workspace accommodations, safety equipment, fishing operations, and the general safety of the observer and crew. Unpredictable weather is another important issue—weather is much more likely to affect fishing patterns for smaller vessels than larger vessels and this often results in higher cost, more complicated deployment logistics, and less efficient use of observer resources (McElderry, 2008).

Advantages of EMS include flexibility of utilization for smaller and larger vessels. The above mentioned issues have been substantially eliminated with the use of the EMS. Fishers using EMS on vessels have often commented positively on the use of EMS over observers because of its less intrusive nature. Other advantages of EMS include the ability to monitor several areas of the vessels at once with a multiple camera setup as well as capturing permanent reliable data which provides for greater flexibility on how the data is analyzed and by whom (McElderry, 2008).

Archipelago has provided a report to NEFSC on their activities in the NEMSF during through 2010 and recommend: 1) discussions with NEFOP to establish objectives of the EMS in the NEMSF; 2) developing a methodology to provide of catch weights and 3) develop well defined standards for data quality. (Pria et al., 2011).

In the letter that is attached to the study, NEFOP identified certain concerns in the EMS, but recommends the project continue to work toward improving the accuracy of fish weight estimates and in improving the accuracy of species identification (Van Atten, 2011b). As such, NMFS announced that EM systems will not be allowed in addition to, or in lieu of, ASM for FY 2012.

It appears that many of the concerns that NEFOP raised may be resolvable if there was a clear vision of how and EMS would be implemented in the region. An EMS may be a valuable tool that requires a

holistic approach that considers the interrelatedness to other program components and design features. Moving forward, at the very least the pilot should incorporate 'best practices' from other fisheries to test out different designs and sampling techniques.

2.12.1 An Overview of Electronic Monitoring in British Columbia Fisheries

EMS have been in place in Canadian fisheries in British Columbia (BC) for several years. The Groundfish Hook and Line Catch Monitoring Program (GHLCMP) was implemented in 2006 to provide accurate estimates of the catches by species and, in particular, details of discards (fish that are discarded immediately upon capture), landings (fish that are retained and then unloaded at dockside), and disposal (fish that although initially retained are not landed because they have been used for bait, consumed on board or high-graded).

Under the GHLCMP, all groundfish hook and line and trap vessels are required to have 100 percent at-sea monitoring by government approved EMS (including video camera). The objectives of this requirement are (1) to verify logbooks, (2) to confirm valid fishing locations, (3) to collect complete sensor records of trips, (4) to randomly review and audit logbooks records, and (5) to collect complete image records of catch retrieval operations (Stanley et al., 2011).

According to EDF (McIlwain, 2011), since self-reported fishing logs are utilized for science and management, a high level of confidence is needed in these data. As a result, 10 percent of landings are randomly audited against the fishermen's self-reported logs to ensure accuracy. This level of coverage was chosen since more frequent audits would have been cost prohibitive to the industry. If self-reported data and the audit have a low level of agreement, then additional audits (up to 100 percent of sets) are conducted and paid for by the fishermen. In addition, sizes of some species are independently verified as being either legal or sublegal through the use of video, using a ruler mounted on the vessel. At-sea discards of legal-size catch are assessed so they can be accounted for in individual quotas (McIlwain, 2011).

The BC EMS includes hardware and software providing video imagery of all gear-deployment operations during fishing events. The video footage shows retention or discarding of all fish at the hauling sites during all fishing events. The cameras are recording at all times as the gear is hauled. The EMS also includes a Global Positioning System-linked to the vessel monitoring system (VMS) and is connected to the winches; the VMS tracks vessel location during fishing to confirm the fishing location of each event in the fisher logs. The EMS hardware also includes hydraulic-pressure and drum-rotation sensors that are used to distinguish specific vessel activities, such as travelling between fishing locations, gear setting, and gear hauling. If the EMS fails during a trip, the vessel is required to cease fishing and return to port for repairs. Fishermen may choose to take an observer in place of the using the EMS; this option was used only in 17 of the 1,274 trips during FY 2008-2009—with the low levels of observer generally attributable to the added expense of observers.

Owing to the difficulty in distinguishing among some rockfish species during video review and the potential for discard mortality, managers have mandated that all rockfish must be retained during fishing and unloaded during dockside monitoring (Stanley et al., 2009).

A unique feature of this program is that the official total catch estimate from logbooks and from dockside monitors can be validated by an estimate generated from EMS data. This was an unanticipated benefit, since the original intent of the system and random review of video footage was to provide an audit check on the quality of individual fisher logbooks. Because the footage is obtained before fishermen can falsify the logs or discard specimens, it can be treated as a random set of observations that provides an opportunity to generate unbiased estimates of the true catch, as well as estimates of uncertainty (Stanley et al., 2009).

2.13 Summary of Issues Raised During Interviews with Stakeholders

In June 2011 and over the rest of the summer we conducted a series of interviews with sector managers and fishermen, dealers, NEFMC members and staff, staff from Northeast Regional Office NERO and NEFOP, staff from the GMRI and from other non-governmental organizations (NGOs). We had several objectives for the interview process:

- 1) to develop a thorough understanding of the multispecies fishery and the monitoring programs from the personal perspectives of the participants
- 2) to develop relationships with knowledgeable information sources that could be called upon at later dates if question arise
- 3) to get a perspective on the “untold” stories regarding the fishery and monitoring program that cannot be found in published materials

To guide our discussions we developed a series of interview forms about the at-sea and dockside monitoring programs. In general we were looking for perspectives of stakeholders and agency staff on what they believe to be the goals and objectives of the monitoring programs, and to gain insight into how well the programs were meeting those goals and objectives.

The following subsections describe many of the points that were raised and the insights gained.

2.13.1 Goals and Objective of the Dockside Monitoring Program

The goals and objectives of the dockside monitoring program, as implemented during FY 2010, were vague and uncertain. A consensus did emerge that the DSMs were supposed to verify the accuracy of the dealer records during the landing and to provide information from the dealer report to sector managers in a timely manner.

We heard many times that the goals and objectives envisioned in the original council motion were very different from the program in place by the end of FY 2010. If 100 percent of landings were monitored and DSMs could inspect holds to verify that all fish were offloaded, then the enforcement benefits were clear.

A vocal minority of persons interviewed, including some agency personnel, were outspoken regarding the potential benefits of the DSM. They believed the program would yield benefits if it was implemented in a way that ensured all offloads were monitored and also ensured that the DSM actually checked to see that weights and tares were accurately measured and recorded.

It was also stated, again by a small minority, that the program should be implemented by assigning DSMs to each registered dealer. A DSM would be present whenever offload took place at the dealer’s dock, and that a DSM should accompany trucks from all registered dealers as they picked up fish from vessel at remote docks. In this manner there would be some assurance that all fish purchased by registered dealer would be reported. In this particular version of the DSM program DSM providers would be paid by the dealers and not by vessels or sectors.

2.13.2 Performance of the Dockside Monitoring Program

Virtually every sector manager and many agency staff members stated that the data supplied by the DSM program had very little to no value, and were often put into storage, or never used. The fact that the program was not even managed by NMFS appeared to be a clear indicator to many of the actual value of the program as a management tool. Sector managers said that there was no point in using the DSM data because they were certain to be superseded by the dealer reports (DRs). In the end, the

legally binding information with respect to attainment of sector ACEs would be the DR so there was no point in duplicating the effort utilize the DSM data.

Vessels operators and dealers often said that the DSMs simply copied the information from the DR and submitted it, and that often the DSM did not actually check to see that weights were being accurately recorded.

During these discussions the need to streamline and modernize the reporting system was often voiced. Many asked why electronic real-time reporting utilizing standard forms and templates were not the norm in the Northeast region.

2.13.3 Goals and Objective of the At-Sea Monitoring Program

There was a general consensus that the primary objective of the ASM program is focused on the accurate estimation of the weight of discarded fish for those stocks for which sectors had allocations. Estimation of landed weights, as well as verification of areas fished, were generally recognized as part of the ASM program, but it was stated that other systems were available to estimate landed weights (DRs and VTRs) and areas fished (VTRs and VMS). Without ASM data, the only other source of discard information for unobserved trips are the VTRs. But since VTRs, like logbooks in general, are completed by the vessel operator, and because there are clear incentives to under report, VTR estimates of discards were more likely to be unreliable in the sector-based fishery.

2.13.4 Performance of the At-Sea Monitoring Program

In general we believe there is a consensus that the discard data provided by ASMs is an improvement over a system in which the only discard data comes from VTRs or from the less frequent instances of NEFO coverage.

It should, however, be inferred that there are not significant concerns with the ASM program. There were many negative comments from operators about the “lack of professionalism” of the ASMs, as well as the lack of knowledge regarding species identification, and finally a perspective that the monitors were spending an inordinate amount of time in their bunks.

Our initial reaction to these anecdotes was that they were symptomatic of a newly implemented system. Many of the vessel operators had not experienced frequent observer or monitoring coverage in the past, and they were not used to the ways that observers and monitors worked. Furthermore, many (if not most) of the ASMs had no prior experience as observers or monitors. The fact that we heard very similar reports during interviews with West Coast vessel operators (as reported Section 3.10) compounded this impression. On the West Coast, coverage levels increased from less than 30 percent in 2010, to 100 percent in 2011, and operators were facing the prospect of paying 100 percent of coverage costs by 2013.

However, our interpretation of the comments changed when we also heard some of these comments during interviews and discussions with vessel operators, co-op managers and processing plant managers in Alaska. Given that most of the persons interviewed in Alaska had a long history with observers, the comments about the apparent lack of professionalism and work ethic among observers and monitors cannot necessarily be written off as symptomatic of a new program. Instead the issues are more likely symptomatic of observer and monitor programs in general (both new and old). These issues could potentially be addressed with better training, recruitment and pay for observers and monitors, as well as increased levels of outreach by observer agencies to industry participants. Unfortunately these solutions all add cost to the observer and monitoring programs; it is likely that higher costs exacerbate the concerns.

It is certainly true that the cost of the ASM program is a significant concern for industry members and most of the agency personnel interviewed. Many comments concerned issues of fairness and equity and the belief that the program would have a greater negative impact on small boats, boats that use more selective gears, boats with lower revenues per day, and boats operating out of small or remote ports where costs of coverage were likely to be higher. Concerns were also expressed regarding the loss of social and cultural heritage if the small boat fishing fleets and communities are pushed out of the groundfish fisheries due to costs of monitoring programs.

It should be noted that there were also some comments that took what could be considered a Darwinian perspective—the fishery is overcapitalized and there are too many sectors. The costs of the ASM program are likely to push vessels and sectors that are less economically viable out of the fishery sooner rather than later. Fortunately according to those that hold this view, the ability of individuals to transfer their potential sector contribution (PSC) to other permit holders allows these less viable operators to exit the fishery with compensation.

2.13.5 Other Insights

In this subsection we highlight some of the issues and insights that arose during the discussion, but were not directly related to observers and monitors.

2.13.5.1 The Pre-Trip Notification System

There were numerous comments regarding the PTNS. Interviewees questioned whether the system was assigning ASM in an equitable manner. While a few sector managers and operators noted that they might be under sampled, many were concerned that their vessel or their sector had higher coverage than other vessels within their sector, or than other sectors in the fishery.

Concerns were also expressed indicating that many vessels were gaming the system to avoid coverage, and that many vessels, particularly smaller day-boats, had very high cancellation rates. Details on actual coverage levels in FY 2010 are found in Section 2.14.

2.13.5.2 Issues of Trust between NMFS, Sectors, Fishers and Dealers

During the course of the interviews the issue of trust, or more precisely the lack of trust, was often discussed. There appears to be significant trust issues in and among almost every group involved in the fishery. The following are some of the examples of the lack of trust voiced during the interviews:

- vessel operators and dealers don't trust NMFS
- NMFS doesn't trust the vessel operators or dealers
- some sectors don't appear to trust other sectors
- sector members may not trust sector managers
- members of a sector may not trust other members of the same sector
- NMFS doesn't trust observers or monitors or their providers
- monitors don't trust vessel operators
- vessel operators don't trust monitors
- dealers don't trust NMFS or other dealers
- vessels don't trust dealers

While we were somewhat surprised at the apparent lack of trust in the Northeast region, similar trust issues did come out during discussions in the West Coast and Alaska, although not to the same extent.

2.13.5.3 Readiness Levels of Sectors to Manage and Pay for Monitoring Programs

We explicitly asked sector managers and fishers about their level of planning and preparedness for taking over and paying for ASM coverage. It was very clear that most fishers and sectors managers felt that paying for ASMs would drive many operators and even some of the sectors out of the fishery. Most felt that operators of smaller vessels and day boats were particularly vulnerable since they had generally lower revenues per fishing day but would have to pay the same in ASM costs per fishing day as a vessel with higher revenues per day. It was also suggested that sectors that had members that were widely distributed across the region or whose members were located in remote ports would also be a cost disadvantage when it came time to pay for coverage.

In general the sector managers that we spoke with were still working through the issues of running their sector and had not yet begun to think about how they might manage ASM coverage in the future or how they might work to set up systems that could reduce costs of ASMs and DSMs. When pressed, some sector managers stated that greater levels of coordination among the sectors would be a key to reducing future ASM costs. It was also clear that many sector managers believed that larger, better organized sectors, or organized groups of sectors working together, would have an advantage when it came to negotiating contracts with providers. Many managers stated that smaller sectors in terms of numbers of participants, and in terms of the size of vessels, would be at a disadvantage, as would sectors that were located farther from major population centers.

2.13.5.4 Levels of Cooperation among Members of Individual Sectors

During the course of the interviews we asked about the level of cooperation and coordination among members of the same sector. In general we heard that currently, members of sectors are not acting in a cooperative and coordinated manner. That is not to say that they are actively working against one another. We also often heard that sectors were really just a means to provide the equivalent of an individual quota to harvesters.

The implication of this lack of coordination and cooperation is that the costs of ASMs and DSMs are likely to be higher. As an example assume that a sector is comprised of nine harvesters. If they coordinate with each other so that only three of their vessels are out at-sea at any given time, then in theory a single ASM could provide up to 33 percent coverage of all vessels. If on the other hand there was no coordination, then two or more ASMs would be required to provide the same level of coverage.

2.13.5.5 Regulatory Discards

During the course of the interviews we gained insights into the significance of the discard issue. Prior to the interviews we understood that one of the primary duties of ASMs was to estimate the amount of discards of each stock. The fact that a large percentage of discards were mandated by regulation had not been fully appreciated. During the interviews the minimum sizes of particular species were discussed. Fishermen often brought up rhetorical issues regarding the minimum size limits and regulatory discards. The following issues were raised during discussions:

- Why were fishers being required to discard fish that were then going deducted from the sector's ACE, particularly when they could generate at least some revenue?

- Why not do away with minimum size limits and let sector participants sell the fish? Even if they received a reduced value it would be more than they receive if the fish are discarded.
- Were there biological reasons for the minimum size limits?
- Isn't a dead fish a dead fish?
- Isn't it easier to count fish that are landed, than to count fish that are discarded?
- If the amount of regulatory discards were reduced wouldn't the need for current levels of monitoring be reduced?
- If minimum sizes were eliminated wouldn't harvesters still discard lower value fish?
- Would dealers accept smaller fish? What would they do with them if the market was unwilling to pay for them?
- Why not prohibit discards of stocks with ACLs and ACEs completely?

2.14 An Assessment of Monitoring Costs and Coverage Rates

This section describes FY 2010 sea-day costs of ASMs and NEFOs and provides detailed estimates of the composition of ASM and NEFO costs in terms of payments to ASMs, overhead costs, and fees. The section examines ASM and NEFO coverage rates from a statistical perspective and tests whether the distribution of coverage levels across sectors is likely to have come from a random selection with a normal distribution. The section concludes with an examination of the estimated ASM costs at the sector level relative to sector-level estimates of ex-vessel revenues.

2.14.1 At-Sea Monitoring Costs in the Northeast Multispecies Fishery in FY 2010

The SCA requires that NEFOs and ASMs be paid at rates established by a "Wage Determination." According to NEFOP, the same rates apply to both ASMs and NEFOs, and in the most recent determination (NEFSC-FSB, 2011a), minimum hourly rates were:

- Fishery Observer I: \$12.79/hour
- Fishery Observer II: \$14.26/hour
- Fishery Observer III: \$15.85/hour

The SCA wage determination also requires that observer contractors provide other benefits including:

- health and Welfare benefits of \$2.59/hour (\$103.60/week or \$448.93/month)
- two weeks of paid vacation
- a minimum of 10 paid holidays per year

Because the observer providers need to meet federal government minimum standards in hiring, they are likely to exceed the standards in order to avoid the risk of being out of compliance. All of these SCA standards tend to increase the cost of NEFOS and ASMs relative to contracts that are not regulated by SCA, such as contracts currently in effect on the West Coast and Alaska.

As shown in Table 3, the average rate charged by providers per sea-day in FY 2010 for ASM coverage was \$630.44 with an additional \$32.28 per sea-day in reimbursable travel costs (Van Atten, 2011a). The average sea-day rate for NEFO coverage was \$741.88 with an additional \$59.38 in reimbursable travel expenses. Training costs experienced by providers for both ASMs and NEFOs are currently reimbursed by NEFOP. These expenses include primarily wages and per diem for trainees. In Table 3 the reimbursed training costs have been amortized per sea-day. In FY 2010, ASM training costs

averaged \$37.46 per sea-day, while NEFO training costs averaged \$39.70 per sea-day.⁸ It should be noted that if training costs are not reimbursed after sectors begin contracting directly with providers, then it is probable that training costs will be amortized into the daily fees, along with other overhead costs and non-reimbursable costs.

As shown in the table, NEFOP also provided an additional \$55.18 in reimbursements to the NEFO provider—\$41.22/sea-day for the data quality incentives and \$13.56 for meals and land hours.

In total, NEFOP paid ASM providers an average of \$700.19/sea-day, while the NEFO providers were paid an average of \$896/sea-day in FY 2010.

Table 3. Sea-day Costs for Monitors and Observers in FY 2010

COSTS	ASM Cost / Sea-day	NEFO Cost / Sea-day
Sea-day (avg)	\$630.44	\$741.88
Travel (avg)	\$32.28	\$59.38
Training (avg)	\$37.46	\$39.70
Other Reimbursable Costs	None	\$55.18
Total Reimbursed Costs (avg)	\$700.19	\$896.14
NEFOP Infrastructure and Overhead Costs	\$217.76	\$393.57
NEFSC Overhead Cost	N/A	\$197.51
Fully Loaded Costs / Sea-day	\$917.95	\$1,487.22

Source: Sea-day Costs for Monitors and Observers in FY 2010 (Van Atten, 2011a).

In addition to the costs that are reimbursed to the contractors, NEFOP incurred an additional \$393.57 per NEFO sea-day and \$217.76 per ASM sea-day in general infrastructure overhead costs during FY 2010.⁹ NEFOP estimates the fully loaded cost for an ASM is \$917.65. The fully loaded cost per sea-day for a NEFO is estimated at \$1,487.22, but this includes an additional NEFSC Overhead Charge of \$197.51 that is not included in the ASM costs.

According to interviews conducted during the study, the sea-day costs for the various ASM providers ranged from \$585 – \$650. We were able to obtain a detailed breakdown of the cost components that give rise to the daily fees from one of the ASM providers. These are summarized in Table 4. It is important to note that the numbers in the table do not reflect actual costs of any one of the ASM providers, but are representative estimates developed exclusively for this study. In developing these representative estimates, we assumed higher personnel costs than the low-cost provider. These higher costs could occur for two main reasons including: 1) higher hourly wages rates, and 2) higher numbers of ASMs on the payroll. In the table, wages, benefits, and taxes for ASMs range from 53 to 62 percent of sea-day costs while insurance for ASM comprises 4 to 5 percent. Other non-reimbursable costs for ASMs (gear, phones, lodging, and other incidentals) comprise roughly 10 percent of sea-day costs.

Overhead costs are generally the same percent of sea-day rate for both providers, ranging from 21.8 to 23.5 percent. Overhead costs include wages and salaries of non-ASM staff, hiring costs, office costs, and general liability insurance. Information regarding fees—by which we mean returns to the owners of the firms—were not explicitly provided, but we assumed in both cases that fees were 10 percent of sea-day costs. In general, government contracts limit the fees that providers can charge. In private contracts, fees may not be similarly limited except through competition and negotiation.

⁸ Observer contractors are not reimbursed for training in programs that currently exist in Alaska and the West Coast. In those programs, training costs are amortized into the daily fees that contractors charge.

⁹ These include costs for training experts, support contracts and NEFOP Staff salaries and travel—85 percent were attributed to personnel costs.

Table 4. Representative Estimates of ASM Cost Components for Low and High Cost Providers

Class	Type	Low Cost Provider		High Cost Provider	
		Cost Per Sea-day (\$)	Percent of Sea-day	Cost Per Sea-day (\$)	Percent of Sea-day
ASM Costs	ASM Wages, Benefits, Taxes	311.88	53.3	364.90	62.4
	ASM Insurance, Medical	24.55	4.2	28.23	4.8
	Non-reimbursable ASM Costs	62.64	10.7	54.37	9.3
ASM Costs Total		399.08	68.2	447.51	76.5
Overhead Cost	Office Costs	26.39	4.5	22.90	3.9
	Overhead Wages, Benefits, Taxes	89.04	15.2	104.18	17.8
	Overhead Insurance, Medical	11.99	2.1	10.41	1.8
Overhead Cost Total		127.42	21.8	137.49	23.5
Fee	Fee	58.50	10.0	65.00	11.1
Total Sea-day Costs and Fees		585.00	100.0	650.00	111.1
Reimbursable Costs	Reimbursable Training	35.49	6.1	39.43	6.7
	Reimbursable Travel	30.58	5.2	33.98	5.8
Reimbursable Total		66.07	11.3	73.41	12.5
Total Sea-day Costs & Fees including Reimbursables		651.07	111.3	723.41	123.7

Source: Developed by Northern Economics based on information provided by ASM providers.

2.14.2 Assessment of Dockside Monitoring Costs

Data regarding the numbers of trips monitored by DSMs and associated costs were not available for this report. As indicated earlier, GMRI received a grant to administer reimbursements to sectors for the DSM program—a total of \$1.2 million of the grant was set aside for reimbursements to sectors (GMRI, 2010a). Each sector contracted directly with DSM providers and then submitted invoices from providers to GMRI. Due to concerns that the available funding would not be adequate to the costs of DSM, GMRI determined (GMRI, 2010b) they would limit reimbursements to the lesser of the amount invoiced by the DSM providers or the results of the following formula:

Max Reimbursement

$$= 0.015 \times \text{Pounds} + 35 \times \text{All Offload Event} + 25 \times \text{Roving Monitor Events}$$

According to Jonathan Labaree of GMRI (2011), it became clear during the year that the formula approach wasn't needed—there would be adequate funding to reimburse all sectors for all DSM provider invoices. In addition, the formula was not as accurate as GMRI would have liked—it tended to underestimate reimbursement amounts for smaller vessels and overestimate them for larger vessels.

Data from GMRI (Peros, 2011) that compiles DSM provider invoices received from sectors, show that DSM were present at during 4,737 offloads including 365 that used roving monitors. The total invoice amount for DSM coverage came \$488,428 during FY 2010—an average of \$103 per offload. GMRI estimates that DSMs witnessed landing of 29.9 million pound—approximately 47 percent of the 64 million pounds landed by sectors in the NEMSF. Based on the estimated pound observed, DSM costs are estimated at \$0.016/landed pound.

2.14.3 Observer and ASM Coverage Levels on Sector Trips

2.14.3.1 Issues with the Definition of Sector Trips

Section 2.8 introduced the PTNS that NEFOP currently uses to deploy ASMs to vessels in the NEMSF. According to NEFOP, the PTNS assigns ASMs to sector vessels in a random manner that, in theory,

results in overall coverage levels in sector trips that are at least reasonably equitable across sectors and individual vessels. However, NMFS-NERO and NEFSC-FSB appear to have had some difficulty accurately defining and counting the number of sector trips. The following documents the reason for this conclusion.

- On July 12, 2011, NEFSC-FSB (2011g) posted a web report titled “Final Estimate of Groundfish Observer/At-Sea Monitor Coverage Rates” on their internet site. Coverage of NEFOs and ASMs came to 26 percent of sector trips. The web report was available as of September 21, 2011.
- The data from the web report were generally in line with data distributed to sectors in Mid-July and to Northern Economics on July 29, 2011 (Van Atten, 2011a). These data included estimates of sea-day coverage, and split out coverage levels between NEFOs and ASMs separately.
- On September 8, 2011 Van Atten (2011h) sent data to Northern Economics that included a table showing very different coverage levels. According to Van Atten (2011b) the increase in the estimated coverage levels is due primarily to an improved accounting of sector trips and secondarily to the removal of covered trips due to poor data quality.
- On September 15, 2011 Van Atten (2011d) sent a final table to Northern Economics with data that were slightly different from the data sent in the previous week.

There are significant differences in the July 12 web report and the data provided on September 15. Over 3,000 trips that had previously been counted as sector trips are no longer being so counted. A sector trip decision tree which has been adapted by Northern Economics from NMFS-NERO (2010) is shown below as Figure 2. The sector trip decision tree can perhaps shed some light on the complexities of determining whether a trip is a sector trip.

Figure 2. Sector Trip Decision Tree

0. Is your vessels affiliated with a NE Multispecies Sector
 - a. If NO this is **NOT** a sector trip—you can exit the decision tree.
 - b. If YES, then continue to #1.
1. Will you be fishing commercially (including setting commercial gear without hauling it)?
 - a. If NO this is **NOT** a sector trip—you can exit the decision tree.
 - b. If YES then continue to #2.
2. Will you be fishing under a NE multispecies DAS?
 - a. If YES this **IS a sector trip**—you are subject to at-sea and dockside monitoring, and you can exit the decision tree.
 - b. If NO then continue to #3.
3. Will you be fishing exclusively with exempted gear or in an exempted fishery (including monkfish-only DAS)?
 - a. If YES this is **NOT** a sector trip—you can exit the decision tree.
 - b. If NO then continue to #4.
4. Will you be fishing in the scallop fishery?
 - a. If YES this is **NOT** a sector trip—you can exit the decision tree.
 - b. If NO then continue to #5.
5. Will you be fishing for an exempted species?
 - a. If YES this is **NOT** a sector trip—you can exit the decision tree.
 - b. If NO this **IS a sector trip**—groundfish catch will count against your ACE, and you are subject to at-sea and dockside monitoring.

Source: Adapted by Northern Economics from Northeast Multispecies Definition of a Sector Trip Information Sheet (NMFS-NERO, 2010).

Note: Step 0 is not included in the original decision tree, and was added by Northern Economics.

A full explanation of why some trips that were originally counted as sector trips are no longer being counted as such has not been provided. A partial explanation from Van Atten (2011e) indicates that trips may have been reclassified to other fisheries (e.g. as a monkfish trip). It also appears that many of the reductions in sector trips were the result of “aborted” trips or trips in which the vessel set gear but did not retrieve gear. Van Atten also indicated that data from two ASMs have been rejected because of quality issues—trips covered by these ASM are no longer included as observed trips, but that they are still included as sector trips (Van Atten, 2011f).

As indicated above, NMFS appears to have had some issues with the identification of Sector Trips. Table 5 compares trip and coverage data from the NEFSC-FSB Web Report (2011g) and the most recent tables provided by Van Atten (2011d). Data in the July 12, 2011 web report indicate there were 14,286 sector trips, while in the updated data the number of sector trips was reduced to 11,213—a difference of 3,073 trips (22 percent). More than half of the revisions in total trips came in the three sectors: the Fixed Gear Sector—down 456 trips; NEFS 2—down 550 trips; and NEFS 3—down 586 trips. Four other sectors had 30 percent or more of their trips reclassified as non-sector trips—NEFS 6, NEFS 9, NEFS 12, and the Port Clyde Sector. We note that relatively few trips that had observer coverage (either by NEFOs or ASMs) have been reclassified. There were 27 fewer observed trips reported, with the biggest change in NEFS 3 which had 13 fewer observed trips. The net effect of

the large reduction in sector trips is that the calculated coverage rate on a trip basis increases significantly from 26.1 percent to 33.0 percent—a 26 percent increase from July to September.

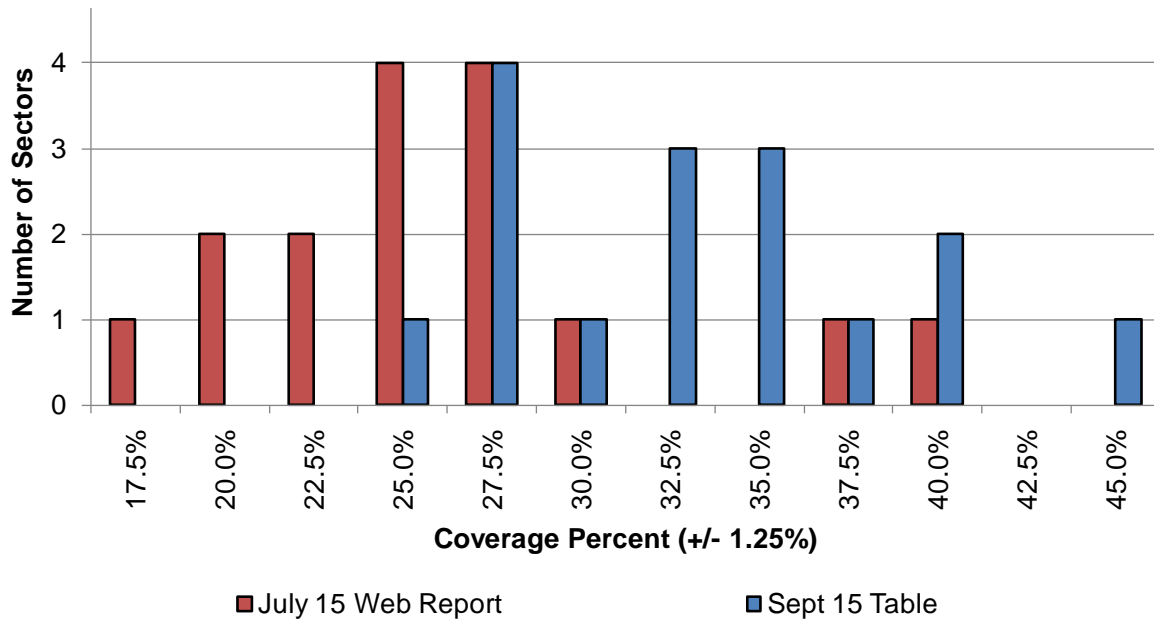
The reduction in numbers of sector trips also has the effect changing the distribution of coverage levels across sectors. Coverage level histograms are provided in Figure 3.

Table 5. Comparison of FY 2010 Sector Trips and Coverage Level Changes from July 12, 2011 – Sept. 15, 2011

Sector	Total Sector Trips				NEFO + ASM Trips Covered			Trip Based Coverage Percent		
	Sept. 15 Table	July 12 Web Report	Diff.	Percent Change	Sept. 15 Table	July 12 Web Report	Diff.	Sept. 15 Table	July 12 Web Report	Percent Change
Fixed Gear Sector	1,871	2,327	-456	-20%	664	661	3	35.5%	28.4%	25%
NCCS	38	37	1	3%	15	15	0	39.5%	40.5%	-3%
NEFS 2	1,501	2,051	-550	-27%	514	516	-2	34.2%	25.2%	36%
NEFS 3	2,305	2,891	-586	-20%	674	687	-13	29.2%	23.8%	23%
NEFS 5	591	651	-60	-9%	237	239	-2	40.1%	36.7%	9%
NEFS 6	110	173	-63	-36%	31	31	0	28.2%	17.9%	57%
NEFS 7	295	332	-37	-11%	79	82	-3	26.8%	24.7%	8%
NEFS 8	152	185	-33	-18%	41	42	-1	27.0%	22.7%	19%
NEFS 9	305	468	-163	-35%	86	88	-2	28.2%	18.8%	50%
NEFS 10	717	938	-221	-24%	273	277	-4	38.1%	29.5%	29%
NEFS 11	1,382	1,732	-350	-20%	438	438	0	31.7%	25.3%	25%
NEFS 12	60	95	-35	-37%	27	27	0	45.0%	28.4%	58%
NEFS 13	259	294	-35	-12%	83	82	1	32.0%	27.9%	15%
Port Clyde Sector	488	730	-242	-33%	162	163	-1	33.2%	22.3%	49%
Sustainable Harvest	1,031	1,244	-213	-17%	350	353	-3	33.9%	28.4%	20%
Tri-State Sector	108	138	-30	-22%	28	28	0	25.9%	20.3%	28%
Sector Total	11,213	14,286	-3,073	-22%	3,702	3,729	-27	33.0%	26.1%	26%
Common Pool	1,806	2,082	-276	-13%	203	205	-2	11.2%	9.8%	14%
Grand Total	13,019	16,368	-3,349	-20%	3,905	3,934	-29	30.0%	24.0%	25%

Source: Compiled by Northern Economics, Inc. based on data in an NEFSC-FSB Web Report (2011g) and data in a table provide by Van Atten (2011d) on September 15, 2011.

Figure 3. Changes in the Distribution of Reported Coverage Levels across Sectors from July - September



Source: Compiled by Northern Economics, Inc. based on data in an NEFSC-FSB Web Report (2011g) and data in a table provide by Van Atten (2011d) on September 15, 2011.

2.14.3.2 Statistical Assessment of the Distribution of Coverage

The assessment that follows examines the actual ASM and NEFO coverage levels in FY 2010 and tests whether it is reasonable to assume the PTNS assigned coverage in a random process with normal distribution across sectors. In other words, we test the null hypothesis that NEFO and ASM coverage is normally distributed around the average coverage rate of 33.0 percent.

In FY 2010, NEFOP had a target coverage goal of placing NEFOs or ASMs on 38 percent of sea-days of sector vessels while they were participating in the NEMSF. According to the most recent data, a total of 3,702 trips out of a total of 11,213 sector trips had either NEFO or ASM coverage (Van Atten, 2011d) for a total trip coverage rate of 33 percent. Table 6 shows combined NEFO and ASM coverage levels in terms of trips by sector in FY 2010 including coverage of common pool trips.¹⁰ According to this table, 33 percent of all NEMSF trips were covered by either a NEFO or an ASM. NEFSC-FSB for FY 2010 had a stated goal of 38 percent coverage of sea-days; this level was deemed necessary to obtain statistically reliable estimates of discards and total catch. If the number of sampled trips is approximately equal to the number of sampled sea-days, then it does not appear likely that the 38 percent coverage goal was met. We did not obtain information directly from NMFS regarding any implications of the lower coverage levels with respect to the assessment of discards and sector attainment of their ACEs.

¹⁰ NMFS does not consider the number of trips per sector or the number of observed trips per sector as confidential—un-revised data similar to the data in this table are found on the Internet at http://www.nefsc.noaa.gov/fsb/Sector/coverage_web_report_2010.pdf (NEFSC-FSB, 2011g).

Table 6. NEFO and ASM Coverage Levels by Sector in FY 2010

Sector	Total Trips Made	NEFO and ASM Trips	Coverage Percent	Expected no. of Observed Trips at 33%
Fixed Gear Sector	1,871	664	35.5%	618
NCCS	38	15	39.5%	13
NEFS 02	1,501	514	34.2%	496
NEFS 03	2,305	674	29.2%	761
NEFS 05	591	237	40.1%	195
NEFS 06	110	31	28.2%	36
NEFS 07	295	79	26.8%	97
NEFS 08	152	41	27.0%	50
NEFS 09	305	86	28.2%	101
NEFS 10	717	273	38.1%	237
NEFS 11	1,382	438	31.7%	456
NEFS 12	60	27	45.0%	20
NEFS 13	259	83	32.0%	86
Port Clyde Community Sector	488	162	33.2%	161
Sustainable Harvest Sector	1,031	350	33.9%	340
Tri-State Sector	108	28	25.9%	36
Total for Sectors	11,213	3,702	33.0%	3,702
Common Pool – Groundfish	1,806	203	11.2%	NA
NE Multispecies Fishery Total	13,019	3,905	30.0%	NA

Source: Columns 1 – 4 from Van Atten (Van Atten, 2011d). The shaded column is from Northern Economics, Inc.

As discussed above, coverage levels in terms of covered trips were relatively inconsistent across sectors, and there is considerable variation from the mean of 33 percent. The right-most column of the Table 6, which has been added by Northern Economics, shows the expected number of trips in each sector if all sectors had the same percentage (33.0 percent) of combined NEFO and ASM coverage on a trip-by-trip basis. This column is used to test whether the numbers of observed trips were likely to have come from a random selection process with a normal distribution around 33 percent. The test is the very common and widely applied χ^2 test (Chi-square test). The χ^2 test compares the expected distribution of observed sea-days with the actual number of observed sea-days, and tests whether it is likely that actual distribution is likely to have come from random sample from a normal distribution around the expected percentage. If the χ^2 test returns a probability value (p-value) smaller than 0.05, the null hypothesis is generally rejected.¹¹ The χ^2 test of the trip level coverage at the sector level yields a p-value of 0.000185, and thus we can reject the null hypothesis—it is highly unlikely that the actual distribution of coverage is from a random sample of a normal distribution around the expected coverage of 33 percent. If we phrase the results in other terms, we would say there would be fewer than 185 occurrences out of one million that the distribution shown in Table 6 comes from a random sample with a normal distribution of sector trips, if the target sample rate was 33 percent.

It must be noted that target coverage levels were set by NEFSC-FSB on the basis of sea-days and not on the number of trips. During the course of this study, Northern Economics received data from NEFOP showing the number of NEFO days and ASM days, along with the overall percentage of sea-days covered for each the individual sectors (Van Atten, 2011j; Van Atten, 2011h), although we have not received sea-day coverage level data corresponding to the trip coverage data summarized in

¹¹ A χ^2 test with an 0.05 p-value can be interpreted by saying that on average every 5 times out of 100 a distribution such as the one tested would be likely to occur.

Table 6. Further, it appears that data showing sea-day coverage for individual sectors cannot be released in this report because they are considered confidential.

Table 7 shows our best attempt to estimate total sea-days and NEFO and ASM coverage levels for all vessels participating in sectors in FY 2010.¹² We estimate that NEFOs or ASMs were onboard sector vessels for 32.3 percent of the estimated 25,167 sea-days. Approximately 8,136 sea-days (6,148 ASM days and 1,988 NEFO days) were logged in FY 2010, with an overall coverage level of 32.3 percent of total sea-days in the NEMSF. On average, we estimate that sectors had NEFO coverage for 7.9 percent of their sea-days, and ASM coverage for 24.4 percent of their sea-days. The overall ratio of NEFO to ASM sea-days is 24 to 76.

Table 7. Estimated NEFO and ASM Coverage Levels for Vessels in Sectors by Sea-Days for FY 2010

Total Sector Sea-days	NEFO Coverage of Sectors				ASM Coverage of Sectors				NEFO + ASM Coverage of Sectors			
	Total Days	% of Total	Low %	High %	Total Days	% of Total	Low %	High %	Total Days	% of Total	Low %	High %
25,167	1,988	7.9%	1.1%	36.9%	6,148	24.4%	2.5%	39.1%	8,136	32.3%	25.9%	45.0%

Source: Estimated by Northern Economics Inc. based on preliminary estimates of sea-days and coverage levels (Van Atten, 2011j; Van Atten, 2011h), and final estimates of trip coverage (Van Atten, 2011d).

Note: The final data provided to Northern Economics did not include actual number of sea-days fished by each sector, but these were included in preliminary data, and these allowed us to estimate the total number of sea by NEFOs and ASMs.

While we recognize that sea-day coverage levels in Table 7 are estimates rather than actual data, we believe they are reliable enough for expository purposes. The primary source of data for the total number of sea-days is a summary report provided on September 8, 2011 (Van Atten, 2011h).¹³ This report showed the number of observed trips by sector as well as the number of observed sea-days by sector. From this report we calculated an estimate of the number of sea-days per observed trip for each sector, and assume that the number of sea-days does not vary by type of observer (NEFO or ASM). We also assume that the number of sea-days for unobserved trips is the same as the number of sea-days for observed trips.¹⁴ In another set of now-preliminary data Van Atten (2011j) provided information on the split of covered sea-days between NEFOs and ASMs for each sector. We assume that the final split of covered sea-days is generally unchanged from the preliminary data.

While we cannot report coverage levels of individual sectors because of confidentiality restrictions, we can report the results of χ^2 tests on the number of NEFO days, ASM days, and overall coverage days. These are shown in Table 8, along with the χ^2 results from the number of sampled trips in each sector. The probabilities that any of these distributions could come from a random sample with a normal distribution around the expected coverage percent are extremely small. We reject the null hypothesis that the PTNS provided a normal distribution of coverage days for sectors in the NEMSF.

¹² NMFS has indicated that data showing NEFO and ASM coverage days by individual sectors are confidential if sectors are specifically named or identifiable. In order to avoid providing information that could be used to identify names of sector in subsequent sections we have chosen not to provide estimates of sea-day coverage levels by sectors at this point in the document.

¹³ This preliminary report used the reduced number of sector trips, but apparently includes observer trips that have since been removed and are no longer being included as part of the coverage data.

¹⁴ This assumption is less likely to be true than the former; however, since vessels are not yet paying for either type of coverage, we believe both assumptions to be reasonable.

Table 8. χ^2 Test Results on Distributions across Sectors of Covered Trips, NEFO, ASM, Total Observed Days

Tested Distribution	P-values	Interpretation
χ^2 Results for Observed Trips	1.85×10^{-4}	There are 185 chances per million that the sample was random from a normal distribution around 33 percent.
χ^2 Results for Overall Observed Days	4.09×10^{-14}	There are 4.09 chances out of one hundred trillion that the sample was random from a normal distribution around 32.3 percent.
χ^2 Results for NEFO Days	3.51×10^{-42}	There are 3.51 chances out of one billion decillion that the sample was random from a normal distribution around 7.9 percent.
χ^2 Results for ASM Days	5.32×10^{-25}	There are 5.32 chances out of ten trillion trillions that the sample was random from a normal distribution around 24.4 percent.

Source: Statistical analysis conducted by Northern Economics, Inc.

2.14.3.3 Equitable Coverage Levels and the Standard Bycatch Reporting Methodology

It is reasonably clear that combined coverage levels of NEFOs and ASMs across sectors were unequal in FY 2010 from a statistical perspective. Some sectors had higher coverage rates than others, and some had lower. We believe that one plausible reason for this is that NEFSC-FSB goals in setting coverage levels were based on meeting “coefficient of variation” requirements for specific gears fished in specific areas (Gear/Area Stratum) as outlined in the 2010 SBRM process (NEFSC-FSB, 2010b). These requirements are likely to be at odds with a goal to have fair and equitable coverage levels across sectors, particularly if SBRM coverage levels vary across strata and if sectors have varying levels of participation in different strata.

The following example may shed some light on the issue of coverage levels at the sector level and differential coverage goals for individual gear/stock strata.

Assume that NMFS has the following target coverage levels for the following Gear-Area Strata:

- Gear-Area Stratum A—coverage goal = 20 percent
- Gear-Area Stratum B—coverage goal = 30 percent
- Gear-Area Stratum C—coverage goal = 40 percent

Assume the following levels of participation in various strata by four different sectors:

- Sector 1 fishes only in Stratum A
- Sector 2 splits its time 50-50 between Strata A and B
- Sector 3 splits its time equally between Strata B and C
- Sector 4 fishes only in Stratum C

If coverage is assigned flawlessly and NMFS coverage goals are met, then the four sectors will have the following coverage levels:

- Sector 1: 20 percent
- Sector 2: 25 percent
- Sector 3: 35 percent
- Sector 4: 40 percent

If coverage is paid on a daily fee basis, then Sector 4 will have higher observer cost per fishing day than the other sectors.

2.14.3.4 Implications of Unequal Coverage Rates across Sectors

The results of our statistical analysis may have some significant implications for coverage levels in FY 2012, when sectors will be required to pay for ASM coverage.

- 1) If the sampling regime experienced in FY 2010 is necessary to meet coverage levels required by the SBRM, and those requirements carry through to FY 2012, then individual sectors will need to use relatively complex means to assign appropriate coverage levels to meet SBRM requirements, and coverage levels and costs borne by sectors are unlikely to be proportional.
- 2) If the sampling regime experienced in FY 2010 is necessary to meet coverage levels required by the SBRM, but NMFS sets a standard coverage level across sectors, then it is unlikely that coverage levels required by the SBRM will be attained. However, at least some disproportional variations in costs across sectors may be reduced.

On September 2, 2011, NMFS-NERO (2011c) announced that all sectors will be required to have ASM coverage on **17 percent of sector trips**. The following is excerpted from the cover letter of the announcement.

The at-sea monitoring (ASM) coverage rate for fishing year (FY) 2012 has been finalized. Each sector is required to implement and fund an ASM program that covers 17 percent of all trips in FY 2012. In combination with NMFS observer coverage, this is expected to provide 25 percent at-sea coverage of fishing trips. NMFS looked at several options for determining the discard rate, including looking first at developing a rate for each individual sector. Because the costs for many of the individual sectors were quite high, we decided to implement a universal coverage rate which worked out to be 25 percent for all trips across all sectors to achieve the goal set out in the regulations at 50 CFR 648.87, i.e., a level that at least meets the coefficient of variation specified in the SBRM and is sufficient to accurately monitor sector operations. This coverage level balances the need for precise discard estimates with the cost of ASM coverage, and is a level that we believe works best for the sectors and for NMFS.

From the letter it is clear that at least for FY 2012, NMFS-NERO has determined that a universal coverage level across sectors on a trip basis will provide sufficient coverage levels to estimate total catch, including discards, in the sector fishery.

2.14.4 Comparison of 2010 ASM Costs by Sector to Potential Costs in 2012

As indicated above, NMFS-NERO is proposing that ASM coverage in FY 2012 be set at 17 percent of each sector's trips and overall coverage (ASM + NEFO) would be set at 25 percent of sector trips. In Table 9 we show 2010 sector trips and coverage levels along with assumed numbers of 2012 sector trips and coverage levels. In the table we assume that the number of trips in 2012 will be identical to the number of trips taken in 2010. We do not show 2010 ASM trips by sector because we have not seen final official estimates of these numbers.

Table 9. Estimated Total Sector Trips and Observed Sector Trips in 2012

Sector	2010 Total Sector Trips	2010 NEFO + ASM Trips	2012 Estimated Sector Trips	2012 Estimated NEFO + ASM Trips	2012 Estimated ASM Trips
Fixed Gear Sector	1,871	664	1,871	468	318
NCCS	38	15	38	10	6
NEFS 02	1,501	514	1,501	375	255
NEFS 03	2,305	674	2,305	576	392
NEFS 05	591	237	591	148	100
NEFS 06	110	31	110	28	19
NEFS 07	295	79	295	74	50
NEFS 08	152	41	152	38	26
NEFS 09	305	86	305	76	52
NEFS 10	717	273	717	179	122
NEFS 11	1,382	438	1,382	346	235
NEFS 12	60	27	60	15	10
NEFS 13	259	83	259	65	44
Port Clyde Groundfish Sector	488	162	488	122	83
Sustainable Harvest Sector 1	1,031	350	1,031	258	175
Tri-State Sector	108	28	108	27	18
Sector Total	11,213	3,702	11,213	2,803	1,906

Source: Developed by NEI using 2010 trip and coverage data from Van Atten (Van Atten, 2011d) and projected 2012 coverage levels from NMFS-NEFO (NMFS-NEFO, 2011c).

Table 10 shows sector-by-sector estimates of ASM costs in 2010 and projected ASM costs for 2012. The table uses the information in Table 9, 2010 ASM cost data (see Table 3 on page 28), and preliminary data that include estimates of sea-days per trip and break-outs of NEFO and ASM coverage on a sector-by-sector basis (Van Atten, 2011j; Van Atten, 2011h). As discussed earlier, we have been informed that we should keep confidential information regarding sea-days at the sector level, so the table assigns randomized names to each of the sectors.

As shown in Table 10, we estimate that the total costs of ASM coverage in 2012 are expected to decline by 30 percent relative to estimated ASM cost in 2010. Total ASM costs in 2010, including travel and training costs, were estimated at \$4.3 million. If coverage rates in 2012 are set at 17 percent on a trip basis rather than on sea-days, the total ASM costs fall to \$2.9 million assuming the same numbers of sector trips are taken. As seen in Table 10, we expect differences across sectors to vary widely. For example, Sector 01 is expected to realize a 7 percent decline in ASM costs while Sector 03 is expected to realize a 44 percent decline. On the other hand, Sector 11 is expected to see a 567 percent increase to \$4,669, but its ASM costs in 2010 were unusually low, with only one ASM sea-day. The primary reason that cost reductions in 2012 are disproportionately distributed is that ASM costs in 2010 were not proportionally distributed. Sectors that had relatively low levels of ASM coverage in 2010 will not see as big a reduction as sectors that had relatively high levels of ASM coverage in 2010.

Table 10. Estimated ASM Cost by Sector in 2010 and Projected Costs in 2012

Sector	2010 Sea-day (\$)	2010 Travel & Training (\$)	2010 ASM Total (\$)	2012 Sea-day (\$)	2012 Travel & Training (\$)	2012 ASM Total (\$)	Percent Change from 2010
Sector 01	181,568	20,087	201,655	110,912	12,270	123,182	-39%
Sector 02	195,438	21,621	217,059	134,873	14,921	149,794	-31%
Sector 03	462,115	51,124	513,239	260,326	28,800	289,126	-44%
Sector 04	26,479	2,929	29,408	31,004	3,430	34,434	17%
Sector 05	924,861	102,317	1,027,179	631,372	69,849	701,221	-32%
Sector 06	143,111	15,832	158,943	114,414	12,658	127,071	-20%
Sector 07	291,265	32,223	323,488	271,391	30,024	301,415	-7%
Sector 08	118,523	13,112	131,636	86,796	9,602	96,398	-27%
Sector 09	153,198	16,948	170,146	81,115	8,974	90,088	-47%
Sector 10	16,392	1,813	18,205	7,120	788	7,907	-57%
Sector 11	630	70	700	4,204	465	4,669	567%
Sector 12	473,463	52,379	525,843	305,715	33,821	339,537	-35%
Sector 13	79,436	8,788	88,224	64,651	7,152	71,803	-19%
Sector 14	161,394	17,855	179,249	144,534	15,990	160,524	-10%
Sector 15	367,549	40,662	408,211	267,033	29,542	296,575	-27%
Sector 16	280,548	31,037	311,585	181,839	20,117	201,956	-35%
Sector Total	3,875,970	428,798	4,304,768	2,697,299	298,402	2,995,701	-30%

Source: Developed by Northern Economics, Inc. based on 2010 coverage levels and costs from Van Atten, and projected coverage levels in 2012.

Note: Sector names have been randomized to protect confidential data.

It should be pointed out that our estimates of projected costs assume that the number of sea-days per trip remains constant within each sector, and that the number of trips by sector remains constant. In reality, we would expect neither sea-days nor the number of trips to remain constant. There could also be an increased tendency for trip lengths with ASMs to shorten relative to trips with NEFOs or without coverage.

2.14.5 ASM Costs compared to Fishery Revenues

This section estimates ex-vessel revenues in the NEMSF and makes comparisons of revenues to the costs of ASMs. In a separate subsection we also examine ASM costs relative to discards.

Table 11 shows estimates of total catch, landings, discards, and revenues by sectors in the 2010 NEMSF. Northern Economics developed the table from two different sources—we were unable to locate a similarly comprehensive table on NMFS web pages. Estimates of total catch come from NMFS-NEO’s online “Catch Monitoring Summary Table” (NMFS-NEO, 2011b). The original table compares sector sub-ACLs to sector catch, and reports the overall exploitation rates of the sector’s sub-ACL for each stock. Total landings come from NMFS-NEO’s online report “Comparison of 2009 and 2010 Fishing Years; Sector Groundfish by Stock” (NMFS-NEO, 2011a). From the source notes of the two tables, it is clear that the former includes estimates of discards, while the latter only includes landed weights. Therefore, we assume the differences between the total catch and total landings are total discards—these are reported in the third column of data in Table 11. Ex-vessel revenues are also in the comparison report, and these are included in the fourth column. Estimates of discard rates and estimates of ex-vessel prices were calculated by Northern Economics from the included data. Overall, vessels operating in sectors generated \$80.5 million in revenue in FY 2010 on total landings of 63.9

million pounds. Total discards were estimated at 1.95 million pounds, and presumably all of these are fish below size limits—regulations prohibit discards of legal sized fish.¹⁵

As seen in Table 11 total ex-vessel revenue for sectors is estimated at \$80.5 million, with over \$45 million from cod and haddock in Georges Bank (GB) and the Gulf of Maine (GOM). If we compare total revenue to total ASM costs in 2010, we estimate that ASM costs (\$4.3 million) comprised approximately 5.3 percent of total revenue in 2010 in sector fisheries. If we assume that 17 percent of trips will be covered by ASMs in 2012, and no change in number of trips, sea-days or total revenues, then ASM costs for sectors would be 3.7 percent of total revenue.

Table 11. Estimates of Total Catch, Landings, Discards & Revenues by Sectors in the 2010 Multispecies Fishery

Stock	Sector Catch (1,000 lbs)	Landed Weight (1,000 lbs)	Discards (1,000 lbs)	Ex-Vessel Revenue (\$1,000)	Discard Rate (percent of catch)	Ex-Vessel Price (\$/lb.)
GB Cod (East)	596.9	569.8	27.2	\$993	4.55	\$1.74
GB Cod (West)	5,460.5	5,223.9	236.6	\$9,107	4.33	\$1.74
All GB Cod	6,057.4	5,793.7	263.7	\$10,100	4.35	\$1.74
GB Haddock (East)	5,410.1	5,393.1	17.0	\$5,769	0.31	\$1.07
GB Haddock (West)	12,777.9	12,700.1	77.8	\$13,585	0.61	\$1.07
All GB Haddock	18,188.0	18,093.2	94.9	\$19,354	0.52	\$1.07
GB Winter Flounder	3,046.0	3,009.3	36.7	\$6,000	1.21	\$1.99
GB Yellowtail Flounder	1,628.8	1,481.5	147.3	\$1,756	9.04	\$1.19
GOM Cod	7,975.8	7,797.7	178.1	\$15,065	2.23	\$1.93
GOM Haddock	817.2	811.3	5.9	\$1,331	0.72	\$1.64
GOM Winter Flounder	178.3	174.2	4.1	\$319	2.32	\$1.83
SNE/MA Winter Flounder	N/A	8.0	N/A	\$26	N/A	\$3.25
CC/GOM Yellowtail Flounder	1,235.0	1,102.3	132.7	\$1,510	10.75	\$1.37
SNE/MA Yellowtail Flounder	335.8	326.3	9.5	\$415	2.83	\$1.27
Witch Flounder	1,534.1	1,406.5	127.6	\$3,390	8.31	\$2.41
Plaice	3,313.8	2,936.5	377.3	\$4,275	11.39	\$1.46
Pollock	12,019.7	11,843.1	176.6	\$9,696	1.47	\$0.82
Redfish	4,721.6	4,391.6	330.0	\$2,517	6.99	\$0.57
White Hake	4,882.0	4,814.8	67.2	\$4,742	1.38	\$0.98
All Stocks	65,933.5	63,981.9	1,951.6	\$80,496	2.96	\$1.26

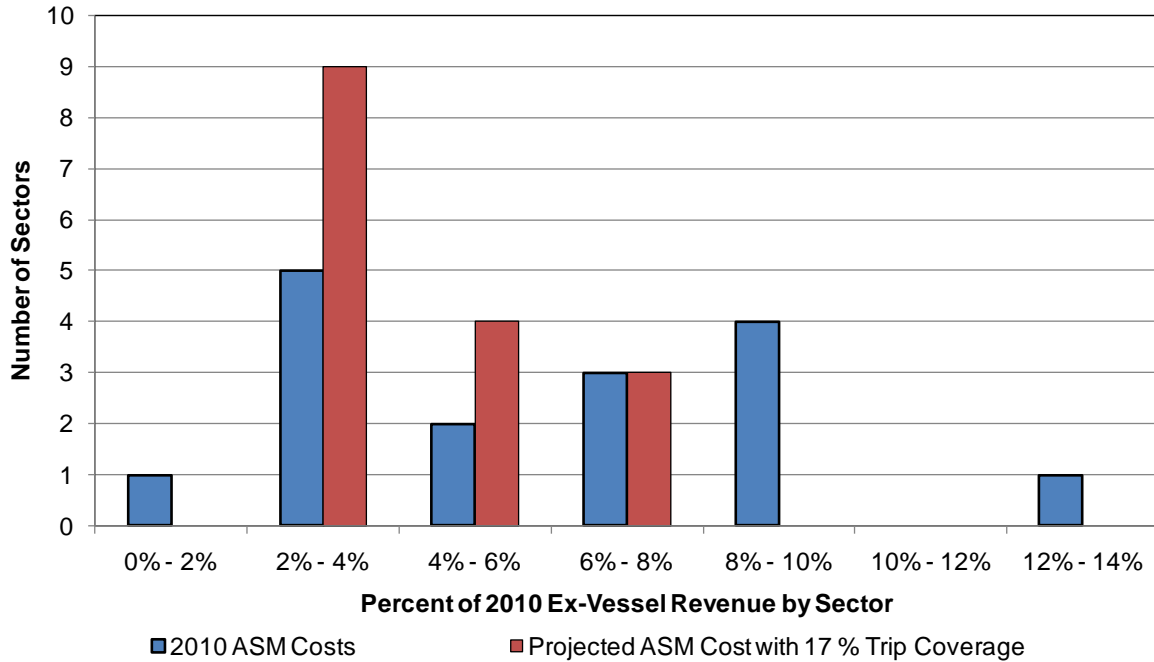
Sources: Estimates of total catch are taken from NMFS-NERO's Sector Catch Monitoring Summary Table for 2010 (NMFS-NERO, 2011b). Landed Weight and Revenue are taken from NMFS-NERO's Comparison of 2009 and 2010 Fishing Years (2011a). Discards and discard rates are estimated by Northern Economics using the difference between catch and landings in the two reports.

In Figure 4 we show estimates of ASM costs in 2010 (the blue columns) as a percentage of each sector's estimated ex-vessel revenue from 2010. The estimates of ASM costs include travel and training costs. These costs are above and beyond the \$630 average sea-day costs for ASMs, and according to Van Atten (2011g), NEFOP has not paid these costs in the past when contracts are between industry and the providers. This table is important because it demonstrates the wide range of impacts ASM costs would have in 2010 if sectors were required to pay for coverage. ASM costs as a percent of ex-vessel revenue ranged from a low of 0.5 percent to a high of 13.1 percent, with four sectors experiencing costs between 8 and 10 percent, and five sectors seeing costs from 2 to 4

¹⁵ Data from in the Comparison of 2009 and 2010 show 8,000 pounds of landings of SNE/MA Winter Flounder in spite of prohibitions on retention by sector vessels.

percent of revenues. It is important to note that the seven sectors with the highest ASM costs as a percent of revenue all have average trip lengths of 1.75 calendar days or less, while trip lengths of six of the nine sectors with the lowest ASM costs relative to revenue had average trip lengths of 4.5 calendar days or more. Figure 5 on the next page shows average trip lengths of each of the sectors.

Figure 4. ASM Costs as Percent of Estimated Ex-Vessel Revenue for FY 2010

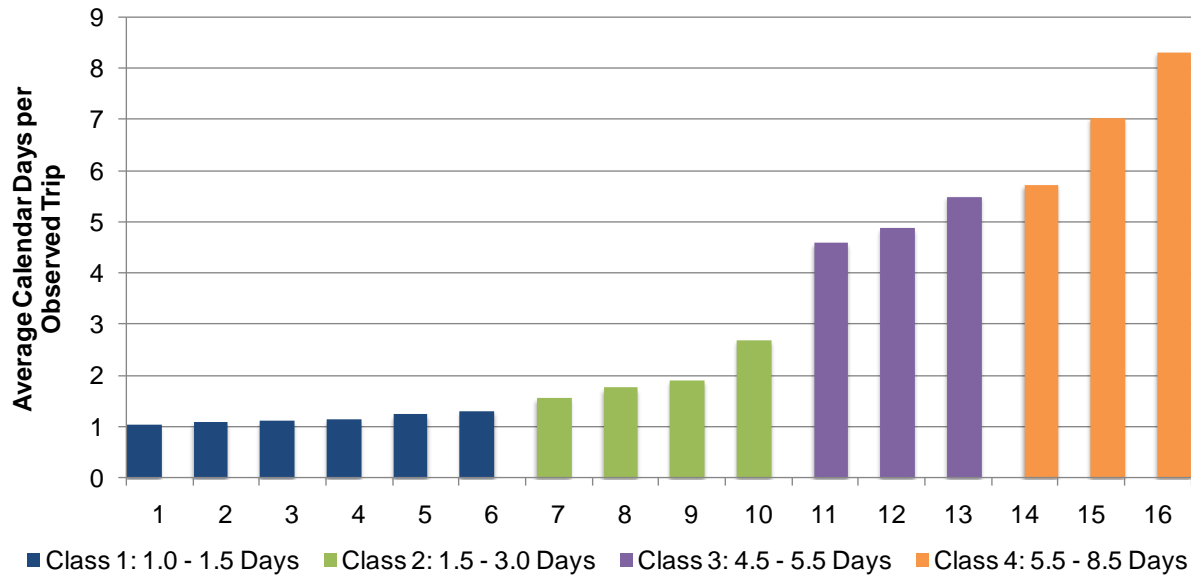


Source: Estimated by Northern Economics, Inc. based on information in Table 9, Table 11, and data provided by Van Atten (2011h).

Figure 4 also shows the estimated distribution of ASM costs as a percent of revenues if ASM coverage was 17 percent across the board, noting again that NMFS-NERO has announced that level coverage for 2012. With ASM coverage on 17 percent of trips, we estimate a much narrower distribution of costs as a percent of ex-vessel revenue—9 of the 16 sectors are projected to have ASM costs from 2 to 4 percent of revenues. We also note that of five of the six sectors that are projected to have ASM costs greater than four percent of ex-vessel revenue with 17 percent coverage have average trip lengths of less than two days. In other words, the sectors with the highest costs tend to have relatively short trips. By contrast, only three of the nine sectors with costs between two and four percent have average trip lengths of less than two calendar days, while four of these nine sectors had average trip lengths of 4.5 calendar days or longer.

In Figure 5 we show average trip lengths of individual sectors during observed trips (NEFOs and ASMs) in FY 2010. The estimates were calculated from preliminary data provided by Van Atten (2011h) indicating numbers of observed trips and numbers of observed sea-days by individual sector. By definition, sea-days are counted as calendar days since providers charge NEFOP on a calendar basis for NEFOs and ASMs. This means that trips will never be less than one day in length. Nine of the sixteen sectors have average trip lengths of less two calendar days, one has average trip lengths of 2.5 calendar days, and the remaining six have average trip lengths of 4.5 days or more. As discussed in the text describing Figure 4, trip lengths are an important factor when looking at the relative impacts of observer costs; therefore, Figure 5 groups the sectors into four classes based on trip lengths. The classes are then used below in a summary of impacts.

Figure 5. Average Trip Lengths of Sectors in FY 2010



Source: Chart developed by Northern Economics, Inc. from information provided by Van Atten (2011h).

In Table 12 and Table 13 we provide an overall summary of participation and ASM coverage and costs in the NEMSF by sector. The table combines the sixteen sectors into four class on the basis of trip lengths, so that there are three or more sectors in each group and confidential information is thus protected. The trip length classes were introduced in the previous figure. Table 12 summarizes the information using estimate numbers for each column, while Table 13 provides percentage comparisons. We note that, as with earlier tables, the estimates of ex-vessel revenue are approximations using Sector ACEs and net transfers, along with industry wide discard rates, exploitation rates and ex-vessel prices.

Table 12. Trips and Days, ASM Coverage and Cost, and Revenue in FY 2010 for Sectors in Trip Length Classes

Trip Length Classes (days)	Sectors in Class	Trips in Class	ASM Trips in Class	Observed Trips in Class	Days in Class	ASM Days in Class	Observed Days in Class	Total ASM Costs in Class (\$)	Ex-Vessel Revenue in Class (\$)
Class 1: 1.0 – 1.5	6	6,373	1,657	2,091	7,533	1,976	2,482	1,383,575	14,030,802
Class 2: 1.5 – 3.0	4	2,688	732	941	4,933	1,324	1,718	927,052	17,948,402
Class 3: 4.5 – 5.5	3	664	143	193	3,210	692	934	484,531	11,753,147
Class 4: 5.5 – 8.5	3	1,488	345	477	9,491	2,156	3,002	1,509,610	36,737,649
All Classes	16	11,213	2,877	3,702	25,167	6,148	8,136	4,304,768	80,470,000

Source: Table developed by Northern Economics using information from previous tables.

Table 13. Participation and ASM Coverage Percentages in FY 2010 for Sectors in Trip Length Classes

Trip Length Classes (days)	Class Trips / All Trips	ASM Trips / Class Trips	ASM Trips / All Trips	Class Days / All Days	ASM Days / Class Days	ASM Days / All Days	ASM Costs / Class Revenue	ASM Costs / Total Revenue
Class 1: 1.0 – 1.5	57%	26%	15%	30%	26%	8%	9.9%	1.7%
Class 2: 1.5 – 3.0	24%	27%	7%	20%	27%	5%	5.2%	1.2%
Class 3: 4.5 – 5.5	6%	22%	1%	13%	22%	3%	4.1%	0.6%
Class 4: 5.5 – 8.5	13%	23%	3%	38%	23%	9%	4.1%	1.9%
All Classes	100%	26%	26%	100%	24%	24%	5.3%	5.3%

Source: Table developed by Northern Economics using information from previous tables.

In combination, Table 12 and Table 13 above provide a summary of sector activities and ASM coverage in FY 2010. Overall, we estimate that there were 11,213 sector trips and an estimated 25,167 sector sea-days. Sectors that take mostly single-day trips (Class 1) accounted for 57 percent of all sector trips, but only 30 percent of the sea-days. Sectors in Class 4 with average trip lengths from 5.5 - 8.5 took only 13 percent of the trips, but had 38 percent of total the sea-days, more than any other class of sectors.

In the tables, ASM coverage levels do not appear to vary all that much, because much of the variation is masked by the grouping of sectors into classes. Overall, we estimate sectors carried ASMs on 26 percent of their trips but on only 24 of their sea-days. Classes 1 and 2 with relatively shorter trips, had ASMs on a greater percentage of their sea days (26 and 27 percent respectively) than sectors in Classes 3 and 4 where trips were longer.

Sectors in Class 4 had the greatest overall ASM costs accounting for \$1.5 million of the \$4.3 total.¹⁶ For the class, ASM costs comprised 4.1 percent of the estimated ex-vessel revenues, which we estimate at \$37.6 million. ASM costs were a similar percentage of revenues for Class 3, while ASM costs for sectors in Class 2 were estimated at 5.1 percent of their ex-vessel revenues. However, ASM costs of Class 1 came to 9.9 percent of the \$14.0 million estimated to have been earned by the six day-boat sectors comprising the class.

2.14.5.1 ASM Costs Relative to Discards

In previous sections we suggest that the importance of measuring discards with ASMs could potentially be reduced if minimum size limits were eliminated from regulations. In this section we discuss the issue further, and estimate ASM costs per pound of discards. We note here that our discussions do not delve into potential biological considerations of discard management, and we acknowledge that there may be important biological arguments for the maintenance of regulations on minimum size limits.

Michael Palmer (2010), in his final summary point of a working paper that was part of NEFSC's 2010 *Discard Estimation Review*, makes the following statement:

Uncertainty in estimating discards may complicate ACE monitoring; however, the extent will depend not only on the uncertainty in the discard estimate, but also the contribution of discards to the overall ACE accounting (variable by sector and stock).

In other words, if the amount of discards is low, then the extent of the uncertainty around the discard estimate is also low. It follows, therefore, that if discards are reduced, then the uncertainty around discard estimates is also reduced.

¹⁶ ASM costs include sea-day cost plus travel and training costs. Training costs include only those amounts that NEFOP reimbursed to ASM providers.

In addition, NOAA makes the following statement in its 2011 proposed rule for Sector Operations Plans and Contracts, in a response to a comment regarding its intention to approve an exemption that allows sector vessels to discard legal-sized, but unmarketable fish (NOAA, 2011):

...actual discards by sector vessels observed by NMFS observers and at-sea monitors on sector trips are applied to the sector's ACEs in live weights, and incorporated into sector-specific discard rates that are used to account for discards by sector vessels on unobserved trips. In addition, this exemption is not expected to lead to high-grading of catch, given that there is a financial incentive for sector vessels to minimize discards of allocated stocks. Since discards of allocated stocks are applied to the sector's ACE through observer data and sector-specific discard rates, there is an incentive for sector vessels that opt for this exemption to land catch rather than discard it, to maximize the value of the sector's ACEs.

Here, NMFS uses the fact that discarded fish count against each sector's ACE, and indicated that operators have incentives to keep and sell as much of their ACEs as possible.

If we take these two statements at face value, then it follows that if minimum size limits were eliminated,¹⁷ sector vessels would be incentivized to reduce discards, because they would be able to earn *something* from the fish that would be deducted from their sector's ACE regardless. If they keep more fish, then their overall discards would be reduced and the base level of uncertainty with respect to discard estimates would be reduced.

In Table 11, we estimate that sectors discarded 1.95 million pounds of groundfish in the NEMSF in 2010. In Table 10 we estimate that ASMs on sector vessels cost \$4.3 million in 2010. Noting that one of the primary needs for ASMs is the estimation of discards along with estimation of total catch, we estimate that ASMs cost \$2.21 for every pound of discards. This amount exceeds the ex-vessel price of every stock in the fishery with the exception of SNE/MA winter flounder.

If the regulations were changed and there were no minimum size limits, then it is appear likely that discards would be reduced, and that ex-vessel revenues would increase. If we assume that changing the regulations reduces discards proportionally across all stocks by 50 percent, then we calculate than an additional 0.95 million pounds would be landed. If we also assume that the average price received for these smaller fish would be 50 percent of the average ex-vessel price received in 2010 ($\$0.63 = \$1.26 \div 2$), then an additional \$600,000 in revenue could be generated. More importantly, the uncertainty in the estimation of sector ACEs would be reduced.

We believe that these issues should be considered within a broader context of discard management that includes not only a broad examination of the economic impacts,¹⁸ but also an examination of biological ramifications as well as any social and cultural implications.

2.14.6 Discussions with ASM Contractors on Potential Costs when Sectors Pay for Coverage

Discussions with observer and monitor providers indicate that when sectors contract directly for ASM services, some costs are likely to decrease while other cost components may increase. Further, providers indicated that in general, they could offer services to sectors that comprise larger vessels and that take longer trips at daily rates that are lower than rates they could offer to sectors comprising smaller day boats.

¹⁷ This presumes there are no biological imperatives to keep the minimum size limits in place.

¹⁸ It is certainly possible that there may be some negative economic effects, e.g. impacts on prices, impacts on perception of quality, impacts to buyers, etc.

Once sectors pay for coverage, providers are likely to reduce wages and benefits rates they pay to ASMs (and DSMs). In other words, they will no longer follow the strict guidelines of the FLSA and the SCA. Most indicate that they would move away from hourly pay rates to daily rates, which would vary depending on whether a monitor is deployed or not. It must be noted that all of the providers with whom we spoke pay their observers and monitors for days they are deployed on vessels, and for days on which they are not deployed (land days). Payment for land days is one of the primary methods used to deal with variable deployments and the problems that variable deployments cause for employee retention. According to the providers interviewed, reducing the number of paid land days is the most effective way to reduce daily fee rates.

The ability to minimize paid land days for ASMs is the primary reasons that providers could offer lower rates to well-organized sectors with vessels that take relatively long trips. One provider speculated that daily fee costs for some sectors could be less than \$450 plus reimbursable travel costs. That same provider indicated that sea-day costs for other less organized sectors might remain at or above current averages (\$630/sea-day).

Efficiencies are not limited to trip-boats sectors—i.e. vessels that take multi-day trips. It is also possible to have very low numbers of land days if the number of trips that a sector takes is relatively stable. Assume, for example, that a hypothetical sector has 21 vessels that all take day-trips, but no fewer than 5 vessels and no more than 6 take a trip on any given day. In theory, the provider could cover 33 percent of the sector's trips with only three ASMs. Each ASM would work seven days a week for two weeks straight, and then would have a week off—two ASMs would always be working during any given week.

Contrast the sector described in the previous paragraph with another 21-vessel sector that has a highly variable fishing pattern. In an extreme case, assume that on most days none of the vessels fish (which days are not known), but when the weather is optimal, 15 or more of the vessels will fish. The ASM provider for this sector would need to have several ASMs willing and able to work on any given day. In order to ensure that enough ASMs are available on any given day, the provider must pay the ASMs whenever they are on call—otherwise the ASMs would probably get other jobs, and the provider would not be able to meet its coverage obligations. Because the provider in this case has to pay for a large number of land days relative to revenue producing sea-days, the daily fee for sea-days will need to be substantially higher than for the sector in the previous example.

It should be noted that the discussions with providers regarding daily fees once sectors take over payment did not specifically address reimbursable travel costs or the issues of whether the daily fees would include the cost of training. Northern Economics presumes that the costs of travel would be in addition to the daily fees discussed above. Sectors could work to reduce the costs of travel for ASMs by using a consistent and limited number of ports. With respect to training costs, NEFOP reimburses for training costs only if the provider's contract is directly with NEFOP. As an example, Van Atten (2011g) cites observers for the scallop fishery—an industry-funded program. NEFOP provides the training to scallop observers at no cost, but the provider is not reimbursed for trainees' wages or per diem. In FY 2010, total reimbursed ASM training costs amortized over all ASM sea-days came to \$37.46 per day of coverage.

2.14.7 A Discussion Regarding Fairness and Equity

Much of the discussion in this summary of observer costs for sectors in the NEMSF involves the issue of fairness and equity.

- In Section 2.14.3.2 we examine coverage levels on sector trips in 2010 and conclude that the distribution of coverage across sectors was not normally distributed and was extremely unlikely to have come from a random selection around standard percentage.
- In Section 2.14.3.3 we demonstrate using a hypothetical example how the sampling regime required in the SBRM could potentially lead to disproportionate coverage levels if different coverage levels are required in different gear/area strata.
- In Section 2.14.3.4 we discuss the inherent conflict between fair and equitable coverage rates and the SBRM and note that NMFS-NERO announcement of 2012 coverage levels for ASMs—17 percent for each sector on a trip-by-trip basis—appears to recognize that conflict.
- In Section 2.14.5 we compare ASM costs in 2010 and potential ASM costs in 2012 to ex-vessel revenue. We note that in 2010, ASM costs relative to ex-vessel revenue in 2010 were quite variable and discuss the finding that sectors with shorter trips tended to have higher costs relative to revenues.
- We also demonstrate in Section 2.14.5 that projected ASM costs in 2012 at 17 percent of sector trips will still tend to favor sectors with longer trips over sectors with fewer trips.
- In Section 2.14.5.1 we discuss discards required by regulation and note that it might be more equitable to allow operators to keep undersized fish and sell them, even at reduced prices, thereby allowing them to obtain at least some value for the fish that count against their sector's ACE.
- In Section 2.14.6 we indicate that providers have told us they may be able to offer lower costs to some sectors—particularly if they are well organized sectors with longer trips.

After considering all of these issues, we conclude that the issue of fairness and equity with respect to the cost of ASM coverage should be one of the highest priorities. We also believe that the NMFS' goal of attaining reliable estimates of discards across all gear and area strata, and across sectors is another top priority. However, we believe that it may be in NMFS' interest to investigate whether both priorities could be met by charging all sectors a fixed percentage of ex-vessel value for ASM coverage. By charging a fixed percentage of revenue, all sectors will experience costs in direct proportion to their revenues. In addition, NESFC-FSB could retain direct control of the assignment of ASMs, and could vary coverage levels to assure that higher priority gears, areas, or even sectors are observed at appropriate levels.

3 Observer Programs in the Pacific Coast Trawl Groundfish Fishery

3.1 Introduction

This section examines the at-sea and first receiver observer programs for the catch shares program of the West Coast Groundfish Limited Entry Trawl fishery (also known as the shore-based IFQ groundfish trawl fishery). Coverage levels of 100 percent are required not only in the IFQ trawl fishery, but also in the offshore fisheries (motherships and catcher processors) for Pacific Whiting.

3.1.1 Historical Overview

NMFS implemented the West Coast Groundfish Observer Program (WCGOP) in 2001 after the Oregon Department of Fish and Wildlife sponsored a study of discard rates in the Oregon groundfish fishery, the results of which declared the fishery a failure, and led to a focused effort to obtain accurate discard rates across the fishery. In 2003, the WCGOP released the first year of limited entry trawl data for use in developing a discard model for fishery management. The primary purpose was to collect data to estimate discard rates. The program also collected data on marine mammals and seabirds (NMFS-NWFSC, 2006).

Prior to the implementation of the catch shares program in 2011, the WCGOP monitored less than twenty-five percent of non-whiting groundfish trawl trips (PFMC, 2010). The program was intended to provide data to derive catch ratios of non-target species. Typically, the final analysis of the estimated total catch by species was not finalized for more than a year after the fishing year ended due to an eight month lag in log book and fish ticket data. The WCGOP used federal funds to hire, equip, insure, and transport observers, as well as to pay for training, debriefing, and data management. The observers were employed by the Pacific States Marine Fisheries Commission (PSMFC), through a Federal contract.

The adoption of amendments 20 and 21 (which were approved by the Pacific Fishery Management Council in 2010) led to the implementation of individual fishing quotas (IFQs) for the west coast shore-based trawl sector. This program—which is also referred to as the West Coast Groundfish Trawl Catch Share Program by NOAA—led to the creation of the Catch Share Observer Program (CSOP) under the WCGOP. Under the CSOP, there is one hundred percent human observer coverage of all Catch Share Program fishing trips. Monitoring of 100 percent of offloads also confirms that landings are reported accurately by first receivers.

The catch share program uses a third-party, or pay-as-you-go, funding approach. The third party system is federally regulated and participants are responsible for making arrangements with a NMFS permitted observer provider to have an observer available for their vessels. Participants pay the observer providers directly for the observer costs. The NMFS-permitted observer providers collect the fees directly from the vessels, recruit qualified individuals, provide insurance and benefits to the observers, deploy the observers, and ensure that the observer data are delivered to NMFS. As previously mentioned, federal funds are used to run the program infrastructure (training, debriefing, and data management) and to equip the observers.

For the first year, fishermen are reimbursed for 90 percent of the cost of observers. The industry proportion of the costs of observers and catch monitors will increase every year so that by 2014, the industry will be responsible for 100 percent of the cost of hiring the observers.

3.1.2 Program Goals

The goal of the CSOP is to collect data on the catch of Trawl Catch Share vessels. NMFS uses the data to enforce the regulations of the Catch Share Program by accounting for the catch of participants so it can be counted against their individual quotas. NMFS also uses the data to develop stock assessments for the annual allocation of catch. It is often assumed that observers are only present to account for constrained species (including yelloweye rockfish, canary rockfish and 6 others), but they must also collect scientific information, and account for potential discards of non-constrained species that could occur as a result of high-grading.¹⁹

3.1.3 Data Sources

Descriptions of the observer program draw primarily on the NOAA publication *Compliance Guide; Pacific Coast Groundfish Trawl Rationalization Program* from December 2010.

3.2 Observer Duties

3.2.1 At-Sea Observers

Observers are independent field biologists who monitor commercial fishing activities. Observers collect information on fishing activity including the areas and depths fished, gear set and retrieval times; the kind and amount of discards; the length, weight and sex of individual fish; biological samples; and interactions with protected species like marine mammals and birds. Observers must be certified by NMFS and must meet the responsibilities specified in regulations at § 660.140(h)(6) for the Shore-based IFQ Program, § 660.150(j)(6) for the Mothership (MS) Coop Program, and § 660.160(g)(6) for the Catcher Processor (CP) Coop Program.

Generally, the observers must:

- successfully perform their assigned duties as described in the Observer Manual or other written instructions from the Observer Program Office, including calling into the NMFS deployment hotline upon departing from and arriving into port after each trip to leave the following information: observer name, phone number, vessel name, date and time of departure and date and time of expected return.;
- accurately record their sampling data, write complete reports, and report accurately any observations of suspected violations of regulations relevant to conservation of marine resources or their environment;
- not disclose collected data and observations made on board the vessel or in the processing facility to any person except the owner or operator of the observed vessel, an authorized officer or NMFS;
- successfully complete NMFS-approved annual briefings as prescribed by the West Coast Groundfish Observer Program for all catcher vessels (IFQ and MS/CV), or for the observers on Mothership or CP vessels; successfully complete NMFS-approved annual briefings as prescribed by the At-Sea Hake Observer Program;

¹⁹High-grading is the practice of discarding less desirable catch of target species in favor of more valuable catch of the same species.

- successfully complete briefing by an observer applicant. This consists of meeting all attendance and conduct standards issued in writing at the start of training; meeting all performance standards issued in writing at the start of training for assignments, tests, and other evaluation tools; and completing all other briefing requirements established by the Observer Program;
- for all catcher vessels (IFQ and MS/CV), hold current basic cardiopulmonary resuscitation/first aid certification courses as per American Red Cross Standards;
- successfully meet debriefing expectations, including reporting for assigned debriefings;
- submit all data and information required by the observer program within the program's stated guidelines; and
- for all catcher vessels (IFQ and MS/CV), meet the minimum annual deployment period of 3 months at least once every 12 months.

3.2.2 Catch Monitors

Under the catch share program, plant observers are termed catch monitors. Catch monitors are stationed at first receiver facilities. Catch monitors confirm that total landings are accurately recorded on fish tickets. Catch monitors must be certified by NMFS through a catch monitor provider and must meet responsibilities specified in regulations at § 660.17(c).

Generally, the catch monitors must:

- perform authorized duties as described in training and instructional manuals or other written and oral instructions provided by NMFS;
- accurately record and submit required data (e.g., fish species composition, identification, sorting, and weighing information);
- write complete reports and report accurately any observations of suspected violations;
- keep confidential and do not disclose data and observations collected at the first receiver to any persons except NMFS staff and authorized officers or others as specifically authorized by NMFS; and
- be NMFS-certified, according to requirements for certification of catch monitors in the regulations.

3.3 Coverage levels

3.3.1 Coverage Levels of At-Sea Observers

Under the Trawl Rationalization Program those participating in the Shore-based IFQ Program are required to have observer coverage at all times the vessel is fishing in the program and while IFQ species are on board the vessel. Vessels may deliver IFQ species to more than one IFQ first receiver, but must maintain observer coverage until all IFQ species from the trip are offloaded. Observers must document or estimate IFQ species discards. Observers are also required 100 percent of the time in the offshore whiting fisheries. Five companies are certified to provide at-sea observers in the trawl rationalization program: Alaskan Observer, Inc., MRAG America, Inc., NWO, Inc., Saltwater, Inc. and TechSea International, Inc.

3.3.2 Coverage Levels of Catch Monitors

Under the West Coast Groundfish Trawl Catch Share Program, catch monitors are required to be present for 100 percent of all shoreside deliveries of IFQ species in the rationalized fishery. Each IFQ first receiver taking deliveries of IFQ species must have a certified catch monitor present for the entire duration of the IFQ landing. First receivers must contract with one of the five provider companies listed in the previous section.

3.4 Employee Requirements

3.4.1 Employee Requirements of At-Sea Observers and Catch Monitors

To be qualified, observer and catch monitor candidates must have:

- bachelor's degree or higher from an accredited college or university with a major in one of the natural sciences;
- successfully completed a minimum of 30 semester hours or equivalent in applicable biological sciences with extensive use of dichotomous keys in at least one course;
- successfully completed at least one undergraduate course each in math and statistics with a minimum of 5 semester hours total for both;
- computer skills that enable the candidate to work competently with standard database software and computer hardware. (50 CFR 679.50(e))
- a physical examination proven by a signed and dated statement from a licensed physician that he or she has physically examined an observer or observer candidate.
- successfully completed NMFS-approved training as prescribed by the Observer Program.
- not have been decertified as specified in § 660.18(b), or pursuant to 50 CFR 679.50.
- *certification training endorsement*. A certification training endorsement signifies the successful completion of the training course required to obtain observer certification.
- *annual general endorsements*. Each observer must obtain an annual general endorsement to their certification prior to his or her first deployment within any calendar year subsequent to a year in which a certification training endorsement is obtained.
- *deployment endorsements*. Each observer who has completed an initial deployment after certification or annual briefing must receive a deployment endorsement to their certification prior to any subsequent deployments for the remainder of that year.

According to one of the contractors, observer compensation includes \$3,840.00 per month to start, with salary increases based on catch share observer experience, and a top salary of \$4,860.00 per month. Biologists who attend this training are expected to make an initial commitment ranging from 5 to 9 months, depending on both employee preference and the needs in the home port to which an employee is assigned. Following training, both trawl catch share observers and catch monitors are required to relocate to a home port in Washington, Oregon, or California for the duration of their contracts. Possible locations include: Neah Bay and Westport, Washington; Astoria, Newport, Coos Bay, and Brookings, Oregon; and Crescent City, Eureka, Fort Bragg, San Francisco, Halfmoon Bay, and Morro Bay, California. (Alaska Observers, 2011)

3.5 Training

The training for observers and catch monitors is based on the WCGOP training structure. This allows observers from the WCGOP to be eligible to be an observer in the CSOP by attending a briefing on the changes under Catch Share Program²⁰.

3.5.1 Training for At-Sea Observers

The shore-based observer training takes thirteen days and instruction includes data sampling methodology, data recording, species identification, at sea safety, etc.

Successful completion of training by an observer applicant consists of meeting all attendance and conduct standards issued in writing at the start of training; meeting all performance standards issued in writing at the start of training for assignments, tests, and other evaluation tools; and completing all other training requirements established by the Observer Program. A training certification endorsement signifies the successful completion of the training course required to obtain observer certification. This endorsement expires when the observer has not been deployed and performed sampling duties as required by the Observer Program Office for a period of time, specified by the Observer Program, after his or her most recent debriefing. The observer can renew the endorsement by successfully completing training once more.

Each observer must obtain an annual general endorsement to their certification prior to his or her first deployment within any calendar year subsequent to a year in which a training certification endorsement is obtained. To obtain an annual general endorsement, an observer must successfully complete the annual briefing, as specified by the Observer Program. All briefing attendance, performance, and conduct standards required by the Observer Program must be met.

Each observer who has completed an initial deployment after their certification or annual briefing must receive a deployment endorsement to their certification prior to any subsequent deployments for the remainder of that year. An observer may obtain a deployment endorsement by successfully completing all briefing requirements, when applicable. The type of briefing the observer must attend and successfully complete will be specified in writing by the Observer Program during the observer's most recent debriefing.

3.5.2 Training for Catch Monitors

Catcher Monitors are required to undertake the same training program as required for observers. All observers are cross-trained as catch monitors and all catch monitors are cross-trained as observers.

3.6 Deployment logistics

3.6.1 Deployment Logistics of At-Sea Observers

According to observer contractors, observers are generally required to live in the port from which they operate. This also allows observers to be assigned to one boat for a couple of months at a time. Captains are required to meet with observers the day before they leave on a trip in order for the observer to do a safety check of the vessel conditions. Once the observer has checked the boat, the

²⁰ The text in the following sub-sections is paraphrased by Northern Economics, Inc. from NOAA's *Compliance Guide: Pacific Coast Groundfish Trawl Rationalization Program* publication.

captain can notify the observer of an upcoming trip by telling the observer when the boat will leave port and the delivery date for the trip.

An observer provider ensure that each observer:

- has an individually assigned mobile or cell phone, in working order, for all necessary communication. An observer provider may alternatively compensate observers for the use of the observer's personal cell phone or pager for communications made in support of, or necessary for, the observer's duties.
- calls into the NMFS deployment hotline upon departing and arriving into port for each trip to leave the following information: observer name, phone number, vessel departing on, expected trip end date and time.
- remains available to NOAA Office for Law Enforcement and the Observer Program until the conclusion of debriefing.
- receives all necessary transportation, including arrangements and logistics, of observers to the initial location of deployment, to all subsequent vessel assignments during that deployment, and to the debriefing location when a deployment ends for any reason; and
- receives lodging, per diem, and any other services necessary to observers assigned to fishing vessels.
 - An observer under contract may be housed on a vessel to which he or she is assigned prior to their vessel's initial departure from port, for a period not to exceed twenty-four hours following the completion of an offload when the observer has duties and is scheduled to disembark; or for a period not to exceed twenty-four hours following the vessel's arrival in port when the observer is scheduled to disembark.
 - During all periods an observer is housed on a vessel, the observer provider must ensure that the vessel operator or at least one crew member is aboard.
 - Otherwise, each observer between vessels, while still under contract with a permitted observer provider, shall be provided with accommodations in accordance with the contract between the observer and the observer provider. If the observer provider is responsible for providing accommodations under the contract with the observer, the accommodations must be at a licensed hotel, motel, bed and breakfast, or other shoreside accommodations that has an assigned bed for each observer that no other person may be assigned to for the duration of that observer's stay. Additionally, no more than four beds may be in any room housing observers at accommodations meeting the requirements of this section.
- Observer providers may not deploy an observer on the same vessel more than 90 calendar days in a 12-month period, unless otherwise authorized by NMFS.

3.6.2 Deployment Logistics of Catch Monitors

Observers deployed to a shoreside processing facility, must be provided with accommodations at a licensed hotel, motel, bed and breakfast, stationary floating processor, or other shoreside accommodations for the duration of each shoreside assignment or period between vessel or shoreside assignments. Such accommodations must include an assigned bed for each observer and no other person may be assigned that bed for the duration of that observer's stay. Additionally, no more than four beds may be in any room housing observers at accommodations meeting the requirements of this section.

Each observer deployed to shoreside processing facilities must be provided with individually assigned communication equipment in working order, such as a cell phone or pager for notification of upcoming deliveries or other necessary communication. Each observer assigned to a shoreside processing facility located more than 1 mile from the observer's local accommodations shall be provided with motorized transportation that will ensure the observer's arrival at the processing facility in a timely manner such that the observer can complete his or her assigned duties.

3.6.3 Overlapping Deployments of Observers and Catch Monitors

It appears that in many situations the observer and the catch monitor are the same person. This is more likely to be the case in remote locations where only a few vessels operate out of a port. Larger plants that have multiple deliveries per day are more likely to have dedicated catch monitors. The regulations allow for one individual to serve as both an observer and catch monitor provided the following conditions are met:

- The individual meets the qualifications to serve as both an observer and catch monitor and has been certified by NMFS in both capacities, as the qualifications, roles, and responsibilities differ between the two;
- The time allowed for work activities must comply with the following:
 - Observers are not permitted to perform sampling duties for more than 16 consecutive hours in each 24 hour period.
 - Catch monitors are not permitted to work more than 16 hours per calendar day with maximum of 14 hours being work other than the summary and submission of catch monitor data. Following a monitoring shift of more than 10 hours, each catch monitor must be provided with a minimum 6 hours break before they may resume monitoring.

3.7 Contractor Responsibilities

3.7.1 Contractor Responsibilities for At-Sea Observers

Observer providers must be certified by NMFS, and must meet obligations identified in regulation § 660.140(h)(5) for the Shore-based IFQ Program, § 660.150(j)(5) for the MS Coop Program, and § 660.160(g)(5) for the C/P Coop Program.

Generally, the observer providers must:

- provide qualified candidates to serve as observers according to standards in the regulations;
- meet specific requirements in hiring observer candidates identified in the regulation, including a written contract or a written contract addendum signed by the observer and observer provider prior to the observer's deployment, and other specific requirements;
- ensure that observers complete duties identified in the regulation in a timely manner;
- ensure that observers provided to vessels meet certain requirements identified in the regulation, including valid observer certification, endorsements, health standards, and NMFS-required training and briefing;
- respond to industry requests for observers pursuant to the terms of the contractual relationship between the observer provider and the vessel;

- provide observer salaries, benefits, and personnel services in accordance with the terms of each observer's contract;
- provide observer deployment logistical support, as set forth in the rule;
- comply with observer deployment and workload limitations;
- verify that a vessel has a valid USCG safety decal before an observer may get underway aboard the vessel;
- maintain communications with observers, with an employee responsible for observer activities on call 24 hours a day;
- maintain communications with the Observer Program Office, as directed in the regulations and consistent with its requirements;
- replace all lost or damaged gear and equipment issued by NMFS to an observer under contract to that provider;
- maintain confidentiality of certain information, described in the regulation;
- comply with limitations on conflicts of interest;
- develop and maintain a policy that meets the requirements of the regulation, addressing observer conduct and behavior for their employees that serve as observers; and
- observer providers may refuse to deploy an observer on a requesting vessel if the observer provider has determined that the requesting vessel is inadequate or unsafe according to standards identified in the regulation.

3.7.2 Contractor Responsibilities for Catch Monitors

Catch monitor providers must be certified by NMFS and must meet the requirements specified in regulation § 660.17 and 660.18. Specifically, catch monitor provider responsibilities are specified in regulation § 660.17(e), and § 660.18(d).

Generally, the catch monitor providers must:

- provide qualified candidates to serve as catch monitors according to standards in the regulation;
- provide catch monitors a copy of standards of conduct, responsibilities, conflict of interest standards, and drug and alcohol policy;
- provide catch monitors a copy of the written contract, with provisions outlined in the regulations, signed by the catch monitor and the provider;
- ensure that catch monitors provided to first receivers meet certain requirements identified in the regulation, including valid catch monitor certification, health standards, and NMFS-required training and briefing;
- respond to catch monitor requests from industry pursuant to the terms of their contract with the first receiver;
- ensure that catch monitors complete their duties identified in the regulation in a timely manner;

- provide catch monitors' salaries, benefits, and personnel services in accordance with the terms of each catch monitor's contract;
- provide catch monitor assignment logistical support, as set forth in the rule;
- comply with catch monitor assignment and workload limitations;
- maintain communications with catch monitors, with an employee responsible for catch monitor activities on call 24 hours a day
- maintain communications with NMFS' catch monitor program office, as directed in the regulations and consistent with its requirements;
- replace lost or damaged gear and equipment issued by NMFS to a catch monitor under contract to that provider;
- maintain confidentiality of certain information, described in the regulation; and
- comply with limitations on conflicts of interest.

3.8 NMFS Responsibilities

3.8.1 At-Sea Observers

NMFS is responsible for administering the Catch Share Observer program. This responsibility includes equipping, training and debriefing the observers and monitors employed by third party companies. NMFS also collects and processes the observer and monitor data.

3.8.2 Catch Monitors

NMFS is responsible for the catch monitoring plan review process. NMFS must determine whether a catch monitoring plan meets all the requirements specified in the regulations and then issue site licenses. NMFS staff or a NMFS designated inspector must inspect the first receiver's site prior to acceptance of a site license to ensure that the first receiver conforms to the elements addressed in the catch monitoring plan. If NMFS does not accept a catch monitoring plan for any reason, a new or revised catch monitoring plan may be submitted.

3.9 Vessel and Plant Responsibilities

3.9.1 Vessel Responsibilities for At-Sea Observers

Any vessel participating in the Shore-based IFQ Program must carry a NMFS-certified observer during any trip until all fish from that trip have been offloaded. If a vessel delivers fish from an IFQ trip to more than one IFQ first receiver, the observer must remain onboard the vessel during any transit between delivery points. Vessels must meet the following requirements (further specified in regulation § 660.140(h)), as they pertain to observers:

- If an observer is unable to perform his/her duties for any reason, the vessel is required to be in port within 36 hours of the last haul sampled by the observer;
- It is the vessel's responsibility to provide accommodations and food for the observer to the standards in regulation;

- Observers must be allowed access to the vessel's navigation equipment and personnel, on request, to determine the vessel's position;
- Observers must be allowed free and unobstructed access to the vessel's bridge, trawl or working deck, holding bins, sorting areas, cargo hold, and any other space that may be used to hold, process, weigh, or store fish at any time;
- Observers must be notified at least 15 minutes before fish are brought on board to allow sampling the catch.
- Observers must be allowed to inspect and copy any state or Federal logbook maintained voluntarily or as required by regulation.
- Observers must be provided reasonable assistance, as specified in regulation, to enable them to carry out their duties, including but not limited to,
 - measuring decks, codends, and holding bins.
 - providing a designated working area on deck for the observer(s) to collect, sort and store catch samples.
 - collecting samples of catch.
 - collecting and carrying baskets of fish.
 - allowing the observer(s) to collect biological data and samples.
 - providing adequate space for storage of biological samples.
 - providing time between hauls to sample and record all catch.
 - sorting retained and discarded catch into quota pound groupings.
 - stowing all catch from a haul before the next haul is brought aboard.
- Vessel owner must provide an observer sampling station that is to the observer at all times and is free and clear of hazards including, but not limited to, moving fishing gear, stored fishing gear, inclement weather conditions, and open hatches.
- Vessels must hold and display a valid USCG safety decal and must maintain safe conditions on the vessel for the protection of observers according to regulation.
- Vessels may NOT transfer an observer to another vessel at sea.

3.9.2 Plant Responsibilities for Catch Monitors

Under the IFQ program, all first receivers must prepare and operate under a NMFS-accepted catch monitoring plan, and must have a NMFS issued First Receiver Site License. The plans are used by NMFS to ensure accurate catch accounting and by catch monitors to assist in completing their duties. The plan must include descriptions of sorting spaces, how catch is accurately sorted and weighed, methods used to prevent unsorted catch from entering areas beyond the sorting space, scales used for weighing and their locations, delivery points and catch monitor's observing area. If a processor has multiple sites where they receive IFQ fish, each site must have its own First Receiver Site License. Prior to issuance of a site licenses NMFS reviews the plans and performs site inspections.

Once they are in operation, IFQ first receivers must provide reasonable assistance to the catch monitors to enable each catch monitor to carry out his or her duties. Reasonable assistance includes,

but is not limited to, informing the monitor when bycatch species will be weighed and providing a secure place to store equipment and gear.

A catch monitor is required to be present at each IFQ first receiver whenever an IFQ landing is received (offloaded, sorted or weighed), unless a waiver has been granted by NMFS. Owners or managers of each IFQ first receiver must arrange for catch monitor services from a certified catch monitor provider prior to accepting IFQ landings. Catch monitoring requirements for IFQ first receivers are specified in regulation § 660.140(i) and (j).

Generally, IFQ first receivers must:

- adhere to all applicable rules, regulations, or statutes pertaining to safe operation and maintenance of a processing and/or receiving facility;
- ensure that an individual catch monitor does not work more than 16 hours per calendar day, with a maximum of 14 hours being worked (other than for the summary and submission of catch monitor data);
- provide catch monitors with a minimum of 6 hours break following a monitoring shift of more than 10 hours;
- allow catch monitors free and unobstructed access, according to the regulation, to the catch throughout the sorting and weighing process, and to any documentation required by regulation (e.g. fish tickets, scale printouts, scale test results);
- provide a secure, dry, and lockable cabinet or locker with the minimum interior dimensions of two feet wide by two feet tall by two feet deep for the exclusive use the catch monitor and NMFS staff or NMFS-authorized agents;
- designate a plant liaison responsible for orienting new catch monitors to the facility, assisting in the resolution of catch monitoring concerns, and informing NMFS if changes must be made to the catch monitoring plan;
- provide reasonable assistance to the catch monitors to enable each catch monitor to carry out his or her duties, including, but is not limited to: informing the monitor when bycatch species will be weighed, and providing a secure place to store equipment and gear;
- notify catch monitors of the offloading schedule to ensure that they are present for the entire offloading process.

3.10 Interview Summaries

This section provides a synopsis of the comments shared in interviews with West Coast Groundfish Fishery participants. The comments reflect the views expressed and are not necessarily the views or opinions of Northern Economics. It should also be noted that the number persons interview was relatively small and that the opinions express may not be representative of the industry as a whole.

Observer Training

Some feel that the monitors are over-qualified and that they had imagined unemployed former fishermen serving the role. Some also report considerable resentment that the observers are potentially earning more than most of the crew.

Observer Integration

Captains need to meet with observers the day before they leave on a trip in order for the observer to do a safety check of the vessel conditions. Observers are usually assigned to a boat for a couple months which enables the captains to call the observers and let them know when the boat will leave and the delivery date.

The response of captains to having observers on board has ranged from captains integrating their observers into the crew by asking them to participate in basic chores like cooking and cleaning while others ostracize their observers. Similarly, when fish need to be counted, some help the observer sort the haul while others stand back till the observer is finished. Another respondent noted that most observers do not cook and clean. Reportedly some observers made incendiary statements when boarding vessels to the effect that they are there to put the boat out of business contributing to crew-observer animosity. Another noted that observers have a range of attitudes from being helpful to being condescending.

The general protocol while at-sea seems to be to notify the observer when there is a tow. In some cases the observers will not respond and stay in their rooms. In other cases the observers are very quick to respond and will be very efficient at processing the haul so as to help get species that can survive being caught, like halibut, returned to the water quickly.

Observer Costs

Costs to fishing operations include making bunk space and working space for the observer, time and effort spent arranging to meet the observer, time and effort meeting with observers for safety checks, and additional insurance costs.

Observer Cost Effect

The opinion was expressed that the full cost of observers will not be bearable by any fishing operation, and will particularly impact smaller boats. Smaller boats go on shorter trips, so there is a smaller amount of fishing time to cover observer costs. It also was stated that many IFQ holders have already leased out their 2011 quota²¹ instead of participating in the shore-based IFQ groundfish trawl fishery.

One respondent indicated that the full cost of observers (in 2014) will have dramatic effects on the fishery. Smaller boats will need to concentrate their fishing efforts into a few months to ensure that their trips cover the cost of observers. The result is that some ports are likely to become unsustainable because there will not be enough regular, year-round, deliveries to keep processors operating.

Another respondent reported that when the vessels must pay 100 percent of observer costs that there is likely to be rapid consolidation in the fleet to larger vessels. The respondent went on to say that there may even be a push for the council to change limits on how much quota vessels can control in order to make operations economically viable in the face of observer costs.

Observer Program Goals

Some respondents reported that the program's goal is to document how much of which fish are being discarded. Others reported that the goal is to track any ITQ species discards. A third indicated the goal is to have a full accounting of the fish caught.

²¹ Full transfers of quota are prohibited until 2013.

Some said the program is meeting its goal in that discards are being counted but that a number of observers fail to return halibut, fast enough for them to survive.²² Another said the goal of tracking discards is being met, but not in a financially sustainable manner. Another agreed that the catch accounting is effective but the cost will have unintended consequences.

Observer Program Effectiveness

Some feel that since there is no biological data being collected, just weights and sizes, there is no reason to require college education for observers. Others noted that insurance for observers is the largest cost driver, so changing the job requirements will have little effect on the costs. Some suggested that the complexity of the work does warrant a college education.

One respondent noted that with 30 percent coverage there was likely an “observer effect” in that captains were likely to fish differently when there was an observer on board, thus creating a fleet wide underestimate of the bycatch. The 100 percent coverage is likely to have a similar effect on behavior—i.e. fishermen will tend to fish cleaner all the time.

Some reported that the shoreside observer is “a joke” because the only thing they seem to do is copy what the at-sea observer has in his or her logs. Moreover, the respondent believes that the processing plant will not do anything to hide fish for fishermen and that the processing plant information systems have an auditing system that catch monitors do not. As they process fish, if the output of processed product does not match the inputs, they will track down where the discrepancy arose. The respondent felt this was far more effective than anything the shoreside monitor could do. The result is that this respondent has greater confidence in the processor’s computer systems than the catch monitors because the catch monitors have no auditing capabilities.

Observer Program Suggestions

Some have suggested that fishermen have a choice between accepting a standard bycatch rate and bringing an observer or using electronic monitoring. Similarly, spatial bycatch rates could be used. Anything to reduce the cost to the point of affordability is needed.

One respondent suggested that the program was likely taking the model from the days of 30 percent coverage and applying it to the current program, when there are likely opportunities to redesign the program to be more costs effective with 100 percent monitoring. They presented a radical spatial solution, in that vessels could be granted the option to fish without an observer if there were beyond the depth contour, off the beach, where there is little chance of catching bycatch. Also, observers are currently using paper when an electronic system could make entering data more efficient and make the data available in real time.

There was a suggestion to look at the BC fishery system where boats are electronically monitored. Ten percent of the video file is then sampled randomly to see that it matches the fishing log. If there is an appearance of discrepancy, more video is sampled. At some point, if the discrepancies continue, the captain loses the privilege of electronic monitoring and must switch to human observers.

One respondent noted that the fleet is not taking advantage of the free observers to experiment with ways to reduce the costs. Once the fishermen have to pay the costs, they will get more creative about reducing them.

²²All halibut must be returned, and observers are asked to estimate the likelihood that halibut returned to sea will survive. Individuals are constrained by the estimated mortality, rather than the number of halibut caught.

One respondent noted that the repercussions for interfering with observers need to be draconian and swift to maintain confidence in the system. In general most trips are successful and there are just a few “bad apples”.

3.11 Summary of Costs in the West Coast and Catch Share Observer Programs

This section describes observer program costs in the West Coast and Catch Share Observer programs, and provides a very preliminary estimate of observer costs relative to ex-vessel revenues. For participants, the transition to the IFQ program is a major change and there appears to be a tremendous amount of uncertainty as to how the program will work and how best to operate within it. Northern Economics believes fishing patterns under the new program may take a few years to stabilize, and caution should be used when inferring that trends from the first part of the first year of will be the norm in the future.

According to observer contractors interviewed for this project, costs per sea-day for observer coverage in the West Coast Groundfish Observer Program (WCGOP) were approximately \$460 per day prior to implementation of the IFQ program. At that time, coverage was limited to around 20 percent with the goal of collecting scientifically valid data for stock assessment purposes. Observers in the WCGOP served not only onboard trawl vessels, but also onboard fixed gear vessels that were not part of the trawl IFQ program.

With the mandate for 100 percent coverage in the IFQ program, NMFS approved a transition plan that would gradually phase in the requirement that participating vessels and shore-plants pay 100 percent of the observer and monitor costs. In the first year NMFS will cover 90 percent of the expected sea-day costs through reimbursements to vessels and plants. In subsequent years the reimbursement percentage drops—to 50 percent in 2012 and 25 percent in 2013. In 2014 vessels and plants will be expected to pay 100 percent of the observer and monitor costs (Freese, 2011).

One of the difficulties of the transitional reimbursement plan was the determination of a baseline sea-day cost against which the reimbursement would be calculated. In the end, NMFS used \$365 per sea-day, a number which was based on estimates from Alaska’s North Pacific Groundfish Observer Program (Freese, 2011). A summary of the status quo observer costs in Alaska can be found in Section 4.3 of this document beginning on page 68. Based on this estimate NMFS will make the reimbursements shown in Table 14.

Table 14. Transitional Reimbursements of Costs in the West Coast Catch Share Observer Program

Year	Reimbursement Percentage	Maximum Reimbursement (\$/day)
2011	90 percent	328.5
2012	50 percent	182.5
2013	25 percent	91.25
2014	0 percent	0

Note: The maximum reimbursement is based on NMFS assumed rate of \$365 per day.

Interviews with two of the observer providers in the Catch Share Observer Program (CSOP) indicate that they are not able to cover their costs at \$365 per day, while a third provider indicates they expect to be able to cover their costs if the number of fishing days per month remains at levels seen in recent months. One CSOP provider indicated that they are able to provide services and make a reasonable rate of return at \$450 per day, and that they would possibly be able to continue to provide observers at prices as low as \$425 per day as long as there were no other changes in the program.

All of the providers indicate that conversion to the IFQ fishery has created substantial changes in fishing patterns by month and port. In order to optimize hiring and deployment of observers and maintain profitability, contractors must reliably predict activity levels by month at the ports they are servicing. If activity estimates are substantially incorrect then losses may occur. In future years, as fishing patterns stabilize, we expect that contractors will be able to make necessary adjustments to their business models, and continue to provide services at sea-day rates ranging \$365 - \$425.

While it is clear that daily costs for fishermen in the West Coast Catch Share Program increased due to mandatory 100 percent observer coverage, the overall effect on the economic condition of the fleet is after less than a full year in the IFQ fishery is more ambiguous. While we examine preliminary catch and revenue data below, the significant changes in the regulatory and management regime led many fishermen to be extremely cautious at the beginning of the year. Further, because the IFQ program freed fishermen from having to stop fishing for winter crab and shrimp in order to fish their 2-month trip limits, many operators only fished crab and shrimp in the early part of the year and did not start fishing for groundfish until summer. This information is not otherwise reflected in the catch data described below. As a result, year-end data may look substantially different than this mid-year snapshot.

As seen in Table 15, the number of vessels participating in the groundfish trawl fishery from January – June declined by 36 percent from the previous year. At the same time overall landings during the first six months also declined significantly from previous years. However, the pounds per vessel and the revenue per vessels increased substantially, as has the average revenue per pound landed. The reduced numbers of participating vessels may be an indication of consolidation in the fleet, or conversely, it may be an indication that vessels are waiting to fish their quota later in the year. It is also clear that average ex-vessel price across all groundfish has increased substantially. However it is not clear if the increases result from the transition to the IFQ fishery or if they are a result of the global supply and demand issues that may be independent of the management regime of the fishery.²³

Table 15. Participation, Landings & Revenues in the Non-whiting IFQ Fishery, January – June 2006-2011

Year	Vessels	Pounds	Pounds/Vessel	Revenue (\$)	\$/Vessel	\$/lb
2006	109	17,568,749	161,181	10,584,717	97,107	0.60
2007	110	22,131,972	201,200	12,050,122	109,547	0.54
2008	111	27,143,106	244,532	15,523,017	139,847	0.57
2009	113	32,730,148	289,647	16,802,800	148,697	0.51
2010	100	28,001,141	280,011	13,691,384	136,914	0.49
2011	64	19,684,899	307,577	12,213,435	190,835	0.62

Source: Draft Mid-Year IFQ Catch Report for West Coast Groundfish (Mattson, 2011)

Note: Data exclude shore-based landings of whiting.

²³ In 2010 total ex-vessel revenue in the shore-based trawl fishery was \$36.8 million including 9.8 million in shore-based whiting. If whiting are excluded total revenue in the shore-based trawl fishery in 2010 was \$26.9 million. (PacFin, 2011).

Table 17 shows numbers of trips, vessels and revenues in the West Coast Groundfish Trawl IFQ Fishery from January – June 2011 including landings from the shore-based whiting fishery. During the first six months, 773 trips were made by 73 vessels with estimated ex-vessel revenue of \$13.8 million.

Table 16. Trips, Vessels and Revenues in the West Coast IFQ Fishery, January – June 2011

Year	Trips	Vessels	Revenue
Jan - Jun 2011	772	73	\$13,813,435

Source: Data on trips vessels and revenues from Mattson (2011).

Note: Estimates include participation and revenues (\$1.6 million) in the shore-based whiting fishery.

Official data on the number of days per trip are not available; according to estimates provided by one observer provider, trips are lasting from one to five days with an average of three. The same provider reports that catch monitors are paid by the hour (\$45/hour) and each offload takes between two and five hours, with an average of four hours.

In Table 17 we apply estimated observer costs (\$365/sea-day and \$180/offload) to the 772 trips report in the table above, and estimate observer cost relative to ex-vessel revenue. The first section of Table 17 shows observer costs assuming the average trip lengths are between two and four days. If the average trip is 2 days, then at-sea observer costs are \$563,560 and the shore-based catch monitor costs are \$139,960 for a total of \$702,520 or 5.1 percent of ex-vessel revenue. If the average trip in the fishery is four days, the cost of observers and monitors increases to 9.2 percent of ex-vessel revenue. The second section of Table 17 shows estimated observer costs if observer contractors increase their daily fees to \$425 per day for at-sea observers, and increase the average hourly fee for monitors to \$50/hour (\$200 per offload). These increases would bring the cost of the observer and monitoring program up to a low-end estimate of 5.9 percent of ex-vessel revenue, and a high-end estimate of 10.6 percent.

Table 17. Estimated Range Costs of Observers in the West Coast IFQ Fishery, January – June 2011

	Costs @ 2 days/trip		Costs @ 4 days/trip	
	\$	% of Revenue	\$	% of Revenue
Estimated Observer Costs Using the Current Cost Structure—\$365 / day for Observers and \$180 / trip for Catch Monitors				
Estimated At-Sea Observer Costs @ \$365 / day	563,560	4.1	1,127,120	8.2
Estimated Catch Monitor Costs @ \$180 / trip	138,960	1.0	138,960	1.0
Estimated Total Cost of Observers/Monitors @ \$365/\$180	702,520	5.1	1,266,080	9.2
Estimated Observer Costs Using Higher Cost Structure—\$425 / Day for Observers and \$200 / Trip for Catch Monitors				
Estimated At-Sea Observer Costs @ \$425 / day	656,200	4.8	1,312,400	9.5
Estimated Catch Monitor Costs @ \$200 / trip	154,400	1.1	154,400	1.1
Estimated Total Cost of Observers/Monitors @ \$425/\$200	810,600	5.9	1,466,800	10.6

Source: Costs are estimated by Northern Economics, Inc.

Note: The numbers of days per trip are not known, but are believed to range from one to five days. Also note that since that Table 17 uses the number of trips from Table 16 which includes some shore-based whiting trips, the estimated costs relative to ex-vessel revenue may be different than if the whiting trips were excluded.

4 The North Pacific Groundfish Observer Program

This section of the analysis examines the observer program in the groundfish fisheries of Alaska. The North Pacific Groundfish Observer Program (NPGOP) is often regarded as an example of a well run and efficient observer program. The program is largely industry funded with vessels and shore plants paying a daily fee for observer coverage to NMFS-certified observer contractors. In 2010, the average daily rate was estimated at \$323 with an additional \$43 per day in reimbursable travel expenses (NPFMC, 2010a).

Despite its apparent successes, the NPGOP is in the process of a restructuring that will significantly increase the number of vessels and plants that are observed, and will significantly change the funding structure.

4.1 Restructuring the North Pacific Groundfish Observer Program

In October 2010, the North Pacific Fishery Management Council (NPFMC) approved Amendment 86 to their FMPs for groundfish in the Bering Sea and Aleutian Islands (BSAI) and Amendment 76 in the Gulf of Alaska (GOA). These amendments will restructure the NPGOP. Specifically, the amendments:

- 1) Expand observer coverage to smaller groundfish vessels (less than 60') that previously had not been subject to any observer coverage
- 2) Extend coverage to all vessels from 60' – 125' that catch and process their fish on board (i.e., catcher processors or CPs) to 100 percent
- 3) Change the way that observers are funded and deployed on catcher vessels (CVs) that are currently required to carry observers for less than 100 percent of their trips.
- 4) Extend the reach of the NPGOP into the directed fishery for Pacific Halibut²⁴—prior to these amendments, vessels participating in the halibut IFQ fishery were not regularly observed.

Vessels that had been required to carry observers on 100 percent of their trips under the status quo are exempt from the restructuring changes and will continue to operate as they have in the past and will pay for observers through contracted observer providers. The smaller CPs that have extended coverage under the amendments will also pay for their observers through contracted observer providers. All other vessels will be charged a fixed percentage of their ex-vessel revenues from landings of groundfish and halibut to cover the costs of the expanded program. The goals and objectives of the restructured program are summarized in the council's problem statement, summarized below (NPFMC, 2010a).

BSAI Amendment 86/GOA Amendment 76 Problem Statement

The North Pacific Groundfish Observer Program (Observer Program) is widely recognized as a successful and essential program for management of the North Pacific groundfish fisheries. However, the Observer Program faces a number of longstanding problems that result primarily from its current structure. The existing program design is driven by coverage levels based on vessel size that, for the most part, have been established in regulation since 1990 and do not include observer requirements for either the <60' groundfish sector or the

²⁴ Halibut is not considered a "groundfish" under the FMPs, and is managed separately under a treaty agreement with Canada. The NPFMC has management authority in most areas that do not directly involve the setting of guideline harvest levels or annual catch limits.

commercial halibut sector. The quality and utility of observer data suffer because coverage levels and deployment patterns cannot be effectively tailored to respond to current and future management needs and circumstances of individual fisheries. In addition, the existing program does not allow fishery managers to control when and where observers are deployed. This results in potential sources of bias that could jeopardize the statistical reliability of catch and bycatch data. The current program is also one in which many smaller vessels face observer costs that are disproportionately high relative to their gross earnings. Furthermore, the complicated and rigid coverage rules have led to observer availability and coverage compliance problems. The current funding mechanism and program structure do not provide the flexibility to solve many of these problems, nor do they allow the program to effectively respond to evolving and dynamic fisheries management objectives.

Both the status quo and restructured observer program include provisions for observers at onshore processing facilities to which nearly all fish that are not processed by CPs and motherships are delivered. Coverage levels are as follows:

- If a shore plant processes less than 500 metric tons (mt) in a calendar month, they are exempt from coverage
- If the plant process between 500 mt and 1,000 mt of groundfish, they have coverage for 30 percent of the days they receive or process groundfish
- If they process more than 1,000 mt in a calendar month, they have observer coverage for 100 percent of the days they receive or process groundfish

Under the status quo, at-sea observer costs (excluding training) have been paid by the vessels and processing plants on which the observers are deployed. Vessel and plant owners, often working through owner associations or cooperatives, contract with NMFS certified observer providers and pay for observers based on a daily rate. Owners also pay a prorated portion of the travel expenses incurred in getting the observer to the port at which they are based. It should be noted that in general, observed vessels and plants pay approximately the same daily rate, and that observers will often work both at-sea and at shore plants during the same cruise.²⁵ There are currently three observer providers operating in the North Pacific, Alaska Observers Incorporated (AOI), Saltwater Inc. and MRAG Americas (MRAG). While all three companies have slightly different rates, the daily fees charged by each are close to each other. According to a 2010 survey by NMFS conducted in association with the restructuring amendments, the average daily fee was \$323 and the average prorated travel cost was \$43 per day²⁶ or a total of \$366 per deployed day. As in other areas, NMFS reimburses providers for the cost of training.

Under the restructured program, several classes of groundfish vessels and processors will carry observers on 100 percent of their trips. These vessels will continue to use the daily fee system through direct contracts with observer providers. The classes of vessels and processors that will pay the daily fee are listed below:

- 1) All CPs operating as part of the American Fisheries Act (AFA) cooperative for CPs in the BSAI Pollock fishery. These 17 vessels are required to carry two observers at all times.

²⁵ The term “cruise” is used in this section and in the NPGOP as the period over which an observer is out in the field working. Typically a cruise lasts for around two months, but may be longer or shorter depending on circumstances. At the end of each cruise the observer is debriefed by NPGOP staff. After the observer is debriefed

²⁶ The \$43 is derived by amortizing the average cost of airfare, excess baggage fee, lodging and travel per diem over the 56-day average that observers were on assignment in Alaska. In 2008 these costs were estimated at \$2,409.

- 2) All trawl CPs operating in non-Pollock fisheries in the BSAI or in the GOA. With a few exceptions these vessels are generally required to carry two observers at all times when fishing in the BSAI, and one at all times in the GOA. There were 22 of these vessels in 2008. A few of these vessels are < 125' and they will see their coverage level increase from 30 percent to 100 percent
- 3) All fixed gear CPs operating either in the BSAI or the GOA are required to carry one observer at all times. There were 42 of these vessels in 2008. If the vessel is between 60' and 125', coverage was limited to 30 percent coverage before restructuring.
- 4) Motherships that take delivery of unsorted codends of trawl vessels. These vessels (three in 2008) operate only in the BSAI Pollock fishery and must carry two observers at all times. The trawl CVs that deliver unsorted codends to these motherships are not required to carry observers.
- 5) Trawl CVs that participate in shore-based cooperatives sanctioned under the AFA in the BSAI Pollock fishery must carry an observer at all times. The 94 vessels that participated in 2008 were generally greater than 125'.
- 6) Any other CVs greater than 125', regardless of gear used, would be required to carry an observer at all times. In 2008 there were no vessels in this category.
- 7) All shore-based processors that participate in the BSAI Pollock Fishery under the AFA will have 100 percent coverage (with two observers working 12 hours per day) and will pay the daily fee for observers through contracted providers. There are currently seven AFA shore plants.

Under the restructured observer program, all non-AFA shore plants that process or receive groundfish or halibut will be assigned coverage by NMFS through the NPGOP. All other vessels not included in the groups listed above will also be assigned observers at coverage levels determined by the NPGOP. Coverage will be paid through an ex-vessel fee charged on all landings of groundfish and halibut regardless of whether observers were present on the vessel or at the plant. The NPFMC has set the overall ex-vessel fee percentage at 1.25 percent. This fee will be split evenly between harvester and processors. Processors will withhold the harvester's share of the fee (0.625 percent) from the ex-vessel payments, and then match that share so the total comes to 1.25 percent.

The NPFMC October 2010 newsletter (NPFMC, 2010b) summarizes the Council's reasoning for choosing the fixed percentage fee, and also discusses the potential increases in coverage levels for the smaller vessels and processors that would be affected by the restructured program:

The Council recommended restructuring the program such that NMFS would contract directly with observer companies to deploy observers according to a scientifically valid sampling and deployment plan, and industry would pay a fee equal to 1.25% of the ex-vessel value of the landings included under the program. (The Magnuson Stevens Act authorizes collection of an ex-vessel fee of up to 2%.) As all sectors benefit from the resulting data, the Council chose to apply the same fee percentage to all restructured sectors, in order to develop a fee program that is fair and equitable across all sectors in the restructured program.

The Council emphasized that under the status quo, NMFS cannot determine when and where to deploy observers. In the sectors with less than 100% coverage requirements, coverage levels are fixed in regulation, and data gaps exist for sectors without any coverage. The restructured program is intended to provide NMFS with the flexibility to deploy observers in response to fishery management needs and to reduce the bias inherent in the existing program, to the benefit of the resulting data.

The NPFMC's EA/RIR/IRFA²⁷ (NPFMC, 2010a) provides an articulate summary of the advantages and disadvantages of the fixed percentage ex-vessel fees.

Advantages of an ex-vessel value fee include:

- *Equity. An ex-vessel value fee is perhaps the most equitable method of funding observer coverage because it is based on the benefits received from the fishery.*
- *Broad-based approach. An ex-vessel value fee is the simplest to apply on a universal basis to all participants in the restructured observer program.*
- *Predictability. A fee that is withheld at the time of landing is likely easier for fishermen in terms of the ability to predict costs, and it would only require processors set aside sufficient funds to pay NMFS for coverage fees since harvesters pay at the time of landings.*

Disadvantages of an ex-vessel value fee include:

- *Fee revenues are not directly linked to coverage costs. Because the fee revenues would not be directly related to observer coverage costs, it is highly likely that the program would experience revenue shortfalls or surpluses relative to the amount of observer coverage desired.*
- *Data limitations. Data that are currently available would require past years' ex-vessel prices to be applied to current year's catch. Using past prices would result in a different fee estimate than using actual revenue. Data limitations also preclude estimating seasonal standardized prices within a year. Depending on when a person harvests the fish, the difference between their actual ex-vessel revenue and the estimated revenue the fee was based upon will vary.*
- *Fee percentages could not be adjusted quickly. The fees would be established in regulation, and could only be changed through regulatory amendment. Reductions in harvest/TAC or prices could result in lower revenue for observers than projected.*

4.2 Participation and Revenues in the Alaska Groundfish Fisheries

This section contains a brief overview of the participation and revenues in the Alaska groundfish fishery with the goal of providing context in which to view the NPGOP.

While the BSAI pollock fishery is by far the biggest volume and revenue generator in the North Pacific, BSAI fisheries for Pacific cod, flatfish and Atka mackerel also generate hundreds of millions of dollars in ex-vessel and product revenues. These fisheries are all dominated by large trawl CVs and even larger trawl and fixed gear CPs—the latter catch and process over 50 percent of the Pacific Cod harvested in the BSAI. CPs and all of the large trawl CVs that deliver to shore plants are required to carry at least one observer at all times and most of the trawl CPs are required to have two observers. The major shore plants that buy from the large trawl CVs all have at least one observer present whenever they are taking deliveries.

In the GOA it is a much different picture. While a many of the smaller fixed gear and trawl CPs work in the GOA, they are not nearly as significant in terms of harvests and revenues. Several of the large AFA trawlers also fish occasionally in the GOA, but most of the trawl harvests in the GOA are made by vessels that are between 60' - 125' and most will only have 30 percent observer coverage. Most of the

²⁷ Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis.

shore plants that buy and process GOA harvests are also limited to 30 percent coverage.²⁸ In terms of the number of vessels in the GOA, the largest group is by far the fixed-gear CVs. These vessels primarily target Pacific cod with hook gear (longline or jigs) or pots, and they also harvest the majority of the highly valued sablefish (black cod). Most also participate in the IFQ halibut fishery. Table 18 provides a summary of the CVs and CPs in the GOA and BSAI. In 2009 a total of 867 vessels participated in the groundfish fishery, 82 of which (9.4 percent) were CPs. Under the status quo, almost all CPs are required to carry observers 100 of the time. The table also shows the disproportionate levels of participation in the BSAI and GOA. In 2009, just 32 percent of the vessels participated in the BSAI while the remaining 68 percent only fished in the GOA.

Table 18. Number of Vessels that Caught Groundfish off Alaska by Area, Vessel Category and Gear, 2008-09

Gear	Year	Gulf of Alaska			Bering Sea & Aleutians			All Areas		
		CVs	CPs	All	CVs	CPs	All	CVs	CPs	All
All gear	2008	704	37	741	214	84	298	837	86	923
	2009	660	42	702	194	79	273	785	82	867
Hook and Line	2008	522	22	544	46	40	86	546	41	587
	2009	510	22	532	38	41	79	527	43	570
Pot	2008	144	1	145	57	6	63	175	7	182
	2009	123	2	125	43	4	47	152	5	157
Trawl	2008	73	14	87	109	40	149	150	41	191
	2009	71	18	89	110	36	146	148	37	185

Source: (Hiatt et al., 2010)

Table 19 summarizes the lengths of all vessels that harvested groundfish (CVs and CPs combined) in the Alaska groundfish fishery by the gear they used. Since many of the vessels use multiple gears, summing the vessels across gear groups will result in double counting. In 2009, 464 of the 527 hook and line gear vessels were less than 60' and were exempt from observer coverage. Similarly, 106 boats that used pot gear and 27 vessels that trawled were not subject to observer coverage.

Table 19. Vessel Lengths (CVs and CPs Combined) in the Alaska Groundfish Fishery by Area and Gear, 2008-09

Gear	Year	Gulf of Alaska			Bering Sea and Aleutians			All Areas		
		<60'	60' – 124'	125'+	<60'	60' – 124'	125'+	<60'	60' – 124'	125'+
Hook and Line	2008	463	59	0	42	4	0	486	60	0
	2009	450	60	0	31	7	0	464	63	0
Pot	2008	108	32	4	18	37	10	115	58	10
	2009	98	25	0	19	24	8	106	45	8
Trawl	2008	27	44	2	5	77	27	27	96	27
	2009	27	44	0	7	76	27	27	94	27

Source: (Hiatt et al., 2010)

Table 20 demonstrates that while the larger CVs are very productive, over 20 percent of the total ex-vessel revenue in the Alaska groundfish fisheries is generated by vessels that do not carry observers—in 2009 vessels <60' had \$66 million in ex-vessel revenue, 90 percent of which came from the GOA.

²⁸ The shore plants in King Cove and Sand Point in the Western Gulf are the two exceptions to this statement. Both of these plants are involved in the BSAI pollock fishery under the AFA and therefore are required to have two observers every day. This requirement will continue in the restructured program except during periods when they are not taking deliveries of the BSAI pollock.

Table 20. Catcher Vessel Ex-Vessel Revenues from Groundfish off Alaska by Area, Vessel Length and Gear, 2008-09

Vessel Length Gear	Year	Gulf of Alaska			Bering Sea & Aleutians				All Areas				All
		<60'	60' – 124'	125'+	<60'	60' – 125'	125'+	MS CVs	<60'	60' – 125'	125'+	MS CVs	
Ex-Vessel Revenue in \$ Millions													
All Gears	2008	83.6	68.5	0	9.9	108	127.1	52.5	93.5	176.5	127.1	52.5	449.6
	2009	60.6	44.5	0	5.4	60.1	72.2	76.5	66.0	104.7	72.2	76.5	319.4
Fixed Gear	2008	71.5	30.4	0	9.2	15.4	3.1	0	80.7	45.8	3.1	0	129.6
	2009	55.5	22.0	0	5.0	7.4	1.8	0	60.5	29.4	1.6	0	91.7
Trawl	2008	12.1	38.1	0	0.7	92.6	124.1	52.5	12.8	130.7	124.1	52.5	320.1
	2009	5.1	22.5	0	0.4	52.8	70.6	76.5	5.5	75.3	70.6	76.5	227.9

Note: MS CVs are trawl vessels generally between 75' - 125' that deliver harvests to at-sea motherships.

Source: (Hiatt et al., 2010)

Table 21 demonstrates the additional value that is generated by the processing of groundfish harvests in Alaska. In 2009, ex-vessel harvests were estimated at \$627 million, while wholesale values were approximately \$1.7 billion. Looking at wholesale values helps to put observer costs for CPs, motherships, and shore plants in perspective. For example, if CPs were estimated to have had \$10 million in observer costs in 2009, it would equate to 3.2 percent of their ex-vessel revenue, but just 1.1 percent of their wholesale revenue.

Table 21. Ex-Vessel and First Wholesale Value of Alaska Groundfish Harvests by Processing Mode, 2008-09

Year	Gulf of Alaska			Bering Sea & Aleutians				All Areas			
	Shore Plants	CPs	All	Shore Plants	MS	CPs	All	Shore Plants	MS	CPs	All
Ex-vessel Value of Harvests and Deliveries in \$ Millions (Values are Imputed for Catcher Processors)											
2008	144.4	24.1	168.5	252.6	52.5	471.1	776.2	397.1	52.5	495.1	944.7
2009	114.2	20.8	134.9	128.7	76.5	287.2	492.3	242.8	76.5	307.9	627.2
First Wholesale Value of Groundfish Products in \$ Millions											
2008	256.2	47.7	303.9	641.4	126.6	1,219.8	1,987.8	897.6	126.6	1,267.5	2,291.6
2009	190.2	41.1	231.3	497.9	88.6	892.5	1,479.0	688.1	88.6	933.6	1,710.3

Source: (Hiatt et al., 2010)

As will be discussed in more detail in the sections that follow, the industry funded costs of the NPGOP in 2008 were estimated at \$14.4 million (NPFMC, 2010a). This is about 1.5 percent of the ex-vessel revenue generated in the groundfish fishery. If, however, it is acknowledged that the majority of observer days occur on CPs and at onshore plants, it may be more relevant to compare the cost of the observer program to the estimated first wholesale value of groundfish products. From this perspective, the cost of observers is 0.6 percent of the total product value generated in the fishery.

4.3 Alaska Observer Costs under the Status Quo

Table 22 summarizes observer coverage in the North Pacific groundfish and halibut fisheries in 2008. The table is reproduced from the NPFMC Observer Restructuring Document (NPFMC, 2010a). It should be noted, however, that observer costs in that document were estimates from a survey of observer providers—actual costs were unknown because they were transactions between private parties and not captured in official data. The daily rate of \$366/day is used—this rate includes

reimbursable expenses which average out to \$43 per observed day and the combined rate for the observer and provider overhead at \$323/day. While these rates vary somewhat across providers, they are believed to be reasonably accurate.

The table shows a break-down of coverage by the class of vessel and plant. Overall, observer coverage was estimated to have cost \$14 million in 2008 for 39,338 days of coverage, including coverage at shore based processing facilities.

There are two groups of vessels and facilities highlighted in the table, those with 100 percent or more coverage, and those with 30 percent coverage. The groups are defined on the basis of coverage levels during various activities and thus are not always exclusive. For example, the AFA trawl CVs < 125' are listed in row 3 of the first section of the table and in row 2 of the second section. An AFA Trawl CV that is <125' is subject to 100 percent coverage when fishing for pollock in the BSAI, but when they fish for other targets they are subject only to 30 percent coverage.

Table 22. Summary of Status Quo Observer Coverage in the North Pacific (2008)

Class of Vessel or Plant	Vessels / Plants	Observed Days		Estimated Cost	
		Count	% of Total	Cost (\$)	% of Total
Vessels and Processors with 100 Percent or More Coverage					
1. Non-Specified Trawl CPs >=60'	24	12,949	33%	4,739,334	33%
2. Non-Specified Fixed Gear CPs >= 60'	43	6,507	17%	2,381,562	17%
3. AFA CPs	17	4,224	11%	1,545,984	11%
4. Motherships (AFA and Non-AFA)	11	781	2%	285,846	2%
Subtotal: CPs & Motherships (Some CPs act as Motherships)	87	24,461	62%	8,952,726	62%
5. Catcher Vessels >= 60' trawl AFA (BS Pollock Targets)	82	5,098	13%	1,865,868	13%
6. Shore-based/Floating processors (AFA)	7	2,828	7%	1,035,048	7%
Subtotal: Vessels & Processors with 100% or more coverage	N/A	32,387	82%	11,853,642	82%
Vessels and Processors with 30 Percent Coverage					
1. Shore-based/Floating processors (non-AFA)	24	2,062	5%	754,692	5%
2. Catcher Vessels >= 60' trawl AFA (Non-Pollock Targets)	84	2,018	5%	738,588	5%
3. Catcher Vessels >= 60' trawl non-AFA	40	1,071	3%	391,986	3%
4. Catcher Vessels >= 60' Fixed gear	138	534	1%	195,444	1%
5. Sablefish CPs >= 60'	18	411	1%	150,426	1%
6. Sablefish IFQ CVs >= 60'	51	379	1%	138,714	1%
7. Catcher Vessels in GOA Rockfish Pilot Program	26	311	1%	113,826	1%
8. Halibut IFQ CPs	7	123	0%	44,870	0%
9. Halibut IFQ CVs	1,351	42	0%	15,372	0%
Subtotal: Vessels and Processors with 30% Coverage	N/A	6,951	18%	2,543,918	18%
All Vessels and Processors with Coverage	N/A	39,338	100%	14,397,560	100%

Note: Classes are non-exclusive—summing the number of vessels & processors will result in double counting.

Source: (NPFMC, 2010a)

If we focus just on the vessels and plants with 100 percent coverage, we see that \$8.95 million of coverage costs (62 percent) were attributed to CPs and motherships. An additional 20 percent of the total was attributed to AFA CVs and shore plants with 100 percent coverage. Altogether, 82 percent (\$11.85 million) of the \$14.40 million total cost in 2008 was derived from vessels or plants with 100 percent or higher coverage.

Deployments to CPs and motherships are generally very long—trips generally last from two to four weeks or longer, and the observer will be on board the entire trip barring unforeseen circumstances. It is entirely possible that an observer will be assigned to a single CPs for their entire “cruise”—the term used in the North Pacific for the period of time the observer spends “in the field” either on assignment or waiting at port to be redeployed. From a cost perspective, observer providers spend less

time and money per observer the longer the deployment—the only costs to the provider for additional days-at-sea are wages, benefits, insurance and perhaps some meal per diem. Similarly, observer days at shore plants with 100 percent coverage will also be relatively low-cost days for the observer provider because the observer will be working many days in a row at a single plant with little or no involvement from the observer provider. It should also be noted that insurance costs for observers working at shore plants are lower than those for observers working at sea.

Finally, observer days on AFA Trawl vessels are also likely to be relatively low-cost days from the contractor's perspective. This is because the AFA trawl vessels are relatively large vessels that all work within cooperatives and schedule their trips on a relatively regular and reliable rotation. The vessels will be at sea for two to four days, will return to port, and stay for a day or possibly two and then head back out to sea. According to at one provider, the observer will often sleep and eat onboard the vessel during the day(s) at port. It should be noted that in most cases, the observer provider will pay the observer wages and benefits for the days in port, even though the day is not being charged to a vessel. For this reason, costs to the provider for CV observers may be higher than costs for plant observers or CP observers. Still, because of the regularity and consistency of the trips, the costs of providing observers to 100 percent CVs, such as the AFA trawlers, are relatively low when compared to cost of providing observers to 30 percent vessels and shore plants.

Because of the relatively low cost of 82 percent of the observed days, it is likely that the costs of the remaining 18 percent of the observed days come at a relatively high cost. According to interviews with observer contractors that provide services to more expensive portions of the fleet, providers have several choices, all of which may be occurring in the status quo:

- 1) They can charge the same rate for these vessels but make lower profit margins in order to remain competitive.
- 2) They can subsidize the overhead costs for these relatively expensive vessels/facilities with profits from more profitable vessels/facilities within the same contract.
- 3) They can charge more than the reported average cost per day.
- 4) They can contract only with more profitable vessels and facilities to keep profit margins relatively high, but still charge lower sea-day rates than the average provider.

4.4 Alaska Observer Costs for Coverage under the Restructured Program

In the analysis of the restructured observer program, agency staff estimated the daily observer costs they believed were likely to prevail for vessels covered by the program. The daily rate used in the analysis for estimating costs under the restructured program was \$467 per observer day—an increase of \$101/day over the daily fee rate estimated under the status quo. The higher costs were attributed to the assumption that in the restructured program the observer contracts would be administered by federal agencies and that pay for observers would be governed by the Fair Labor Standards Act and the Service Contract Act. Under these regulations, observers would be paid on an hourly basis at standard rates with overtime pay. The rates estimated in the analysis assumed that observers would work 12 hours per day, 7 days per week with an average base rate before benefits and taxes of \$16.20/hour and an average overtime rate of \$24.30/hour. The analysis also added a hourly premium for holiday and vacation benefits based on the assumption that observers would receive paid holiday and vacation benefits at a rate of 20 days per year—the \$1.24 premium is added to hours worked at base rates, but is not applied to overtime hours. Finally, the rate assumes that costs of health and welfare taxes (e.g., unemployment insurance and medicare) would come to a fixed rate of \$3.50 per hour. Using these assumptions, the estimated average daily wages, benefits and employer paid taxes

comes to \$272.35 per day. A survey of observer providers in Alaska found that on average, observer contractors paid an average of \$171.00 per day in wages, benefits and taxes—a difference of \$101.35 from the rate calculated using FLSA and SCA rules.

The agency analysts implicitly assume that each “cruise” would comprise 56 days,²⁹ and that there would be one travel day and one day in port during each cruise. Miscellaneous travel and port costs (airfare,³⁰ excess baggage, ground transportation, and lodging and meals) totaling \$2,409 were amortized over all 56 days of the cruise, adding an additional \$42.72. This is the same amount found in the survey of contractors referenced above.

The analysts then assume that contractor overhead would remain the same as in the status quo i.e. with the current \$366 average rate that includes travel. Given that the survey of contractors found average wage, benefit, and tax amounts of \$171 per deployed day, and miscellaneous travel expenses that averaged \$43 per deployed day, it was calculated that on average, observer contractors received \$152 per deployed day to cover overhead and profits—i.e. \$366/day – \$171 in wages – \$43 in travel = \$152 for overhead and profit. Over a 56 day cruise with 54 days in which the observer is deployed, the overhead and profit going to the contractor comes to \$8,208 per cruise.

The various components were then added together to arrive at the new rate per deployed day under the restructured program. The calculation of these rates is shown in Table 23. The new rate as calculated is \$467.07 per deployed day. Over the course of a 56-day cruise with 54 deployed days per cruise, the total cost the cruise comes to \$25,221.97.

Table 23. Calculation of Assumed Daily Rate for Restructured Portions of the NPGOP

Wages and benefits @ 16.20/hour with time and a half for overtime, 16 days per year of paid holiday & vacation, and Medicare and unemployment payments:	\$ 272.35
Travel and port costs amortized over 56 days (round trip airfare, baggage, ground transport, food and lodging during travel):	\$ 42.72
Observer contractor overhead and profits:	+ \$ 152.00
Total estimated daily fee used in the NPGOP Restructuring Analysis	\$ 467.07

Source: Developed by Northern Economics, Inc. from data in the Observer Restructuring Analysis (NPFMC, 2010a).

After a careful analysis of the calculation of this rate and in-depth discussions with observer contractors and staff of the NPFMC and NPGOP, NORTHERN ECONOMICS believes the calculated rate (\$467.07) is likely to underestimate the eventual daily rate that NMFS will need to pay for coverage of vessels and shore plants in the restructured portion of the NPGOP. The following numbered list summarizes what we believe are appropriate additions and revisions in the calculation of the rate:

- 1) We believe that the observers would be paid for eight hours per day at standard hourly rates during the two initial travel and port days. The calculation of rates in the document does not include pay for these travel days. At \$19.70/hour (the standard hourly rate of \$16.20 plus the

²⁹ The analysts do not explicitly state that they assume each cruise will be 56 days, but the results of their calculations do rely on the assumption that the length of an average cruise is fact 56 days.

³⁰ Airfare was based on “typical” round trip charges from Seattle to Dutch Harbor at \$1,957.

assumed \$3.50 hourly rate for employer-paid taxes) these 16 hours would add \$315.14 per cruise.³¹

- 2) Because of the inefficiencies of deployments to vessels and plants that have less than 100 percent coverage, we believe that, during a standard cruise, observers would have several more “port” days during which they are not deployed. For expository purposes, we assume there will be 16 additional hours paid to observers during these additional port days. At the standard hourly rate, this would add another \$315.14 per cruise.
- 3) Again, because of the inefficiencies of the system, we assume that there will be more movement of observers between ports within Alaska during each cruise. Because there are few direct flights between ports and travel is nearly always routed through Anchorage, we assume for expository purposes there will be two additional travel days and total costs (airfare + other costs) will come to $\$800 \times 2$ or \$1,600.
- 4) We also assume that the observers will not be deployed on the additional travel days in item 3 above, but will be paid for eight hours at standard hourly rates for both of days (\$315.14).
- 5) The the original analysis did not adjust assumptions regarding contractor overhead costs under the re-structured program. We believe the additional logistics required of the observer contractors to deploy observers among additional vessels, and to move them between ports will increase their overhead costs. For example, contractor-paid lodging and meal costs are likely to increase. For expository purposes, we assume these costs will increase by 10 percent over each cruise. As stated above, the survey of observer providers indicated that overhead and profits comprised \$8,208 ($\$154 \text{ OHP/day} \times 54 \text{ deployed days/cruise} = \$8,208/\text{cruise}$). A 10 percent increase in contractor overhead will add \$820.80 per cruise.
- 6) Because of increased numbers of port and travel days per cruise, we believe the overall length of the average cruise will need to increase. For simplicity we assume the average length of each cruise will increase by such that the number of observed days per cruise (54 observed days) remains unchanged.

Table 24 below compiles all of these additional or revised assumptions and estimates a revised daily rate for 30 percent coverage under the restructured NPGOP. The additional assumptions add a total of \$3,366.22 to the cost of a cruise that results in 54 observed days. This will increase the daily fee per observed day to \$529.41, an increase of 13 percent over the \$467 estimated in the Restructuring Analysis. One of the more critical revisions of the six described above, is the assumption that the overall length of a cruise increases to accommodate the additional port and travel days. If the length of a cruise was instead assumed to have remained at 56 days, the number of observed days per cruise would drop, and the costs per observed day would have increased.

³¹ It may be reasonable to assume two additional paid days of travel at the end of each cruise. We have not included these additional days because some observers are likely to be based in Alaska and will lower than average travel costs.

Table 24. Northern Economics’ Revisions in the Calculation of the Daily Rate for Coverage under the Restructured NPGOP

1) Observer wages and benefits for initial travel and port days (2 days @ 8 hrs / day)	\$ 315.14
2) Observer wages and benefits for port days (16 hrs)	\$ 315.14
3) Additional intra-Alaska travel (2 trips @ \$800 per trip, each trip requires 1 day)	\$ 1,600.00
4) Observer wages and benefits for additional travel days (2 days @ 8 hrs / day)	\$ 315.14
5) Increased contractor overhead per 56 day cruise	+ \$ 820.80
Sub-total: Increased cost per cruise	\$ 3,366.22
Original cost per cruise	+ \$ 25,221.97
Sub-total: Revised Cost per cruise	\$ 28,588.19
Revised Estimate of Daily Fee Applicable to the 30 Percent Coverage after Restructuring	\$ 529.41

Source: Estimated by Northern Economics, Inc.

4.5 Fairness and Equity in the North Pacific Groundfish Observer Program

NPFMC and NMFS staff indicate that the issue of fairness and equity played a significant role in the decision making process with respect to the restructuring of the observer program (Kimball, 2011; Queirolo, 2011). Alternatives that contemplated a daily fee that would be paid by small vessels when an observer was on board were essentially “non-starters” according to Kimball. The council and the industry recognized that it would be nearly impossible to come up with a sampling regime that allowed NMFS to place observers where they were needed and at the same time was equitable to all of the small vessels. It was also recognized that there were significant differences in the revenue that different vessels could earn per day. Vessels in the lucrative IFQ fisheries for sablefish and halibut could probably afford the cost of observers, but because of generally low bycatch and discard rates in those fisheries the need for observer coverage was less apparent. On the other hand, participants in the jig fisheries for Pacific cod earn significantly less revenue per day, but NMFS may have greater observer requirements from a regulatory perspective. The percentage system that was ultimately approved by the council recognized that that some participants would pay more than other participants, but that those that paid more, were also likely to earn more and benefit more from the fishery.

The NPFMC also made it clear that they intended for both harvesters and processors to contribute to the cost of the restructured program—half of the 1.25 percent fee was to be deducted from the vessels ex-vessel revenue by the processor, and the other half was to be paid by the processor themselves. It was recognized that processors will have the ability to pass on some of the costs that they are supposed to bear back onto the harvesters - and even to consumers to a certain extent. But according Queirolo (2011), issues of price elasticity and relatively market power made it clear that at least some of the costs of observers would be borne by the processors.

4.6 Conclusions Regarding Observer Costs in the North Pacific Groundfish Observer Program

Our analysis of the costs of observers in the North Pacific leads to the conclusion that the costs that have been experienced in the daily fee system under the status quo are not representative of the costs that are likely to be experienced in a system that has shorter and less frequent trips. The costs currently experienced in the North Pacific are substantially skewed by the efficiencies that are gained from:

- 1) Deployment of observers on catcher processors trips lasting several weeks;
- 2) Deployment of observers at shore plants for long period of time; and
- 3) Deployment of observers on highly organized and regularly schedule trips by AFA CVs.

The efficiencies are unlikely to be matched in programs that have shorter, less frequent, more irregular deployments. In addition, if future contract are regulated by the FSLA and SCA, then wages and benefits of observers are estimated to increase by approximately \$100 during deployed sea-days.

5 Comparisons of Observer Programs across Regions

5.1 The Current Program in the North Pacific Groundfish Fisheries

Fishery and Coverage Level Summary

The current observer program in the North Pacific is characterized by high levels of coverage on vessels and processors that operate in the relatively lucrative fisheries of the BSAI. In 2008 the program had 39,338 observer days, 82 percent of which were on CPs and motherships, or shore plants and CVs operating the BSAI pollock fisheries. CPs and motherships, which in most cases are required to have 2 observers for 100 percent of their trips, have observer deployments that last for several weeks at a time. BSAI pollock shore plants and CVs have 100 percent coverage, and are very well organized as members of cooperatives and stable fishing patterns. The long deployments and high levels of organization and cooperation mean there are very few “land days” for observers, and thus observer costs are generally quite low.

The remaining 18 percent of observer coverage days take place on smaller vessels (60’ – 125’) and shore plants. Observers for these vessels and shore plants is supposed be at 30 percent of operating days in each of their major target fisheries by quarter, although vessels and plants are allowed to schedule the days on which observer coverage takes place.

Fee Basis and Contracts

Observer providers are certified by the NPGOP, and have contracts with individual owners who pay fees for the number of sea days of coverage. Training is provided by the NPGOP at no charge, but providers pay their trainees for their time in training and any travel or per diem costs.

Cost per Sea-day

Because of the factors described above, observer costs in the NPGOP are relatively low: average cost per sea-day in 2008 was \$323 + reimbursable travel costs, which averaged \$43 when amortized over observed days. Total costs for sea-day coverage in the NPGOP were estimated at \$14.4 million in 2008, which equated to about 1.5 percent of estimated ex-vessel value in groundfish fisheries.

5.2 The Restructured Program in the North Pacific Groundfish Fisheries

Fishery and Coverage Level Summary

In 2010 the NPFMC approved Amendments that will restructure the observer program. All vessels and plants that currently have 100 percent or more coverage will continue in the same basic system that currently exists. In addition some smaller CPs, which did not have 100 percent coverage in the past, will now be required to carry observers 100 percent of the time.

All other vessels and shore plants including vessels less than 60’ that had previously been excluded from coverage will operate under the “restructured program.” The restructured program will also be expanded to cover the longline IFQ fishery for Pacific Halibut which until now has been exempt from coverage.

Under the restructured program NPGOP will have the ability to assign observers to specific fisheries when and where they wish depending on data needs. They will be constrained only by the amount of available funding (see Fee Basis and Contracts below).

Fee Basis and Contracts

Funding for the restructured portion of the NPGOP will come from fees of 0.625 percent of ex-vessel value in groundfish and halibut fisheries. The fees will be paid by all vessels that are part of the restructured program and will be matched (at 0.625 percent) by all processors, plants, and buyers to whom the covered vessels deliver and sell their fish. Because of the match, the costs of the restructured portion to fishers and processors of the NPGOP will be equal to 1.25 percent of ex-vessel value of the participants.

Observers in the restructured portion of the program are expected to be provided by observer contractors through direct contract with NPGOP. Because this will be a federal contract, providers will be expected to provide pay and benefits to observers in line with the FLSA and SCA. The federal contracting requirements are expected to add approximately \$100 to the sea day cost of observers.

Cost per Sea-Day

As mentioned above the federal contract requirements are expected to add approximately \$100 to the sea day cost of observers. NPGOP estimated the cost of observer in the restructured program to be \$467 per day. This was calculated by taking the current average charges (\$323 + \$43 for travel) and adding \$100 to account for additional wages and benefits to observers under federal contract rules.

Northern Economics believes that \$467/day, including travel, under-estimates the eventual costs per day in the restructured program because the calculations do not take into account the probability that the number of “land days” relative to the number of sea-days will increase. In the restructured program, trip lengths and deployments will be measured in terms of days rather than weeks. The shorter trip-lengths and shorter deployments make it unlikely that an observer will be actively working seven days per week for eight straight weeks, as is assumed in the cost calculations.

Fairness and Equity

Fairness and equity was apparently a key factor in the decision by the NPFMC to adopt the percentage fee schedule for vessels and plants in the restructured portion of the program and to leave the daily fee in place for the larger vessels and plants that will be paying for 100 percent or more coverage. Vessels and plants that will have 100 percent or more coverage generally earn enough that they will be paying less than 1.25 percent of their revenues for observer coverage. Because their observers will not be paid under federal contract it is not expected that their cost will increase above current levels at \$366 (including travel).

The percent fee is viewed as fair and equitable for the remaining fleets because all vessels and plants will realize the same impact on their ex-vessel revenue (0.625 percent). In addition, the flexibility the percentage fee system gives to NPGOP for deploying observers where they are most needed, gives fishery managers necessary tools to ensure that harvests are sustainable.

5.3 West Coast Groundfish Observer Program

Fishery Summary and Coverage Levels

The West Coast shore-based trawl groundfish fishery began operations under an IFQ program in 2011. With implementation of IFQs, came the additional requirement that all vessels fishing IFQs would be required to have observers on all trips, and that by 2014 the industry would bear all of the

costs of the observer program. In addition, shore plants accepting IFQ landings are also required to pay for shore-based catch monitors for every landing.

In 2010, total ex-vessel revenue in the shore-based trawl fishery was \$37 million including \$10 million in shore-based whiting. If whiting are excluded, total revenue in the shore-based trawl fishery in 2010 was \$27 million. Since the first year of the program is not yet complete, it is difficult to get a sense of how the fishery is progressing under IFQs. Preliminary data indicate that through the first six months of 2011 73 vessels had 772 landings, with ex-vessel revenue of \$13.8 million, including \$1.6 million of shore-based whiting. Through the first six months of 2010, 100 vessels had landings of \$13.7 but these estimates excluded the shore based whiting landings. While it appears that fewer vessels are participating, it is very possible that the reduction in early participation is a result of increased options available to fishermen under the IFQ program.

Fee Basis and Contracts

NMFS-NWR is helping vessels through the transition to 2014 when vessels will be required to bear all of the costs of 100 percent coverage. In 2011, NMFS will cover 90 percent of sea-day costs; by 2013 the reimbursements will decrease to 25 percent, and by 2014 will be eliminated. In agreeing to reimburse costs, NMFS set a baseline rate of \$365 per day, based on costs from the Alaska program.

Observer contractors are providing observers via private contracts with vessel operators. Because the contracts are private, providers do not need to follow FLSA and SCA wage and benefit requirements. As with other programs NMFS does not charge for observer training programs, but providers pay wages to trainees and cover per diem and travel costs. Several contractors are currently supplying observers in the trawl IFQ program with costs believed to be \$365 per sea day on average.

Discussions with three of the providers indicate that the first year of the program has not been profitable—two of the three indicated they believe they must raise their daily fees in 2012 in order to cover their costs. The third provider is more sanguine, and believes it may be possible to operate profitably at daily rates of \$365 once participation patterns stabilize and vessels organize themselves so they don't all go fishing on the same day.

Fairness and Equity

Because all vessels in the fishery are required to have observers for 100 percent of their trips, the question of equitable coverage rates across vessels is moot. However, the costs of the observer program relative to ex-vessel revenues appear to be quite high compared to observer costs as a percent of ex-vessel revenue in Alaska. With 772 landings through June, we estimate that observers and catch monitors have cost between 5.1 to 9.2 percent of ex-vessel revenues—the uncertainty is a result of a lack of information regarding trip lengths, which are thought to range between 1 to 5 days. The low estimate presumes the average trip is two calendar days, and the high estimate presumes the average trip is four calendar days.

5.4 At-Sea and Dockside Monitors in the NE Multispecies Fishery

Fishery Summary and Coverage Levels

The Northeast Multispecies fishery transitioned to a sector-based catch share program in 2010. Sixteen sectors formed and were allocated ACEs of each stock based on catch histories of sector members. By joining sectors, fishermen are no longer bound by many of the restrictive days-at-sea regulations of prior years. Increased at-sea and dockside monitoring programs were also added to the fishery, with the primary goals of improving estimates of discards and verifying the accuracy of dealer

reports. ASMs would augment the coverage from the existing New England Fishery Observer Program. In FY 2010, NEFOP set a target ASM coverage rate of 30 percent of sea-days—ASMs, in combination with an 8 percent coverage rate by NEFOs, would bring the percent of observed trips up to 38 percent—a level believed to be required for reliable estimates of discards. The DSM rates for FY 2010 were set at 50 percent of landings. In addition, a pre-trip notification system was also implemented to assign ASM to sector trips in a fair and equitable manner.

Data from the first year of the program indicate that combined ASM and NEFO coverage levels were 32 percent of the estimated 25,167 total sea-days—ASMs covered approximately 24 percent of sea-days. DSMs were estimated to have covered 42 percent of the estimated 11,213 offloads from sector trips. NMFS-NERO has recently announced that DSM coverage will not be required after September 19, 2011, and in a separate announcement, that ASM coverage levels in FY 2012 will be set at 17 percent of trips.³²

Fee Basis and Contracts

During the first two years of sector management, costs of ASMs will be paid directly by NEFOP, but in 2014 sectors are expected to take over the ASM program. In 2010 and 2011 ASM providers are working under federal contracts and must follow wage and work rules mandated by the FLSA and SCA. In the first year of the program, costs of ASMs ranged from \$585 – \$650 per sea-day depending on the provider. The average ASM cost NEFOP \$630/sea-day. In addition, NEFOP reimbursed providers for travel at the rate of \$32 per day, and also reimbursed providers for the wages and per diem paid to ASMs during training. If the average training costs per ASM sea-day are included, the total cost for the average ASM sea day was \$700 in FY 2010.

In 2014 it is presumed that ASM providers will contract directly with sectors, and will no longer be bound by the FLSA and SCA requirements. As indicated in the summary of the Alaska program, FLSA and SCA wage and benefit requirements were estimated to add \$100 per sea-day to the cost of observers. While wages and benefits paid to ASMs are expected to decline in 2014, it appears that NEFOP will not be reimbursing providers for wages and per diem paid to ASMs during training.

Fairness and Equity

An analysis of NEFOP data found that combined coverage levels of NEFOs and ASMs across sectors were unequal in FY 2010 from a statistical perspective. Some sectors had higher coverage rates than others, and some had lower. Because NEFOP bore the costs of ASM coverage in 2010, the disproportionate coverage levels was unlikely to have caused significant financial hardship for any of the sector. The findings do however point to potential problems with fairness and equity when sectors begin to pay for ASMs in 2014.

An assessment of ex-vessel revenue from sector trips in FY 2010 reveals that sectors generated \$80.5 million in the multispecies fishery. Total costs of ASMs including reimbursable travel and training costs were estimated at \$4.3 million or 5.1 percent of total revenue, although there was considerable variation across sectors. ASM costs for the six sectors whose vessels had average trip-lengths between 1 and 1.5 calendar days were 9.9 percent of their ex-vessel revenues. ASM costs for sectors at the other end of the spectrum were 4.1 percent of ex-vessel revenues.

³² NMFS-NERO has not indicated whether DSM coverage will be resumed in 2012.

6 Persons Contacted or Interviewed

During the course of this study we had discussions with over 60 persons with direct interests in the fisheries of New England, the West Coast and Alaska. In general, we attempted to keep these conversations informal and “off the record”, and for the most part we do not cite individuals. This is particularly true in the case of the three observer contractors from MRAG Americas, Saltwater Inc. and Alaska Observers Inc. The representatives of these companies provided invaluable information with the understanding that we would protect confidential business information. We listed the persons with whom we have spoken in the table below, along with their affiliation and the region in which they operate. We greatly appreciate all of the help provided.

Table 25. Persons Contacted During the Course of the Study

Name	Affiliation / Interest Group	City, State	Region
Bryan Belay	MRAG Americas	Anchorage, AK	ALL
Tim Carroll	Saltwater, Inc.	Anchorage, AK	ALL
Chris Rilling	NFMS-OST	Silver Spring, MD	ALL
Nick Brancaleone	Sector Manager, NEFS III	Boston, MA	NE
Eric Brazer	Sector Manager, Fixed Gear Sector	Chatham, MA	NE
Larry Ciulla	Gloucester Seafood Display Auction	Gloucester, MA	NE
Tom Dempsey	Policy Director for CCCHFA	Chatham, MA	NE
Aaron Dority	Sector Manager, Northeast Coastal Community Sector	Boston, MA	NE
Libby Etrie	Northeast Sector Services Network	Portland, ME	NE
David Goethel	NEFS Sector 12 Fishermen and NEFMC Member	New Hampshire	NE
Ellen Goethel	NEFS Sector 11 & 12	New Hampshire	NE
Mark Grant	NMFS NERO, Sector Policy Analyst	Gloucester, MA	NE
Nina Jarvis	Gloucester Seafood Display Auction	Gloucester, MA	NE
Bert Jongerdan	Portland Fish Exchange	Portland, ME	NE
Jessica Joyce	Gulf of Maine Research Institute	Portland, ME	NE
Andrew Kitts	NMFS-NEFSC	Woods Hole, MA	NE
Jonathan Labaree	Gulf of Maine Research Institute	Portland, ME	NE
Emilie Litsinger	Environmental Defense Fund	Boston, MA	NE
Ben Martens	Port Clyde Sector Manager	Portland, ME	NE
Katherine McArdle	NFMS-NEFSC NE Fishery Observer Program	Woods Hole, MA	NE
Frank Mirarchi	NEFS 10, sector fisherman	Scituate MA	NE
Gino Moro	NMFS-NERO Enforcement Division	Gloucester, MA	NE
Tom Nies	NEFMC Staff	Newburyport, MA	NE
Jackie Odell	Northeast Seafood Coalition	Gloucester, MA	NE
Jim Odlin	NEFMC Member & Sustainable Harvest Sector fisherman	Portland, ME	NE
Mark Phillips	sector fisherman	Norwood, MA	NE

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Name	Affiliation / Interest Group	City, State	Region
David Pierce	MA Division of Marine Fisheries and NEFMC Member	Boston, MA	NE
Maria Jose Pria	Archipelago Marine Research, Ltd	Victoria, BC	NE
Stephanie Rafael	Sector Manager, NEFS Sector 9	New Bedford, MA	NE
Maggie Raymond	Assoc. Fisheries of Maine & Sustainable Harvest Sector	South Berwick, ME	NE
Cindy Smith	Sector Manager, Tri-state sector manager	Portland, ME	NE
Eric Thunberg	NMFS-OST	Woods Hole, MA	NE
Amy Van Atten	NFMS-NEFSC NE Fishery Observer Program	Woods Hole, MA	NE
Sara Wetmore	NFMS-NEFSC NE Fishery Observer Program	Woods Hole, MA	NE
Susan Williams	NMFS-NERO Enforcement Division	Gloucester, MA	NE
Michael Bell	The Nature Conservancy	Morrow Bay, CA	WC
Steve Bodnar	Coos Bay Trawlers Association, Inc.	Coos Bay, OR	WC
Merrck Burden	Marine Conservation Alliance	Seattle, WA	WC
Dave Colpo	Pacific States Marine Fisheries Commission	Portland, OR	WC
Steve Freese	RFMC Alternate Member, NMFS-NW Region	Seattle, WA	WC
Paul Kujala	Fisherman	Astoria, OR	WC
Pete Leipzig	Fishermen's Marketing Assn.	Eureka, CA	WC
Dorothy Lowman	PFMC Member and Fisheries Consultant	Portland, OR	WC
Janell Majewski	NMFS-NWFSC West Coast Observer Program	Seattle, WA	WC
Dayna Matthews	NMFS-NW Region Enforcement Division	Lacey, WA	WC
Rod Moore	PFMC member & West Coast Seafood Processors Assoc.	Portland, OR	WC
Brad Stenberg	Pacific Fishery Information Network (PACFIN)	Portland, OR	WC
Dan Waldeck	Pacific Whiting Conservation Cooperative	Portland, OR	WC
Lauren Frey	Servco Insurance Services	Seattle, WA	WC, AK
Michael Lake	Alaska Observer, Inc.	Seattle, WA	WC, AK
Brent Paine	United Catcher Vessels	Seattle, WA	WC, AK
Joe Sullivan	Mundt MacGregor LLP	Seattle, WA	WC, AK
Julie Bonney	Alaska Groundfish Data Bank	Kodiak, AK	AK
John Gruver	AFA Catcher Vessel Inter-cooperative Manager	Seattle, WA	AK
Nicole Kimball	NPFMC Staff	Anchorage, AK	AK
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7 References

- Alaska Observers, I. 2011. Alaska Observers Homepage. Available online at <http://alaskanobservers.com/whiting.html>. Accessed June 25th, 2011.
- Freese, S. 2011. Permits & Economics Branch Chief NMFS-NWR. Personal communication with M. Hartley,
- GMRI. 2010a. Accessing Federal Funding for Dockside Monitoring & Sector Operations. Available online at <http://www.gmri.org/upload/files/Dockside%20Monitoring%20Funding%20Presentation.pdf>. Accessed 9/10/2011.
- GMRI. 2010b. Accessing Federal Funds for Dockside Monitoring; FAQ. Available online at <http://www.gmri.org/upload/files/Dockside%20Monitoring%20Funding%20FAQs.pdf>. Accessed September 9, 2011.
- Hiatt, T., M. Dalton, R. Felthoven, B. Fissel, B. Garber-Yonts, A. Haynie, S. Kasperski, D. Lew, C. Package, J. Sepez and C. Seung. 2010. ECONOMIC STATUS OF THE GROUND FISH FISHERIES OFF ALASKA, 2009.
- Kimball, N. 2011. NPFMC Fishery Analyst. Personal communication with M. Hartley, August 23, 2011.
- Kurkul, P. A. 2011. Memo to Sector Regarding DSM Coverage in 2011 and 2012. Available online at <http://www.nero.noaa.gov/nero/nr/nrdoc/11/1111MulSectorMemberDSMRequirements.pdf>. Accessed September 1, 2011.
- Labaree, J. 2011. Dockside Monitoring Costs. Personal Communication with M. Hartley, 9/12/2011.
- Mattson, S. 2011. Draft Mid-Year IFQ Catch Report for West Coast Groundfish. Department/Division, Seattle. Report
- McElderry, H. 2008. At-Sea Observing Using Video-Based Electronic Monitoring. Archipelago Marine Research Ltd. Victoria, BC.
- McIlwain, K. 2011. Catch Shares and Monitoring Systems; British Columbia Groundfish Fishery.
- NEFMC and NMFS. 2009. Final Amendment 16 to the Northeast Multispecies Fishery Management Plan Including a Final Supplemental Environmental Impact Statement and an Initial Regulatory Flexibility Analysis.
- NEFSC-FSB. 2010a. NEFOP Memo 10-009. Available online at http://www.nefsc.noaa.gov/fsb/NEFOPMemos/2010%20Memos/NEFOP%20Memo_10-009-1.pdf. Accessed September 2, 2011.
- NEFSC-FSB. 2010b. Standardized Bycatch Reporting Methodology; Proposed 2010 Observer Sea Day Allocation; Consultation and Prioritization Process; Response to Comments. Available online at http://www.nefsc.noaa.gov/femad/fsb/SBRM/2010/2010_Prioritization_response_to_comments_May112010.pdf. Accessed September 11, 2011.
- NEFSC-FSB. 2011a. Regulatory Compliance: Observer and Sector Program Material Notebook. N. F. S. Branch. Woods Hole.
- NEFSC-FSB. 2011b. Training: Observer and Sector Program Material Notebook. N. F. S. Branch. Woods Hole.
- NEFSC-FSB. 2011c. Duties: Observer and Sector Program Material Notebook. N. F. S. Branch. Woods Hole.

- NEFSC-FSB. 2011d. Qualifications:Observer and Sector Program Material Notebook. N. F. S. Branch. Woods Hole.
- NEFSC-FSB. 2011e. Pre-Trip Notification System: Observer and Sector Program Material Notebook. Woods Hole.
- NEFSC-FSB. 2011f. Approved At-Sea and Dockside Monitoring Providers. Available online at <http://www.nefsc.noaa.gov/fsb/Sector/Approved%20providers.pdf>. Accessed
- NEFSC-FSB. 2011g. Final Estimate of Groundfish Observer/At-Sea Monitor Coverage Rates. Available online at http://www.nefsc.noaa.gov/fsb/Sector/coverage_web_report_2010.pdf. Accessed August 23, 2011.
- NEFSC-FSB. 2011h. NEFOP/ASM Contracts: Observer and Sector Program Material Notebook. Woods Hole.
- NMFS-NERO. 2010. Northeast Multispecies Definition of a Sector Trip Information Sheet Available online at <http://www.nero.noaa.gov/nero/regs/infodocs/SectorTripInfoSheet.pdf>. Accessed July 23, 2011.
- NMFS-NERO. 2011a. NOAA Fisheries Commercial Groundfish Landings and Revenue; Comparison of 2009 and 2010 Fishing Years; Sector Groundfish by Stock. Available online at http://www.nero.noaa.gov/ro/fso/reports/2009_2010_Comparison.htm. Accessed
- NMFS-NERO. 2011b. Sector Catch Monitoring Summary Table, 2010. Available online at http://www.nero.noaa.gov/ro/fso/reports/Sectors/Sector_Summary_2010.html. Accessed July 23, 2011.
- NMFS-NERO. 2011c. Cover Letter to Sector Managers Announcing Coverage Rates for FY 2012.
- NMFS-NWFSC. 2006. West Coast Groundfish Observer Training Manual.
- NOAA. 2011. Proposed Rule: Magnuson-Stevens Act Provisions; Fisheries of the Northeastern United States; Northeast Multispecies Fishery; 2011 Sector Operations Plans and Contracts, and Allocation of Northeast Multispecies Annual Catch Entitlements. *Federal Register* 76 (February 28, 2011):10852.
- NPFMC. 2010a. Restructuring the Program for Observer Procurement and Deployment in the North Pacific – Public Review Draft.
- NPFMC. 2010b. Observer Program. *News and Notes*. October 2010. Anchorage. <http://www.fakr.noaa.gov/npfmc/newsletters/news1010.pdf>.
- PacFin. 2011. PFMC Port Group Report 020Wtwl: Groundfish Estimated Ex-vessel Revenue (\$1000) Landed-catch for All Trawl Gear (except Shrimp Trawls). Available online at http://pacfin.psmfc.org/pacfin_pub/pfmc_pub/gmtrpt_pub_rpts.php?yyyy=2010. Accessed September 15, 2011.
- Palmer, M. C. 2010. Estimating in-season discards from the Northeast United States groundfish fishery: an investigation of the separate ratio method (Part II). NEFSC Discard Estimation Methodology Review, 2/22/2011.
- Peros, J. 2011. GMRI DSM Accounts Spreadsheet. Personal communication with M. Hartley,
- PFMC. 2010. Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery; Final Environmental Impact Statement Including Regulatory Impact Review and Initial Regulatory Flexibility Analysis.
- Pria, M. J., J. Bryan and H. M. McElderry. 2011. New England Electronic Monitoring Project: 2010 Annual Project. Victoria, BC.

- Queirolo, L., Ph.D. 2011. Alaska Regional Economist NMFS-AKR. Personal communication with M. Hartley, 8/26/2011.
- Stanley, R. D., H. M. McElderry, T. Mawani and J. Koolman. 2011. The Advantages of an audit over a census approach to the review of video imagery in fishery monitoring. *ICES Journal of Marine Science*. May 9, 2011 (Advanced access):
- Stanley, R. D., N. Olsen and A. Fedoruk. 2009. Independent Validation of the Accuracy of Yelloweye Rockfish Catch Estimates from the Canadian Groundfish Integration Pilot Project. *Marine and Coastal Fisheries: Dynamics, Management and Ecosystem Science* 1: 354-362.
- Thompson, N. B. and P. A. Kurkul. 2009. Letter to New England Fishery Management Council. August 20, 2009.
- USDOL. 2008. Register of Wage Determinations under the Service Contract Act; Wage Determination No. 2004-0287
- USDOL. 2011a. McNamara-O'Hara Service Contract Act. Available online at <http://www.dol.gov/whd/contracts/sca.htm>. Accessed
- USDOL. 2011b. Compliance Assistance-Fair Labor Standards Act. Available online at <http://www.dol.gov/whd/flsa/>. Accessed 9/2/2011.
- Van Atten, A. 2011a. Sea Day Costs for Monitors and Observers in FY 2010; Personal communication with M. Hartley, August 8, 2011.
- Van Atten, A. 2011b. Cover Letter to: 2010 Northeast Multispecies Fishery Electronic Monitoring Pilot Study.
- Van Atten, A. 2011c. Wage Determination. Personal communication with G. Eaton, September 14, 2011.
- Van Atten, A. 2011d. Multispecies Limited Access Observer Coverage by Sector - FY10. Personal communication with M. Hartley, September 15, 2011.
- Van Atten, A. 2011e. Verbal Explanation of Potential Causes of Reductions in Sector Trips. Personal communication via voice mail with M. Hartley, September 13, 2011.
- Van Atten, A. 2011f. Coverage by Sector in 2010. Personal communication with M. Hartley, September 21, 2011.
- Van Atten, A. 2011g. Reimbursements for Training. Personal communication with M. Hartley, September 2, 2011.
- Van Atten, A. 2011h. NEFOP Incident Report and Groundfish Coverage Level Summary. Personal communication with M. Hartley, September 8, 2011.
- Van Atten, A. 2011i. Interview at NEFOP Offices. Personal Communication with M. Hartley, June 17, 2011.
- Van Atten, A. 2011j. Sector Groundfish Monitoring Costs. Personal communication with M. Hartley, August 1, 2011.
- Williams, S. J. and G. Moro. 2010. Interview with NMFS NERO Enforcement Division agents. M. Hartley, 7/22/11.