

# Evaluation of Monitoring and Reporting Needs for Groundfish Sectors in New England Phase I Report

By

Bruce Turris <sup>1</sup>  
Howard McElderry <sup>2</sup>

<sup>1</sup> Pacific Fisheries Management Incorporated  
Vancouver, BC Canada

<sup>2</sup> Archipelago Marine Research Ltd.  
Victoria, BC Canada

April 2008

***PACIFIC FISHERIES MANAGEMENT INCORPORATED***





# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>INTRODUCTION.....</b>	<b>9</b>
<b>CONTEXT FOR THIS WORK .....</b>	<b>10</b>
<b>FISHERY BACKGROUND.....</b>	<b>12</b>
<b>CURRENT MANAGEMENT PROGRAM.....</b>	<b>14</b>
<b>CONCERNS WITH THE CURRENT MANAGEMENT PROGRAM .....</b>	<b>15</b>
<b>SECTOR MANAGEMENT .....</b>	<b>16</b>
<b>SECTOR MONITORING.....</b>	<b>18</b>
<b>SECTOR MONITORING OPTIONS.....</b>	<b>20</b>
<b>A PHASED APPROACH .....</b>	<b>29</b>
<b>RECOMMENDATIONS .....</b>	<b>30</b>



## **EXECUTIVE SUMMARY**

This Phase I report examines all of the information received to develop an understanding of the current state of the fishery monitoring systems and where it needs to move to enable Sector based management.

NOAA Fisheries Service has begun the process of developing new guidance to assist regional fishery management councils in finding measures to end overfishing in all U.S. commercial and recreational fisheries by 2010. To end overfishing and prevent it from occurring in the future, the new law requires all fisheries to be regulated under annual catch limits (ACLs), with accountability measures to ensure that catches do not exceed the limit.

As part of Amendment 16 to its Groundfish Plan, the New England Fishery Management Council is working on a more comprehensive sector management program, a system that would allow groups of fishermen to enter into contractual agreements and operate with a limited number of pounds available for harvest. The Council would set each sector's TACs to ensure conservation goals were accomplished while allowing each sector to develop its own unique set of rules. Sectors will be required to report their catch weekly consistent with the multispecies FMP sector reporting requirements. Both landings and discards will be counted against the Sector's TACs. Assumed discard rates will be used and applied against a sector's share unless a sector can provide other accountability for the discards and obtain an exemption. Sectors will be responsible for developing annual Operations Plans that outline how the sector will monitor their catch.

Since there have generally been no TACs in groundfish, the days at sea (DAS) restrictions are the primary management tool for controlling effort and total catch. Rolling area closures are also used by NERO for similar purposes. Increasingly restrictive input controls, rising operating costs, and greater market competition have made it more difficult for vessel operators to remain economically viable. Management changes need to be implemented that enable operators to improve economic returns and allow for sustainable management of the groundfish resources.

In place since 1994, the current effort control program has recently come under fire because of the low level of fishing allowed per vessel and concerns over the wasteful discarding of fish. Some industry members suggest there is a culture of discarding in the industry and that the problem is increasing and hurting the stocks.

There does not appear to be much confidence in the accuracy of the data collected on discarding and species catch by area. The combination of unreported and misreported harvesting information impairs the manager's ability to properly manage on a stock specific basis and the scientist's ability to accurately assess the health of the stocks. Adding to the problem is the delay in having data available to managers in a meaningful format that enables them to make timely, informed and responsible decisions that protect the groundfish resources.

Many believe that more than half of the active fleet will participate in sectors. The number of sectors is unknown, but may range between 12 and 19. Sector membership will vary and most sectors will be managed internally with individual allocations that allow vessels to move annual catch entitlements (ACE) around to improve economic efficiency and optimize the harvest of the sectors' allocations. Industry sees sectors as a means of moving away from inefficiencies realized from input controls that result in regulatory discarding and underharvested stocks.

The design of an effective and comprehensive monitoring program is guided by having a clear understanding of the objectives for the program. The primary tool used to sustainably manage groundfish fisheries is the total allowable catch (TAC). TACs are generally set at a level where the annual fishing mortality will not decrease the standing stock. This requires knowledge of the true annual catch and mortality. It is extremely difficult to ensure catch mortalities are kept within TAC limits when all mortalities are not accounted for. Specifically, managers need an accurate accounting of the total catch and release mortality on a stock specific basis.

Sustainably managed groundfish fisheries depend upon high quantity research and assessment information (biological data, survey data, fishery data). Monitoring programs can improve on the precision of data collected from the fishery as well as the type and amount of information (set locations, water temperature, currents, biological samples, habitat type, etc.).

While sector management will provide the framework for individualizing fishing operations, monitoring is a tool for levelling the playing field by reassuring participants that individual accountability and compliance is being scrutinized. The monitoring program (combined with the individual allocation) better aligns each fisherman's incentives with those of the sector and the manager.

It's hard to imagine many vessels being able to maintain a viable fishing operation if they were required to have 100% at-sea observer coverage at \$1200 a day. If the monitoring program is unaffordable, too many vessels will be forced out of the fishery or into a position of non-compliance. However, in so far as effective monitoring provides for successful sector management, it allows for improved economic returns to the fishermen

There are a number of monitoring tools available. The tools used in the options presented in this report include:

- VMS**    Vessel Monitoring System: the vessel tracking systems already found on all groundfish vessels participating in the federally regulated multispecies fishery.
- VTR**    Vessel Trip Report: the reports completed by the vessel operator providing information on catch and discards by species and area on a set and trip basis.
- DR**     Dealer Report: the report completed by companies purchasing the fish from the vessel providing detailed information on the catch weight by species.

- HP** Hail Program: a program that allows vessel operators to communicate their activity (start and completion of a fishing trip and scheduled landings).
- DMP** Dockside Monitoring Program: a program in which a third party contractor monitors and reports on the sorting and weighing of the catch on shore.
- EMP** Electronic Monitoring Program: a program using cameras, sensors, and GPS on vessels to record vessel and fishing location, activity, catch, and compliance.
- ASOP** At-sea Observer Program: a program using observers on vessels to record vessel fishing location, activity, catch, compliance and collect biological data.
- RM** Roving Monitor: an individual who meets vessels at the point of offloading to confirm and record information and install/remove EMP equipment.
- DM** Dockside Monitor: an individual who monitors and records the sorting and weighing of groundfish catch from a vessel.
- LR** Landing Report: a report completed by the DM providing detailed information regarding the total weight by species offloaded from a vessel subject to DMP.
- EMR** Electronic Monitoring Report: A report of the area specific retained and released catch by a vessel as recorded by the vessel's EMP equipment.

Using a combination of the above tools, three basic monitoring approaches are identified for consideration. Options 2 and 3 also have sub-options. A total of six monitoring options are presented, but nine scenarios are identified. As we progress through the options, they become more comprehensive in the tools used and the extent to which the tools are utilized. Not surprisingly the latter options better meet sustainable management objectives but are also more costly. In the body of the report each option describes the roles of the sector manager, NMFS, and third party contractor. The pros and cons of each option relative to the industry and government objectives are also identified.

**Option 1: Modified Status Quo**  
**HP + VMS + VTR + DR**

This option is similar to the current monitoring requirements. The primary difference is that the information is collected by a third party contractor. This option also assumes that NMFS will continue with some low level of at-sea observer coverage similar to existing levels.

Prior to the start of a trip the vessel hails-out to the contractor their intentions to commence fishing, including when they will be leaving port and when they plan on landing. Upon completion of harvesting activities the vessel hails-in to the contractor when they will be landing, landing location, if the product is being trucked, and where the fish is going (auction, processing plant). The vessel submits their completed VTR to the contractor within 7 days of offloading and the buyer submits the completed Dealer Report (DR) to the contractor within 7 days of receiving the fish.

In addition to providing the hail services, the contractor reviews the VTR and DR data for completeness, enters the data into a data base program, and merges the data to determine species catch weights by area. An assumed discard rate mortality is applied and added to the landed weight mortality. The contractor then calculates total mortality by stock and

deducts the mortality from the applicable vessel and sector allocations. Within 48 hours of receiving all data associated with a vessel trip, status reports are provided to the sector manager and NMFS. The sector manager reviews the catches against the vessel's and sector's allocations. NMFS uses the data to monitor sector catch mortality against the sector allocations.

**Option 2: Dockside Monitoring**  
**HP + VMS + DMP + VTR**  
*a) < 100% DMP + DR*  
*b) 100% DMP*

This option builds on Option 1 by adding independent monitoring of the product either at the point of landing or at the processing plant and assumes that NMFS will continue with some level of at-sea observer coverage similar to existing levels. The hail program is the same as in Option 1. The difference between 2a) and 2b) is the level of dockside monitoring and the use of dealer reports in the absence of dockside monitoring data.

Upon completion of harvesting activities the vessel hails-in to the contractor when they will be landing, landing location, if the product is being trucked, the time it will be offloaded, where the fish is going, and the scheduled time for the plant to receive the fish. The vessel also hails-in the estimated total weight of fish being offloaded, the major species categories and requests a Roving Monitor (RM) in the case where the product is being trucked and a Dockside Monitor (DM) to monitor the catch at the location it is being sorted and weighed. The vessel submits their completed VTR to the RM or DM or within 7 days of offloading.

*a) < 100% DMP + DR:* If the product is being trucked from the landing port the vessel may be met by a RM who will check and record the number of totes/boxes loaded onto the truck as well as the vessel's holds to see that all the fish has been offloaded. The RM does not necessarily attend every truck offload, but often enough so the vessel operator believes the probability is high.

Once the product reaches the location where it will be sorted and weighed a DM may be present to monitor and record the sorting and weighing of the product. The DM does not attend every offload, but frequently enough so that the plant and vessel operator believes the probability of being monitored is high. For monitored offloads, the DM completes a Landing Report (LR). The buyer of the fish submits the completed dealer report (DR) to the contractor within 7 days of receiving the fish.

The contractor receives and reviews the applicable reports (LR, VTR and DR) for completeness, enters the data into a data base program, and merges the data to determine species catch weights by area.

*b) 100% DMP:* The role of the RM is the same as in 2a). Once the product reaches the location where it will be sorted and weighed it cannot be offloaded until a DM is present. The DM will arrive 15 minutes prior to the scheduled offloading time and

will be present to monitor and record the sorting and weighing of the product and complete a LR. The contractor receives and reviews the applicable reports (LR and VTR) for completeness, enters the data into a data base program, runs edit checks, and merges the data to determine species catch weights by area.

An assumed discard rate mortality, based on the retained catch and the area fished, is applied and added to the landed weight mortality. The contractor then calculates total mortality by stock and deducts the mortality from the applicable vessel and sector allocations. Within 48 hours of receiving all of the data associated with a vessel trip, status reports are provided to the sector manager and NMFS.

**Option 3: Dockside Monitoring and At-Sea Monitoring**

**HP + EM/ASOP + VMS + DMP + VTR**

*c) < 100% EMP/ASOP*

*d) 100% EMP + < 100% ASOP*

*e) 100% EMP/ASOP*

This option builds on Option 2 by adding independent monitoring of the catch at sea either through electronic monitoring (EMP) and/or at-sea observers (ASOP). We have assumed 100% DMP (Option 2 b) above) for all three sub-options, but three additional sub-options could have been developed using Option 2 a). The differences in options 3a), 3b) and 3c) are the level of at-sea monitoring.

*a) < 100% EMP/ASOP:* When the vessel hails-out it is required to request at-sea monitoring. All gillnet and hook & line vessels and only trawl vessels fishing in a single area under mandatory retention can request electronic monitoring (EMP) equipment. Trawl vessels fishing multiple areas and/or not subject to mandatory retention must request an at-sea observer (ASOP).

Upon receiving the request, the contractor will advise the vessel operator whether or not they are required to take electronic monitoring or an at-sea observer for that trip. If the vessel is required to have monitoring on board, they cannot leave port until the EMP equipment has been installed or until an observer has boarded.

*b) 100% EMP + < 100% ASOP:* When the vessel hails-out it is required to request at-sea monitoring. All gillnet and hook & line vessels and only trawl vessels fishing in a single area under mandatory retention are required to take electronic monitoring (EMP) equipment. Trawl vessels fishing multiple areas and/or not subject to mandatory retention must request an at-sea observer (ASOP).

For trawl vessels fishing in multiple areas, the contractor will advise the vessel operator whether or not they are required to take an at-sea observer for that trip. If the vessel is required to take an observer, they cannot leave port until an observer has boarded.

- c) *100% EMP/ASOP*: When the vessel hails-out it is required to have at-sea monitoring. All gillnet and hook & line vessels and only trawl vessels fishing in a single area under mandatory retention are required to take electronic monitoring (EMP) equipment. Trawl vessels fishing multiple areas and/or not subject to mandatory retention must take an at-sea observer (ASOP).

Upon completion of harvesting activities the vessel follows the same hails-in requirements identified in Options 2. If the vessel had an observer, the observer disembarks and submits a completed Observer Report (OR) from the trip. If it was an EMP trip, the RM or DM boards the vessel to remove and replace the hard drive.

For gillnet and hook & line vessels, the contractor reviews the trip EMP data and compares a percentage of the monitored sets with the VTR information. If the data match within acceptable error limits, the entire VTR data is accepted as accurate. If the error level is too high, an additional percentage of EMP data will be compared with VTR data. If the entire EMP data is reviewed an Electronic Monitoring Report (EMR) will replace the VTR as the accurate record for the trip. For trawl vessels fishing in a single area under mandatory retention, the contractor will review the EMP data to confirm that the vessel fished in only one area, that the area matches with the VTR, and that there were no discards. If there are no violations, the VTR will be considered an accurate record.

The contractor receives and reviews the applicable reports (LR, VTR, EMR, and OR) for completeness, enters the data into a data base program, runs edit checks, and merges the data to determine species catch weights by area. For all trips where an observer or electronic monitoring is not required, an assumed discard rate mortality, based on the retained catch and the area fished, is added to the landed weight mortality. For EMP and ASOP trips the discard mortality is calculated by applying established species mortality rates to the estimates of discards from the VTR, EMR, or OR. When applicable, the sector manager will use the at-sea monitoring mortality estimates to request a reduction/exemption from the assumed mortality rate established by NMFS.

The contractor then calculates total mortality (discarded plus retained) by stock and deducts the mortality from the applicable vessel and sector allocations. Within 48 hours of receiving all of the data associated with a vessel trip, status reports are provided to the sector manager and NMFS.

Adapting to sector and quota management (TACs, ACL, and ITQs) will, by itself, take time and result in changes to the fleet as sectors and vessels organize themselves, develop business plans, consolidate ACE, and learn how to maximize fishing and economic opportunities. The general experience in other jurisdictions, where fisheries have moved to quota management, is that there is an adjustment period, but the viability of the fishery improves. A financially healthy fishery is more capable of absorbing increased management costs. Alternatively, no monitoring changes concurrent with the movement to sector management could lead to further discarding and catch misreporting as the opportunity and economic incentives to high-grade and misreport increase. Therefore, it

is important to find the right balance between changes to the management framework and monitoring requirements.

The options above should provide the basis for Sectors to develop base level monitoring programs. Government may also want to use the options to set minimum standards. If Sectors want to have exemptions from input controls or assumed mortality rates, they may be required to have minimum monitoring requirements consistent with the options identified.

A phased approach allows for smoother transition and enables government and industry to productively reprofile resources (financial and human) and for new monitoring infrastructure to be put in place and expand with the growing needs of the fishery.

It is apparent that changes are necessary in how the groundfish fisheries in the Gulf of Maine are monitored. The following recommendations acknowledge the need to make changes and the difficulties associated with change in an industry facing increasing market competition, growing economic instability, and uncertain future resource availability:

*Recommendation 1:* **Option 1 should be the minimum monitoring requirements for the common pool fishery.** Even with input controls, the proper management of TACs requires the collection of catch data from the common pool fishery in a timely manner.

*Recommendation 2:* **Sector monitoring should be phased in over a three year period with Option 2 (dockside monitoring) being required in year 1 and Option 3 (at-sea monitoring) required by year 3.** The industry and government will need time to organize and develop the required infrastructure.

*Recommendation 3:* **During the first 5 years the monitoring program should be contracted to a single service provider.** Currently, there is no centralized data management system suitable for sector-based fisheries management and development of one would likely be more efficient and representative after the monitoring program components have been implemented and the bugs worked out. A single service provider can more effectively resolve data issues, realize economic efficiencies, and make responsive adjustments between program components.

*Recommendation 4:* **The contractor should be selected through a competitive bidding process coordinated by a government agency.** The need for a single service provider during the first 5 years of the program, the lack of a comprehensive industry organization, issues concerning data confidentiality, and the likelihood of multi-source funding arrangements supports having a government agency (NMFS or the Atlantic State Fisheries Commission) act on behalf of the industry as the contracting authority.

*Recommendation 5:* **Some, but not all, costs should be borne by industry.** Using the monitoring program responsibly and efficiently is more likely if industry is sharing in the costs.

*Recommendation 6:* **There should be an annual program evaluation.** Evaluation is important to monitor the service provider's performance and to make necessary program operations and efficiency improvements.

*Recommendation 7:* **There should be a comprehensive communications plan to prepare participants for the new monitoring initiatives, educate them on new and ongoing program requirements, allow for feedback, and identify necessary contacts.**

## INTRODUCTION

Bruce Turriss of PFMI (Pacific Fisheries Management Inc.) and Howard McElderry of AMR (Archipelago Marine Research Ltd.) have considerable expertise with commercial groundfish fisheries management and monitoring programs. They have been contracted by GMRI to examine the existing New England fishery monitoring systems and determine how it should change under Sector based management. The contractors spent a week in February meeting with key New England industry and agency groups. The findings from these meetings and other information will be assembled into two reports. This is the first report (Phase I) and will specify the nature of the fishery monitoring systems required under Sector based management. The second report (Phase II) will focus on delivery options and implementation issues that would be involved with establishing a monitoring framework necessary for Sector managed fisheries. Both reports will be prepared for GMRI and presented to the New England Fisheries Management Council. Feedback from the Council and other stakeholders will be incorporated in the final report.

This is the Phase I report and examines all of the information received to develop an understanding of the current state of the fishery monitoring systems and where it needs to move to enable Sector based management. The suggested best practices will be presented in a risk management context. There will be a minimum level of monitoring required for the Sector management, and increasing levels of monitoring based on data quality and compliance objectives. We hope to provide information on the relationship between the monitoring system cost/practicality and the level of management system effectiveness. This investigation will also provide information on how changes to the management system could affect monitoring requirements. The report will also outline standards and policies for monitoring and reporting that should be in place before sectors begin operation and if a phased approach could be used.

## CONTEXT FOR THIS WORK

NOAA Fisheries Service has begun the process of developing new guidance to assist regional fishery management councils in finding measures to end overfishing in all U.S. commercial and recreational fisheries by 2010. This deadline is a new requirement under the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act of 2006. The highest priority in the Magnuson-Stevens Act reauthorization was to strengthen the Act to ensure an end to overfishing. The U.S. Ocean Action Plan also called for expansion of market-based management systems. To end overfishing and prevent it from occurring in the future, the new law requires all fisheries to be regulated under annual catch limits, with accountability measures to ensure that catches do not exceed the limit.

The reauthorization of the Magnuson-Stevens Act includes new language governing all limited access privilege programs (LAPPs) and requires a referendum in which a supermajority of those voting must approve an Individual Fishing Quota (IFQ) program before such a system can be implemented in New England. With these significant new requirements, some members of the groundfish industry decided that sectors were worthy of close consideration.

Sectors were first authorized in Amendment 13, enabling a group of demersal longline fishermen from Cape Cod to receive a percentage of the available Total Allowable Catch (TAC) for Georges Bank Cod and exemption from certain multispecies regulations.

As part of Amendment 16 to its Groundfish Plan, the New England Fishery Management Council is working on a more comprehensive sector management program, a system that would allow groups of fishermen to enter into contractual agreements and operate with a limited number of pounds available for harvest. The Council would set each sector's TACs to ensure conservation goals were accomplished while allowing each sector to develop its own unique set of rules. Some of the measures for evaluating sector options include the ability to address wasteful discards, simplify management, accord fishermen greater control over their livelihoods, provide a mechanism for economics to shape the fishing fleet rather than the regulations, and prevent excessive consolidation of fishing businesses so that a day boat fishery can continue.

Sectors will adopt TACs (as shares of the ACL) and Accountability Measures (AMs) for species managed under the Sector's Fisheries Management Plan (FMP). Sectors will be required to report their catch weekly consistent with the multispecies FMP sector reporting requirements. Both landings and discards will be counted against the Sector's ACLs. Assumed discard rates will be used and applied against a sector's share unless a sector can provide other accountability for the discards and obtain an exemption. Sectors will be responsible for developing annual Operations Plans that outline how the sector will monitor their catch.

The need to be accountable and stay within the Sector's ACL requires a monitoring program that provides accurate and timely information to fishermen, sector managers and fishery managers. Such a monitoring program is the focus of this report.

## FISHERY BACKGROUND

The New England Fishery Management Council's Northeast Multispecies (Groundfish) Fishery Management Plan regulates catches of cod, haddock, Pollock, redfish, plaice, winter witch, windowpane and yellowtail flounders, and halibut in federal waters. Atlantic cod and yellowtail flounder are two of the weaker stocks. The 10 regulated species are further divided into 19 stocks across 5 management areas. The fishing year runs from May 1 through April 30 and is managed using input controls including limited days-at-sea (DAS), trip limits, mesh size, and seasonal and year round closures

There are approximately 800 vessels currently active in the fishery. Boats range in size from 30 to 100 feet, with the majority measuring between 30 and 70 feet. Otter trawls predominate in the groundfish fishery, while gillnets and hooks, or longlines, are used to a lesser degree.

Table 1. Summary of Gear Designation of Groundfish Vessels in 2004  
(permitted and active vessels)

<b>Gear</b>	<b>Number of permitted vsls</b>	<b>% of total</b>	<b>Number of active vsls</b>	<b>% of total</b>
<b>Bottom trawl</b>	794	54%	502	65%
<b>Midwater trawl</b>	6	< 1%	2	< 1%
<b>Other trawl</b>	10	< 1%	6	< 1%
<b>Bottom longlines</b>	163	11%	59	8%
<b>Hand line</b>	133	9%	35	5%
<b>Sink gillnet</b>	282	19%	160	21%
<b>Pots and traps</b>	11	< 1%	2	< 1%
<b>Other</b>	85	6%	7	< 1%
<b>Total</b>	1,484	100%	773	100%

Framework Adjustment 42, 2006; 2004 Data; Permitted vessels is the number of vessels with limited access multispecies permits. Active vessels is the number of vessels that called into the days-at-sea system.

While there were nearly 1500 limited access groundfish fishermen in 2004, only 773 used any of their allocated DAS, and that number has continued to decline. Some preliminary analysis showed that in the 2005/2006 fishery 500 vessels landed 99% of the regulated groundfish catch. The total number of active limited access vessels has declined from roughly 1,000 in 2001 to 773 in 2004 and the associated groundfish catch has fallen from 103 million pounds to 75 million pounds during the same period.

There are still approximately 2000 open access fishing permits for the groundfish fishery but they are severely restricted in what they can catch. Fewer than 300 open access permit holders landed any regulated groundfish in the 2001-2004 fishing years and they landed less than 500,000 pounds (less than 1% of the total groundfish catch) of all regulated groundfish species in those years.

Most of the active vessels are owner-operated with home ports in Massachusetts, Maine, Rhode Island, New Hampshire, and Connecticut though there are some from the Mid Atlantic states. Groundfish is landed at as many as 70 different ports, with fewer than 10 ports handling the majority of fish landed. The primary ports are Portland, New Bedford, Boston and Gloucester. A considerable amount is landed at outports where it is offloaded onto trucks and taken to an auction or plant in a major center.

All vessels participating in the federally regulated groundfish fishery are required to have on board a Vessel Monitoring System (VMS) that pings every 30 to 60 minutes, 24 hours a day, 7 days a week unless the vessel is at the dock for 30 days or more and receives a letter of exemption. The VMS is used to track DAS and monitor vessel location for fishing in unauthorized areas. The enhanced VMS also has e-mail capability.

The Endangered Species Act and Magnuson-Stevens Act require some level of at-sea observer coverage in the groundfish fishery. Observers are provided by the Northeast Fishery Observer Program at a cost of \$1200 per day. The data from the program is used by the regulatory agencies for stock assessment, economic analysis, and the estimation of bycatch and discards. The observer program attempts to maintain 5% coverage of the A-DAS vessels, and 40% coverage of U.S./Canada, SAP, and B-DAS fisheries. Actual coverage levels are below the identified targets.

## CURRENT MANAGEMENT PROGRAM

Vessels participating in the federally regulated groundfish fishery receive a permit issued annually by NMFS, including a letter identifying the vessel's DAS allocation. Since there are no TACs in groundfish, the DAS are the primary management tool for controlling effort and total catch (There may also be species specific trip limits for yellowtail, cod and hake).

Prior to leaving port for the grounds, groundfish vessels declare their planned fishing activity to NERO. They also have to give notice of their need for an observer (if they are required to have one that trip) or must have a waiver if an observer is not required. As soon as a vessel passes the demarcation line, the DAS count commences (as recorded by the VMS) and continues until the vessel again crosses the demarcation point on return to port. The VMS records location, speed, direction and date and time information for the vessel. Catch information, including species and area of retained and released catch, is recorded by the vessel operator on a Vessel Trip Report (VTR) and by the observer (whenever an observer is on board). The VTR must be submitted to NERO by the 15<sup>th</sup> of the following month, creating delays of as much as 45 days.

Many vessels offload their catch directly onto trucks and deliver to a processing plant or the fish auction. Vessels don't weigh their catch on board and only have estimates of the product weight loaded onto the truck. The fish are weighed at the plant or auction and the buyer of the fish is responsible for completing a Dealer Report (DR) that provides an accurate weight of the catch by species. DRs are submitted on a weekly basis to NERO in an electronic format. It takes approximately 2 months or more before NERO has the VTR and DR information on the computerized data base system.

While DAS may be the primary method for controlling fishing effort, rolling area closures are also used by NERO for similar purposes. Closing productive fishing areas throughout the region during strategic times reduces the fleets harvesting efficiency (catch per unit of effort) and results in a lower total catch without reducing the allocated DAS.

## CONCERNS WITH THE CURRENT MANAGEMENT PROGRAM

Increasingly restrictive input controls, rising operating costs (fuel prices), and greater market competition (farmed fish) have made it more difficult for vessel operators to remain economically viable. Management changes need to be implemented that enable operators to improve economic returns (reduce operating costs, develop new markets, improve product quality, and better service market needs) and allow for sustainable management of the groundfish resources.

In place since 1994, the current effort control program has recently come under fire because of the low level of fishing allowed per vessel and concerns over the wasteful discarding of fish. Some industry members interviewed suggested there is a culture of discarding in the industry and that the problem is increasing and hurting the stocks. Some discards are caused by regulations (prohibited species, juveniles, catches in excess of permitted trip limits), while other fish may be released for economic reasons (unmarketable, low value, or excessive quantity) or safety reasons (poor weather, too much to bring on board).

The overall quality and timeliness of the data from the groundfish fishery is concerning. There does not appear to be much confidence in the accuracy of the data collected on discarding and species catch by area. VTRs are intended to report discards, but there is a strong belief that this is not happening. Indeed the observer data does not match up well with the VTR data, with the observers recording a higher discard rate than the VTRs. The low level of observer coverage makes it difficult to accurately estimate fleet wide discards, and the VTR data would likely significantly underestimate true discard levels.

There is also concern regarding the lack of accurate information on species catch by area. Many vessel, primarily trawl vessels, fish in more than one management area on a trip. While vessels are required to complete a VTR for each area fished, it is believed that many operators only submit one VTR even if they fished multiple areas.

The combination of unreported and misreported harvesting information impairs the manager's ability to properly manage on a stock specific basis and the scientist's ability to accurately assess the health of the stocks. Adding to the problem is the delay in having data available to managers in a meaningful format that enables them to make timely, informed and responsible decisions that protect the groundfish resources.

## SECTOR MANAGEMENT

The New England Fishery Management Council is working towards providing definition to sector management, but there is still considerable uncertainty in industry regarding how sectors will be organized and what rules they will operate under. The Council Operating Policies defines a sector as “*a group of persons holding limited access vessel permits who have voluntarily entered into a contract and agree to certain fishing restrictions for a specified period of time, and which has been granted a TAC(s) in order to achieve objectives consistent with applicable FMP goals and objectives.*” The Council has also made it clear that:

- Sectors will have TACs as shares of Annual Catch Limits (ACLs) and Accountability Measures (AMs) for species managed under the sector’s Fisheries Management Plan.
- Sector shares will be allocated as a percentage of the ACL of the applicable FMP.
- Discards will not count towards a sector’s allocation but discards will count as catch against a sector’s share, unless a sector can provide other accountability for the discards and obtain an exemption.
- A sector reaching any sector allocation would result in the sector’s fishery closing.
- A sector’s allocation will not be reduced because another sector or the common pool fishery exceeded their assigned share.
- A sector exceeding its annual allocation will have its share reduced in the following year.
- Sectors will be required to report their catch weekly consistent with the Multispecies FMP sector reporting requirements.
- Transfers of annual catch entitlements (ACE) between sectors within the fishing year may be allowed.
- Vessels can only fish in one groundfish sector within a fishing year.

Many believe that more than half of the active fleet will participate in sectors. The number of sectors is unknown, but may range between 12 and 19. Having a number of different sectors is one way of minimizing risk – legal risks associated with joint and several liability, and economic risk associated with having the sector fishery shut down. Sector membership will vary and may be influenced by gear type, species focus, organizational relationship, and regionalism. Most sectors will be managed internally with individual allocations that allow vessels to move annual catch entitlements (ACE) around to improve economic efficiency and optimize the harvest of the sectors’ allocations.

Industry sees sectors as a means of moving away from inefficiencies realized from input controls, such as DAS, trip limits, and rolling closures that result in regulatory discarding and underharvested stocks. In addition to providing greater operational flexibility to vessels, sectors will also have enforcement committees that allow for the internalization of compliance issues associated with sector rules.

There is still considerable unknown about how sector management will work:

- What will be the monitoring requirements?
- What will monitoring cost and who pays?
- Will the Council and NERO still use input controls (DAS, trip limits, rolling closures)?
- On what basis will ACE be allocated to sectors and what shares of ACLs will each sector have
- Will the TACs be set low and Sector allocations be less than expected?
- How will the movement of quota between and within sectors be facilitated?

It is also unclear when sector management will be in place (2009 or 2010) and how the common pool fishery will be monitored and managed.

The conservation concerns with sector management are similar to the concerns for ITQ management. Will there be high-grading? Will there be misreporting of the catch (area of catch and volume of catch)? Will discarding increase as a vessel or sector approaches their allocation? Will there be enforcement problems associated with different rules in the sector fishery and common pool fishery? While the Council is working on a motion to require the retention of all legal sized fish, the success of such rules and similar rules to address the concerns above necessitates a comprehensive monitoring program.

## SECTOR MONITORING

The design of an effective and comprehensive monitoring program is guided by having a clear understanding of the objectives for the program. Both the resource managers (government) and the industry (permit holders, fishermen, dealers) have distinct and shared objectives for sector management monitoring programs.

*Resource manager's monitoring objectives:*

- **TAC management:** The primary tool used to sustainably manage groundfish fisheries is the total allowable catch (TAC). TACs are generally set at a level where the annual fishing mortality will not decrease the standing stock. This requires knowledge of the true annual catch and mortality and the ability to detect changes in stock abundance. It is extremely difficult to ensure catch mortalities are kept within TAC limits when all mortalities are not accounted for. Specifically, managers need an accurate accounting of the total catch and release mortality on a stock specific basis. Therefore, the monitoring programs needs to provide the following:
  - **Quantify total mortality:** Accurate total mortality data is difficult to obtain under current conditions in the groundfish fisheries. Generally referred to as discards, this often unaccounted for catch can represent a serious impediment to sustainability. In most groundfish fisheries, some level of discards is unavoidable. Unwanted catch releases occur when there is no market for the fish; when the value of one fish is greater than another (resulting in the lower valued fish being released); or when retention of a species exceeds the permitted limits. In cases when fish are released at sea, there is almost always some level of associated mortality. When fish are released back to the water, an estimate is taken to determine the quantity released and then a level of mortality is assigned. The mortality rate may be based on the species of fish, condition identifiers, gear used, fishing depth, or length of fishing time. At-sea monitoring can accurately estimate the quantity released and collect information that will aide in mortality estimation.
  - **Species and area (stock) management:** Not only are there problems accounting for total mortality, but the catch information (both target and non-target) are often not properly recorded by species and area for those fisheries without at-sea monitoring. Fishermen may misreport the species and area of catch in an attempt to bypass the fishing rules or regulations that do not permit the retention of a certain species or quantity in a specific area. Of course, this plays havoc with the data used to manage the fishery and assess the stocks. It is important to manage on a stock basis. Without proper monitoring, smaller stocks could be significantly overfished while larger stocks or less accessible stocks could be underfished.
  - **Timely information:** In addition to accurate, the information on catch, area and mortality should be timely so that managers know if TACs and ACLs are being exceeded and can take the appropriate action (i.e. closures, new limits, etc).

- **Improved stock assessment:** There are many different groundfish stocks commercially harvested in the New England northeast multispecies fishery. An impediment to sustainability in groundfish fisheries is the deficiency in the quantity and accuracy of groundfish research and assessment information (biological data, survey data, fishery data). Monitoring programs can improve on the precision of data collected from the fishery as well as the type and amount of information (set locations, water temperature, currents, biological samples, habitat type, etc.).
- **Improved compliance:** Fisheries management is becoming increasingly complex, with more rules being developed and the incentive for non-compliance growing. Compliance with closures, fishing limits, gear restrictions, and reporting requirements can be improved with monitoring.

*Industry's monitoring objectives:*

- **Timely and accurate data:** Similar to the managers, sector managers and vessel operators will want prompt information about a vessel's catch to properly manage the sectors allocations, coordinate transfers, and ensure the sector's fishing opportunities are not curtailed.
- **Level playing field:** Fishermen are a competitive bunch, and don't want their peers to have an advantage because they are cheating or not fishing as selectively or responsibly as they are. While sector management will provide the framework for individualizing fishing operations. Monitoring is a tool for levelling the playing field by reassuring participants that individual accountability is being checked and complied with. The monitoring program (combined with the individual allocation) better aligns each fisherman's incentives with those of the sector and the manager.
- **Affordability:** It's hard to imagine many vessels being able to maintain a viable fishing operation if they are required to have 100% at-sea observer coverage at \$1200 a day. If the monitoring program is unaffordable, too many vessels will be forced out of the fishery or into a position of non-compliance.
- **Economic benefits:** In so far as effective monitoring provides for successful sector management, it allows for improved economic returns to the fishermen by:
  - Removing the need for inefficient management measures such as rolling closures, trip limits, and DAS.
  - Allowing for improved business planning on a seasonal and longer-term basis.
  - Providing for greater operational flexibility to improve product quality, distribution, and servicing of market needs.
  - Allowing for economic efficiencies through consolidation, specialization and regionalization of fishing operations.
  - Improving the asset value (value of sector allocations) to the fishermen through more clearly defined access and improved economic returns.

## SECTOR MONITORING OPTIONS

There are a number of monitoring tools available, depending on how comprehensive the program needs to be to meet stated objectives. The tools used in the options presented in this report include:

- VMS** Vessel Monitoring System: the vessel tracking systems already found on all groundfish vessels participating in the federally regulated multispecies fishery.
- VTR** Vessel Trip Report: the reports completed by the vessel operator providing information on catch and discards by species and area on a set and trip basis.
- DR** Dealer Report: the report completed by companies purchasing the fish from the vessel providing detailed information on the catch weight by species and the vessel the catch was received from.
- HP** Hail Program: a program that allows a vessel operator to communicate their activity such as commencement and completion of a fishing trip (when they will be leaving, where they will be fishing, when they plan on landing) and scheduled landing and offloading of fish.
- DMP** Dockside Monitoring Program: a program in which a third party contractor monitors and reports on the sorting and weighing of the catch on shore (often referred to as a weighmaster program).
- EMP** Electronic Monitoring Program: a program using cameras, sensors, and GPS on board vessels to record vessel and fishing location, fishing activity, catch (retained and released), and compliance with fishing rules (closed areas, mandatory retention, gear restrictions).
- ASOP** At-sea Observer Program: a program using observers on board vessels to record vessel and fishing location, fishing activity, catch (retained and released) estimates, compliance with fishing rules (closed areas, mandatory retention, gear restrictions) and collect biological samples/information.
- RM** Roving Monitor: an individual, employed by the third party contractor responsible for the DMP, who meets vessels at the point of offloading to confirm and record information on the hail-in and the number of totes/boxes offloaded for transportation, collect the VTR, and install/remove EMP equipment.
- DM** Dockside Monitor: an individual, employed by the third party contractor responsible for the DMP, who monitors and records the sorting and weighing of groundfish catch from a vessel.
- LR** Landing Report: a report completed by the DM providing detailed information regarding the total weight by species offloaded from a vessel subject to DMP.
- EMR** Electronic Monitoring Report: A report, produced by a third party contractor, of the area specific retained and released catch by a vessel as recorded by the vessel's electronic monitoring equipment.

Using a combination of the above tools, three basic monitoring approaches are identified for consideration. Options 2 and 3 also have sub-options. While there are nine possible monitoring scenarios, a total of six monitoring options are presented. As we progress through the options, they become more comprehensive in the tools used and the extent to

which the tools are utilized. Not surprisingly the latter options better meet sustainable management objectives but are also more costly. Each option describes the roles of the sector manager, NMFS, and third party contractor. The pros and cons of each option relative to the industry and government objectives are also identified.

**Option 1: Modified Status Quo  
HP + VMS + VTR + DR**

*Description:* This option is similar to the current monitoring requirements. The primary difference is that the information is collected by a third party contractor. This option also assumes that NMFS will continue with some low level of at-sea observer coverage similar to existing levels.

Prior to the start of a trip the vessel hails-out to the contractor their intentions to commence fishing, including when they will be leaving port and when they plan on landing. The vessel is given a hail-out number and records it in the VTR for that trip. The VMS system must be operating at all times and the VMS data continues to be collected by NMFS for enforcement purposes. Upon completion of harvesting activities the vessel hails-in to the contractor when they will be landing, landing location, if the product is being trucked, and where the fish is going (auction, processing plant). The vessel is given a hail-in number and records it in the VTR for that trip. The vessel submits their completed VTR to the contractor within 7 days of offloading. The buyer of the fish submits the completed Dealer Report (DR) to the contractor within 7 days of receiving the fish.

In addition to providing the hail services, the contractor reviews the VTR and DR data for completeness, enters the data into a data base program, and merges the data to determine species catch weights by area. This is done by taking the ratio of estimated weights in the VTR and applying those ratios to the landed weights in the DR. An assumed discard rate mortality, based on the retained catch (DR) and the area fished (VTR), is applied and added to the landed weight mortality. The contractor then calculates total mortality by stock and deducts the mortality from the applicable vessel and sector allocations. Within 48 hours of receiving all data associated with a vessel trip, status reports are provided to the sector manager and NMFS. Sector managers and NMFS staff will also be able to monitor online vessel hail-out and hail-in activity provided to the contractor.

Upon receiving the status reports, the sector manager reviews the catches against the vessel's and sector's allocations. If transfers are required between sector vessels, the sector manager will organize it with the appropriate vessels. If transfers are required between sectors, the sector manager will work with other sector managers and NMFS on the appropriate stock and volume of unutilized allocations to be moved.

The status reports from the contractor allow NMFS to monitor sector catch mortality (both landed and discard mortality) against the sector allocations. The information is also

important for understanding requests from sector managers for transfers of ACE between sectors.

*Pros:*

- Low cost
- Minimal change from current program
- More timely data management and reporting

*Cons:*

- No independent estimates of at-sea discards
- No independent estimates of species catch by area
- No independent verification of landed weights and species reporting
- No change in incentives for fishermen to:
  - Reduce discards
  - Minimize mortality
  - Fish selectively
- Unable to reduce assumed mortality rate

**Option 2: Dockside Monitoring**  
**HP + VMS + DMP + VTR**  
*a) < 100% DMP + DR*  
*b) 100% DMP*

*Description:* This option builds on Option 1 by adding independent monitoring of the product either at the point of landing or at the processing plant (where-ever the fish is sorted and weighed). This option also assumes that NMFS will continue with some level of at-sea observer coverage similar to existing levels. The difference between 2a) and 2b) is the level of dockside monitoring and the use of dealer reports in the absence of dockside monitoring data. The level of DMP is a function of the risks and rewards (costs and benefits) of obtaining accurate and reliable landed weight data.

Prior to the start of a trip the vessel hails-out to the contractor their intentions to commence fishing, including when they will be leaving port and when they plan on landing. The vessel is given a hail-out number and records it in the VTR for that trip. The VMS system must be operating at all times and the VMS data continues to be collected by NMFS for enforcement purposes.

Upon completion of harvesting activities the vessel hails-in to the contractor when they will be landing, landing location, if the product is being trucked, the time it will be offloaded, where the fish is going (auction, processing plant), and the scheduled time for the plant to receive the fish. The vessel also hails-in the estimated total weight of fish being offloaded, the major species categories (this is done for planning purposes for the contractor when scheduling Dockside Monitors) and requests a Roving Monitor (RM) in the case where the product is being trucked and a Dockside Monitor (DM) to monitor the catch at the location it is being sorted and weighed. The vessel is given a hail-in number

and records it in the VTR for that trip. The vessel submits their completed VTR to the contractor either at the point of offloading (the VTR is given to the RM or DM) or within 7 days of offloading.

- c) *< 100% DMP +DR*: If the product is being trucked from the landing port to the auction or plant the vessel may be met by a RM who will check and record the number of totes/boxes loaded onto the truck as well as the vessel's holds to see that all the fish has been offloaded. The RM does not necessarily attend every truck offload, but often enough so the vessel operator believes the probability is high. The RM collects the VTR from the vessel.

Once the product reaches the location where it will be sorted and weighed (either by truck or the vessel lands at that location) it cannot be offloaded (from the truck or the vessel) until the scheduled time identified by the hail-in. A DM may be present to monitor and record the sorting and weighing of the product. The DM does not attend every offload, but frequently enough so that the plant and vessel operator believes the probability of being monitored is high. For monitored offloads, the DM completes a Landing Report (LR) for the monitored product and collects the VTR (if not already collected by the RM). The buyer of the fish submits the completed dealer report (DR) to the contractor within 7 days of receiving the fish.

The contractor receives and reviews the applicable reports (LR, VTR and DR) for completeness, enters the data into a data base program, and merges the data to determine species catch weights by area. This is done by taking the ratio of estimated weights in the VTR and applying those ratios to the landed weights from either the LR or the DR (in the absence of an LR).

- d) *100% DMP*: If the product is being trucked from the landing port to the auction or plant the vessel may be met by a RM who will check and record the number of totes/boxes loaded onto the truck as well as the vessel's holds to see that all the fish has been offloaded. The RM does not necessarily attend every truck offload, but often enough so the vessel operator believes the probability is high. The RM collects the VTR from the vessel.

Once the product reaches the location where it will be sorted and weighed (either by truck or the vessel lands at that location) it cannot be offloaded (from the truck or the vessel) until a DM is present. The DM will arrive 15 minutes prior to the scheduled offloading time (in some cases the offloading time will be consistent with the hail-in but often it may be coordinated by the plant and communicated to the dockside monitoring contractor). The DM will be present to monitor and record the sorting and weighing of the product. The DM completes an LR for the monitored product from each vessel and collects the VTR (if not already collected by the RM).

The contractor receives and reviews the applicable reports (LR and VTR) for completeness, enters the data into a data base program, runs edit checks, and merges the data to determine species catch weights by area. This is done by taking the ratio

of estimated weights in the VTR and applying those ratios to the landed weights from the LR. The contractor will also track variances between hailed and offloaded weights and DMP and DR weights.

An assumed discard rate mortality, based on the retained catch and the area fished, is applied and added to the landed weight mortality. The contractor then calculates total mortality by stock and deducts the mortality from the applicable vessel and sector allocations. Within 48 hours of receiving all of the data associated with a vessel trip, status reports are provided to the sector manager and NMFS. Sector managers and NMFS staff will also be able to monitor online vessel hail-out and hail-in activity provided to the contractor.

Upon receiving the status reports, the sector manager reviews the catches against the vessel's and sector's allocations. If transfers are required between sector vessels, the sector manager will organize it with the appropriate vessels. If transfers are required between sectors, the sector manager will work with other sector managers and NMFS on the appropriate stock and volume of unutilized allocations to be moved.

The status reports from the contractor allow NMFS to monitor sector catch mortality (both landed and discard mortality) against the sector allocations. The information is also important for understanding requests from sector managers for transfers of ACE amongst sectors.

*Pros:*

- Independent verification of landings improves confidence in and accuracy of landed catch data
- More timely data management and reporting than Option 1 (where offloads are monitored)
- Improved compliance
- Improved TAC management

*Cons:*

- More expensive than Option 1
- Significant change from status quo
- No independent estimates of at-sea discards
- No independent estimates of species catch by area
- No incentive for fishermen to:
  - Reduce discards
  - Minimize mortality
  - Fish selectively
- Unable to reduce assumed mortality rate

- Option 3: Dockside Monitoring and At-Sea Monitoring**  
**HP + EM/ASOP + VMS + DMP + VTR**  
*a) < 100% EMP/ASOP*  
*b) 100% EMP + < 100% ASOP*  
*c) 100% EMP/ASOP*

*Description:* This option builds on Option 2 by adding independent monitoring of the catch at sea either through electronic monitoring (EMP) and/or at-sea observers (ASOP). We have assumed 100% DMP (Option 2 b) above) for all three sub-options, but the reader should realize that three additional sub-options could have been developed using Option 2 a) above (< 100% DMP + DR). The differences in options 3a), 3b) and 3c) are the level of at-sea monitoring. The level of at-sea monitoring will be a function of the risks and rewards (costs and benefits) of obtaining accurate and reliable information about catch and discards by area and species.

Prior to the start of a trip the vessel hails-out to the contractor their intentions to commence fishing, including when they will be leaving port and when they plan on landing. The vessel is given a hail-out number and records it in the VTR for that trip. The VMS system must be operating at all times and the VMS data continues to be collected by NMFS for enforcement purposes.

- d) < 100% EMP/ASOP:* When the vessel hails-out it is required to request at-sea monitoring. All gillnet and hook & line vessels and only trawl vessels fishing in a single area under mandatory retention can request electronic monitoring (EMP) equipment. Trawl vessels fishing multiple areas and/or not subject to mandatory retention must request an at-sea observer (ASOP).

Upon receiving the request, the contractor will advise the vessel operator whether or not they are required to take electronic monitoring or an at-sea observer for that trip. The decision to monitor a trip at-sea will be made by the contractor and based on a statistical model designed in conjunction with NMFS and industry to estimate area, species and vessel discard rates and compare monitored and unmonitored trips. If the vessel is required to have monitoring on board, they cannot leave port until the EMP equipment has been installed or until an observer has boarded. The contractor will install the equipment or have an observer onboard the vessel within 24 hours of the request. During the trip, the EMP equipment is mapping the vessel's location, speed, and direction and recording set and haul locations, fishing activity, and catch (retained and released). Observers are recording set and haul locations, estimating catch, collecting biological information and monitoring compliance with fishing rules (closed areas, gear restrictions, etc.).

- e) 100% EMP + < 100% ASOP:* When the vessel hails-out it is required to request at-sea monitoring. All gillnet and hook & line vessels and only trawl vessels fishing in a single area under mandatory retention can request electronic monitoring (EMP) equipment. Trawl vessels fishing multiple areas and/or not subject to mandatory retention must request an at-sea observer (ASOP).

For gillnet and hook & line vessels, and trawl vessels fishing in a single area under mandatory retention, the contractor will make arrangements for EMP equipment to be installed on the vessel if the equipment is not already on board.

For trawl vessels fishing in multiple areas, the contractor will advise the vessel operator whether or not they are required to take an at-sea observer for that trip. The decision will be made by the contractor and based on a statistical model designed in conjunction with NMFS and industry to estimate area, species and vessel discard rates and compare observed and unobserved trips. If the vessel is required to take an observer, they cannot leave port until an observer has boarded. The contractor will provide an observer for the designated departure time, provided that 24 hours of advance notice is given. During the trip, observers are recording set and haul locations, estimating catch, collecting biological information and monitoring compliance with fishing rules (closed areas, gear restrictions, etc.).

- f) *100% EMP/ASOP*: When the vessel hails-out it is required to request at-sea monitoring. All gillnet and hook & line vessels and only trawl vessels fishing in a single area under mandatory retention can request electronic monitoring (EMP) equipment. Trawl vessels fishing multiple areas and/or not subject to mandatory retention must request an at-sea observer (ASOP).

For gillnet and hook & line vessels, and trawl vessels fishing in a single area under mandatory retention, the contractor will make arrangements for EMP equipment to be installed on the vessel, within 24 hours, if the equipment is not already on board.

For trawl vessels fishing in multiple areas, the contractor will make arrangements for an observer to meet the vessel within 24 hours of the request. The vessel cannot leave port until an observer has boarded. During the trip, observers are recording set and haul locations, estimating catch, collecting biological information and monitoring compliance with fishing rules (closed areas, gear restrictions, etc.).

Upon completion of harvesting activities the vessel hails-in to the contractor the vessel's landing time and location, if the product is being trucked, offloading time, where the fish is going (auction, processing plant), and the scheduled time for the plant to receive the fish. The vessel also hails-in the estimated total weight of fish being offloaded and the major species categories (this is done to aid the contractor in scheduling dockside monitors), requests a RM (in the case where the product is being trucked) and/or a DM (to monitor the catch at the location it is being sorted and weighed). The vessel is given a hail-in number and records it in the VTR for that trip. The vessel submits their completed VTR to the contractor either at the point of offloading (the VTR is given to the RM or DM).

If the vessel had an observer on the trip, the observer disembarks and submits a completed Observer Report (OR) from the trip. If it was an EMP trip, the RM or DM may board the vessel to remove and replace the hard drive.

For gillnet and hook & line vessels, the contractor reviews the trip EMP data and compares a percentage of the monitored sets with the VTR information (it is possible that the EMP data may cover several trips and would be compared with corresponding VTRs from different trips). If the data match within acceptable error limits, the entire VTR data is accepted as accurate. If the error level is too high, an additional percentage of EMP data will be compared with VTR data (at the vessel owner's expense – the owner has an incentive to accurately complete the VTR). If there continues to be an unacceptable level of discrepancy between the VTR and the EMP data, the entire EMP data will be reviewed and the Electronic Monitoring Report (EMR) will replace the VTR as the accurate record for the trip.

For trawl vessels fishing in a single area under mandatory retention, the contractor will review the EMP data to confirm that the vessel fished in only one area, that the area matches with the VTR, and that there were no discards. If there are no violations, the VTR will be considered an accurate record.

If the product is being trucked from the landing port to the auction or plant the vessel may be met by an RM who will check and record the number of totes/boxes loaded onto the truck as well as the vessel's holds to see that all the fish has been offloaded. The RM does not necessarily attend every truck offload, but often enough so the vessel operator believes the probability is high. The RM collects the VTR from the vessel (and may collect the hard drive).

Once the product reaches the location where it will be sorted and weighed (either by truck or the vessel lands at that location) it cannot be offloaded (from the truck or the vessel) until a DM is present. The DM will arrive 15 minutes prior to the scheduled time identified by the hail-in. The DM will be present to monitor and record the sorting and weighing of the product. The DM completes a Landing Report (LR) for the monitored product from each vessel and collects the VTR (if not already collected by the RM).

The contractor receives and reviews the applicable reports (LR, VTR, EMR, and OR) for completeness, enters the data into a data base program, runs edit checks, and merges the data to determine species catch weights by area. This is done by taking the ratio of estimated weights in either the VTR or EMR for gillnet, hook & line and single area mandatory retention trawl trips and applying those ratios to the landed weights from the LR. For multi-area trawl trips this is done by taking the ratio of estimates from the OR and applying them to the landed weights from the LR.

For all trips where an observer or electronic monitoring is not required, an assumed discard rate mortality, based on the retained catch and the area fished, is added to the landed weight mortality. For EMP and ASOP trips the discard mortality is calculated by applying established species mortality rates to the estimates of discards from the VTR, EMR, or OR. When applicable, the sector manager will use the at-sea monitoring mortality estimates to request a reduction/exemption from the assumed mortality rate established by NMFS.

The contractor then calculates total mortality (discarded plus retained) by stock and deducts the mortality from the applicable vessel and sector allocations. Within 48 hours of receiving all of the data associated with a vessel trip, status reports are provided to the sector manager and NMFS. Sector managers and NMFS staff will also be able to monitor online vessel hail-out and hail-in activity provided to the contractor.

Upon receiving the status reports, the sector manager reviews the catches against the vessel's and sector's allocations. If transfers are required between sector vessels, the sector manager will organize it with the appropriate vessels. If transfers are required between sectors, the sector manager will work with other sector managers and NMFS on the appropriate stock and volume of unutilized allocations to be moved. The sector manager will also resolve disputes involving discrepancies between the VTR and EMP data (proper completion of VTR, keypunching errors, etc.), between the skipper and the observer (species identification, estimates of catch and discards, etc.), or between monitor and unmonitored trips.

The status reports from the contractor allow NMFS to monitor sector catch mortality (both landed and discard mortality) against the sector allocations. The information is also important for understanding requests from sector managers for transfers of ACE amongst sectors.

*Pros:*

- Independent verification of landings improves confidence in and accuracy of landed catch data
- Independent verification of estimated catches (retained and discarded) by species and area
- More timely data management and reporting than Options 1 or 2
- Improved compliance
- Improved TAC management
- Improved information for stock assessment
- Provides incentives for vessels to fish selectively, reduce discards and discard mortality, and accurately report catch
- Can increase sector allocation by seeking reduction/exemption from assumed mortality rate

*Cons:*

- More expensive
- Significant change from status quo

## A PHASED APPROACH

Forcing too much change (and too much added expense) on the industry immediately would likely meet significant resistance and increases the difficulty of implementing constructive and proactive revisions to the management of the commercial groundfish fishery.

Adapting to sector and quota management (TACs, ACL, and ITQs) will, by itself, take time and result in changes to the fleet as sectors and vessels organize themselves, develop business plans, consolidate ACE, and learn how to maximize fishing and economic opportunities. The general experience in other jurisdictions (Canada), where fisheries have moved to quota management, is that there is an adjustment period, but the viability of the fishery improves. A financially healthy fishery is more capable of absorbing increased management costs.

Alternatively, no monitoring changes concurrent with the movement to sector management could lead to further discarding and catch misreporting as the opportunity and economic incentives to high-grade and misreport increase. The health of the resource also has a bearing on the economic value. The value of sector's and its members' allocation is related to the sustainability of the fishery. Therefore, it is important to find the right balance between changes to the management framework and monitoring requirements.

The options above should provide the basis for Sectors to develop base level monitoring programs. Such programs will take into account the size of their vessels, the areas they fish, the species they catch, the ACL, and financial impacts of more monitoring. For example, a sector may believe that Option 2 a) works best for them initially, but plan on moving towards Option 3 c) over time because they believe they can minimize discard mortality (through selective fishing, shorter sets, and better on deck handling) and increase their ACL by receiving an exemption from the assumed discard rate.

Government may also want to use the options to set minimum standards. For example, they may require Option 1 as the minimum standard for all vessels fishing in the common pool fishery (in effect the common pool is just like another sector that is subject to input controls). If Sectors want to have exemptions from the input controls, they may be required to have minimum monitoring requirements consistent with Option 2 a), 2 b) or 3 a). Sectors wanting exemption from the assumed discard rate may opt for Options 3 b) or 3 c). The Government and Sectors may also look at monitoring scenarios that combine 2 a) (less than 100% DMP + DR) with less than 100 % EMP/ASOP.

A phased in approach allows for smoother transition and enables government and industry to productively reprofile resources (financial and human) and for new monitoring infrastructure to be put in place and expand with the growing needs of the fishery.

## RECOMMENDATIONS

Based on the information collected and the various meetings with industry, government and other interested parties, it is apparent that changes are necessary in how the groundfish fisheries in the Gulf of Maine are monitored. Indeed, new legislation and the advent of sector management only serve to expedite and focus the discussion on necessary and overdue monitoring improvements.

The following recommendations acknowledge the need to make changes and the difficulties associated with change in an industry facing increasing market competition, growing economic instability, and uncertain future resource availability:

**Recommendation 1: Option 1 should be the minimum monitoring requirements for the common pool fishery.** Even with input controls, the proper management of TACs requires the collection of catch data from the common pool fishery in a timely manner. The current process for collecting catch data takes three months or longer and makes it difficult for fishery managers to monitor the success or failure of management measures and intervene judiciously to avoid excess harvesting.

**Recommendation 2: Sector monitoring should be phased in over a three year period with Option 2 (dockside monitoring) being required in year 1 and Option 3 (at-sea monitoring) required by year 3.** The industry and government will be going through significant change as it moves to sector management. They will need time to organize and develop the infrastructure (sector organization, data systems, monitoring capacity, ACE trading network, communications, etc.) to accommodate such change.

**Recommendation 3: During the first 5 years the monitoring program should be contracted to a single service provider.** Currently, there is no centralized data management system suitable for sector based fishery management and development of one would likely be more efficient and representative after the monitoring program components have been implemented and the bugs worked out. In the interim, the service provider will need to develop in-house systems to accommodate the various forms of information collected (hails, VTRs, EM, ASOP, DMP, DR). The use of a single service provider will ensure that:

- the data collection methods and requirements are consistent across all sectors
- there is an integrated monitoring program with all the necessary elements
- there is a common conduit for reporting all information from all user groups

Furthermore, during the first years of the program, there will be data issues that need to be resolved (i.e. DMP data doesn't match up with VTR data, EM data doesn't match up with VTR, ASOP estimates greatly differ from DMP data) by looking directly at the various data collection processes and products. This would be more difficult in a multi-contractor scenario. There are also economic efficiencies to be gained. As the program develops the contractor can make adjustments between program components (i.e. use more EM and less ASOP, have more at-sea observers and less dockside monitors). Additionally, there will not be the costs of redundant infrastructures associated with multi-service providers.

**Recommendation 4: The contractor should be selected through a competitive bidding process coordinated by a government agency.** The need for a single service provider during the first 5 years of the program, the lack of a comprehensive industry organization, issues concerning data confidentiality, and the likelihood of multi-source (government, industry, outside sources) funding arrangements supports having a government agency (NMFS or the Atlantic State Fisheries Commission) act on behalf of the industry as the contractor of monitoring services. This could change over time as industry matures and takes on greater responsibility for the management of the groundfish resource (a natural evolution under quota management). The competitive bidding and selection process should be transparent and involve industry. The process will provide clarity to the work required, obligate potential service providers to identify implementation plans and deliverables, and enable government and industry to evaluate the selected service provider's performance.

**Recommendation 5: Some, but not all, costs should be borne by industry.** While there is clearly rationale for government to absorb some of the costs for monitoring program, there are also important reasons for industry to burden some of the program costs. Using the monitoring programs responsibly and efficiently is more likely if industry is sharing in the costs. Industry will also have a greater incentive to seek out program designs and improvements that minimize costs and better suit operational needs.

**Recommendation 6: There should be an annual program evaluation.** Evaluation is important to monitor the service provider's performance and to make necessary program operations and efficiency improvements. The annual evaluation should assess data quality, compliance, and procedures, and provide a comparative analysis (i.e. DMP vs DR, hails vs VTR, VTR vs DR, VTR vs EM/ASOP, etc.) and comprehensive summary of the fishery data (i.e. vessel activity, landings, distribution, offload amounts, monitoring time, etc.)

**Recommendation 7: There should be a comprehensive communications plan to prepare participants for the new monitoring initiatives, educate them on new and ongoing program requirements, allow for feedback, and identify necessary contacts.** All forms of communication should be used (websites, public meetings, mail-outs, e-mails, newspapers) to correspond with all potential participants. The information provided should not only identify the changes occurring but provide the rationale for the changes and the ongoing evaluation to be conducted.