

# Developing Effective Monitoring for the Northeast Multispecies Fishery: Methods and Considerations



White Paper

New England Fishery Management Council

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## Section 1: Program Goals and Objectives

In October 2011, the New England Fishery Management Council (NEFMC; “Council”) convened a workshop on lessons learned during the first year of sector management, which included both panels of sector representatives and breakout groups with a larger number of participants. In the panel that focused on monitoring and in each breakout group, many questions were raised that challenged the efficiency and effectiveness of the monitoring program for the New England groundfish fishery. While participants discussed many specific aspects of the program, both the panel and most of the breakout groups felt that it was necessary to reconsider the goals of the program and then determine whether the current program was the most cost-effective way to meet those goals.<sup>1</sup> The Groundfish Plan Development Team (PDT) has prepared this paper in response to those comments in order to assist the Council in designing a more effective program.

A comprehensive fishery monitoring program consists of both at-sea and shore-side components, and must be designed in a way that at-sea observers, dockside monitoring, and electronic monitoring (or whatever combination of the three are used) complement each other in order to collect the necessary data. These programs also augment or complement the federal Observer Program (NEFOP). Managers are faced with the difficult task of determining the nature of the monitoring and the desired levels of each type of coverage in order to achieve management goals.

Participants at the October NEFMC workshop stated overwhelmingly that affordability was their main concern in the design of a monitoring program. That principle is therefore assumed in this paper. Once program goals and minimum data needs are determined, calculations can be done to determine the most cost-effective way to achieve the desired outcomes. It would also be possible to identify basic requirements for the program and then secondary goals that could be considered as tiered advantages if they are cost-efficient.

The authority for requiring monitoring programs in U.S. fisheries is laid out in the Magnuson Stevens Fishery Conservation and Management Act (“Magnuson Act”). Under the discretionary provisions in §303(b)(8), the Magnuson Act states that:

“...Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, may require that one or more observers be carried on board a vessel of the United States engaged in fishing for species that are subject to the plan, *for the purpose of collecting data necessary for the conservation and management of the fishery*; except that such a vessel shall not be required to carry an observer on board if the facilities of the vessel for the quartering of an observer, or for carrying out observer functions, are so inadequate or unsafe that the health or safety of the observer or the safe operation of the vessel would be jeopardized.”<sup>2</sup> (Emphasis added).

While the Magnuson Act stipulates that observer programs have the purpose of collecting data necessary for conservation and management, it does not provide any further guidance on developing goals and identifying needs for such programs.

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<sup>1</sup> New England Fishery Management Council. 2011. Meeting Summary: “New England Fishery Management Council Sector ‘Lessons Learned’ Workshop”. Available at: [http://www.nefmc.org/nemulti/council\\_mtg\\_docs/Nov%202011/8\\_SectorWorkshopSummary.pdf](http://www.nefmc.org/nemulti/council_mtg_docs/Nov%202011/8_SectorWorkshopSummary.pdf) (last accessed February 14, 2012).

<sup>2</sup> 16 U.S.C. §1853. Sec. 303 “Contents of Fishery Management Plans”.

Current Management Goals:

The current rules for monitoring in the groundfish fleet were adopted in Amendment 16 to the Northeast Multispecies Fishery Management Plan (FMP).<sup>3</sup> It is important to note that the amendment adopted rules for industry-funded at-sea and dockside monitoring programs, but was largely silent on the interaction (in terms of objectives) between those programs and the NEFOP observer program. What is clear is that the industry-funded component was meant to gather additional data to build upon the NEFOP coverage and to facilitate operation of the sector management program. The amendment stated only one main goal for the industry-funded monitoring program, and did not explicitly make a link between the goal and the monitoring requirements. However, by looking at some of the language in the document it is possible to construct some information on what the overall purpose of monitoring was intended to be.

The clearest statement of the purpose of the monitoring program in Amendment 16 is this:

“The primary goal of observers or at-sea monitors for sector monitoring is to verify area fished, catch, and discards by species, by gear type. This data will be reported to the sector managers and to the NMFS. Electronic monitoring may be used in place of actual observers or at-sea monitors if the technology is deemed sufficient for a specific trip based on gear type and area fished.”<sup>4</sup>

However, based on other information in the document and the particular standards that it adopted for monitoring, there seem to be secondary goals or other purposes for which the program was intended. The requirements for sector operations plans included several references to both dockside and at-sea monitoring proposals that would provide adequate monitoring for ACE, as well as monitoring of sector regulations including landings and discards.<sup>5</sup> It is not clear what, if any, other sector regulations were meant to be included in that category. For the stated primary goal, it is also not clear whether the information is meant to be used to ensure that sectors do not exceed their allocations, or whether there was meant to be scientific or other components to the program.

Strategic Guidance for Setting Monitoring Goals in New England:

The United Nations Food and Agriculture Organization (FAO), in its handbook “Guidelines for Developing an at-Sea Fishery Observer Programme”, states that, “Observer programmes are usually implemented in order to generate data for both *fishery science* and *compliance* purposes,

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<sup>3</sup> New England Fishery Management Council (NEFMC). 2009. Amendment 16 to the Northeast Multispecies Fishery Management Plan. New England Fishery Management Council, Newburyport, MA.

<sup>4</sup> *Ibid.*, p. 109.

<sup>5</sup> “...A plan and analysis to show how the sector will avoid exceeding their allocated TACs (or target TACs if the allocation is in terms of DAS). This plan should include provisions for monitoring and enforcement of the sector regulations, including documentation of both landings and discards...detailed information about the sector’s *independent third-party weighmaster system* that is satisfactory to NMFS for monitoring landings and utilization of ACE... [and] detailed information about a monitoring program for discards.” *Ibid.*, p. 100.

which in turn serve wider *fisheries management* objectives.”<sup>6</sup> The handbook goes on to further delineate the two categories and concludes that a program must develop a balance between the two in accordance with management priorities and programmatic constraints. It also states that priority-setting and evaluation of constraints should ideally be performed when management plans are developed or updated, but that if no management priorities are available they can be assessed at the time of developing an observer program.

In 2008, two researchers from the Archipelago organization in British Columbia authored a paper evaluating monitoring and reporting needs for sectors in New England.<sup>7</sup> In the paper, they urged that, “The design of an effective and comprehensive monitoring program is guided by having a clear understanding of the objectives for the program.” Objectives were broken into categories based on whether they were objectives of managers or industry participants, and some were considered to be shared while others were distinct between the two groups. The objectives for managers included TAC management, quantifying total mortality, species and area management, timely information, improved stock assessment, and improved compliance. Industry’s monitoring objectives were listed as timely and accurate data, a level playing field, affordability, and economic benefits.

Another study that was conducted by MRAG Americas in order to develop principles for development of monitoring programs<sup>8</sup> found that goals should be established in similar categories to those described by the FAO and Archipelago studies. The reasons for establishing goals include science (conservation initiatives or stock assessment needs), management (assessing catch and landings), industry (community sustainability or value-added processing or marketing), and enforcement (enforcing regulations). In addition, they reason that goals for monitoring must be carefully crafted to ensure attainment of overall management goals, and that goal-setting must be adaptive and include regular evaluation and revision of the monitoring program through a formalized evaluation framework that is developed alongside the monitoring program itself. The MRAG paper goes on to identify several fisheries in Alaska and British Columbia that set goals for monitoring and illustrates how the monitoring program and evaluation were tailored to achieve those goals.

#### Goal-Setting in Other Regions:

In catch share fisheries around the world, comprehensive monitoring programs exist to meet the needs of science, management, compliance, and industry as outlined above. This paper will focus on three regions of Canada (Scotia-Fundy, Quebec, and Pacific) and the U.S. West Coast Groundfish Observer Program due to some general similarities with the New England groundfish

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<sup>6</sup> Davies, Sandy. 2003. Guidelines for Developing an at-Sea Fishery Observer Programme. Reynolds, Eric (ed.) FAO Fisheries Technical Paper 414. Available at <http://www.fao.org/DOCREP/005/Y4390E/y4390e00.htm>.

<sup>7</sup> McElderry, H. and B. Turriss. 2008. Evaluation of Monitoring and Reporting Needs for Groundfish Sectors in New England. Available at: <http://www.gmri.org/upload/files/GroundfishMonitoringNeedsFinalReportfinal.pdf>.

<sup>8</sup> MRAG Americas. 2011. Guiding Principles for Development of Effective Monitoring Programs. Available at: <http://blogs.edf.org/edfish/files/2011/05/MRAG-EDF-Guiding-Principles-for-Monitoring-Programs-Final-Final.pdf>

fishery. Some of these fisheries operate under ITQs and therefore may demand differing program objectives.

The Canadian framework for fisheries monitoring<sup>9</sup> differentiates between fishery monitoring and catch reporting, but considers them to be complementary processes that together provide a picture of how a fishery is operating. *Fishery monitoring* is defined as “observing and understanding the fishery and its dynamics... includ[ing] observation and examination of the catching and landing of fish and any related activities, such as counting of vessels and gear and sampling of any fish caught.” *Catch reporting* is defined as “providing information either verbally, in writing or electronically on the catch and other essential details related to the fishing activity (location, gear type, etc).” The framework suggests that monitoring and catch reporting are not activities that are clearly defined to be conducted by monitors alone.

“Monitoring is carried out by harvesters, First Nations and, increasingly, third party observers designated by DFO. Departmental staff including fishery officers, fishery guardians, fishery managers, biologists and scientists also conduct monitoring activities... Reporting is performed by harvesters or by fish buyers, off-loaders or contracted third party dockside monitors/observers... on behalf of harvesters.”

This approach suggests that the activities normally associated with monitoring may be performed by parties other than traditional observers if it is more sensible logistically or economically. The delineation of duties for each party in a monitoring program needs to be considered carefully in order to ensure accuracy of data, elimination of redundancy, and cost reduction. Following the framework, each region in Canada is able to create its own monitoring program based on local conditions, priorities and capabilities.

In the early years of the monitoring program in the eastern Canadian Scotia-Fundy region, an operations manual was developed that described the objectives and operations of the program.<sup>10</sup> These were relatively narrowly defined compared to some goals in other regions. The primary objectives were:

1. To maintain an observer presence of between 50% and 100% on all foreign vessels within the coverage area;
2. To maintain an observer presence of 10–15% on all domestic groundfish vessels greater than 30 m;
3. To gather information on fish stocks and fishing techniques to improve the state of knowledge in the areas of stock assessment, setting of TAC's, population dynamics, gear behaviour, etc;
4. To monitor and report on compliance with fisheries acts, regulations, and policies.
5. To provide senior management with relevant information necessary in the formulation of sound fisheries policies and regulations; and

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<sup>9</sup> Fisheries and Oceans Canada Pacific Region Fisheries and Aquaculture Management. 2010. Strategic Framework for Fishery Monitoring and Catch Reporting in the Pacific Fisheries. Available at: <http://www.pac.dfo-mpo.gc.ca/consultation/picfi-ipcip/docs/monrep-survdecl/stratfwk-cadre-strat-eng.pdf>

<sup>10</sup> Van Helvoort, Gus. 1986. Observer Program Operations Manual. Department of Fisheries and Oceans. Halifax, Canada. FAO Fisheries Technical Paper 275. Available at: <http://www.fao.org/DOCREP/003/S8480E/S8480E00.HTM>.

6. To assist the fishing industry when and where possible and to acquaint it with the goals of the observer program.

There were also two secondary objectives identified:

7. Pollution control monitoring; and
8. Protection of submerged telecommunication cables.

While these objectives are clearly identified, it is unclear what led to the goals describing specific coverage levels. It is likely that objectives three through five led to the development of goals one and two.

The Quebec region employs at-sea observers who are independent but accredited by the Department of Fisheries and Oceans. The program website describes its mandate, which is not necessarily equivalent to an objective but does define the purpose of the program. The mandate is defined as... “Allow[ing] for the collection of detailed, geographically co-ordinated information on the fishing effort, catches and discard at sea. This information, which would be difficult to collect through other programs, allows the DFO to meet its information needs” in the areas of conservation and protection, fisheries management, and science.<sup>11</sup>

In contrast, the more recently developed Pacific Canadian monitoring system has very broad and explicitly stated goals. The primary goal is, “To have accessible, accurate, and timely fisheries information, such that there is sufficient information and public confidence for fisheries to be managed sustainably and to meet other reporting obligations and objectives.”<sup>12</sup> A risk-based strategic framework has been developed for Pacific Canada in order to balance the biological, socioeconomic, management and other risks for Pacific fisheries and determine the highest priorities for monitoring. There is also a strategic approach to implementation outlined that puts the observer program into an effective overall monitoring system, including through the completion of a comprehensive information management system. Five main principles are identified to guide the application of the strategic framework: conservation and sustainable use, consistency and transparency, tailored requirements, shared accountability and access, and cost-effectiveness.

The West Coast Groundfish Observer Program’s (WCGOP) goal, as defined in the training manual for observers, is “to collect bycatch information that can be used to assess the total mortality of a variety of groundfish species.”<sup>13</sup> This very specific goal has been also stated

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<sup>11</sup> <http://www.qc.dfo-mpo.gc.ca/peches-fisheries/surveillance/observateur-observer-eng.asp>.

<sup>12</sup> Fisheries and Oceans Canada Pacific Region Fisheries and Aquaculture Management. 2010. “Summary of the Strategic Framework for Fishery Monitoring and Catch Reporting in the Pacific Fisheries. Available at: <http://www.pac.dfo-mpo.gc.ca/consultation/picfi-ipcip/docs/monrep-survdecl/summfwk-sommcad-eng.pdf>.

<sup>13</sup> (NWFSC) Northwest Fisheries Science Center. 2011. West Coast Groundfish Observer Manual April 2011 Catch Shares Training Manual. West Coast Groundfish Observer Program. NWFSC, 2725 Montlake Blvd. East, Seattle, Washington, 98112. p. 2-2. Available online at: [http://www.nwfsc.noaa.gov/research/divisions/fram/observer/pdf/cs\\_manual\\_2011/Chapter%202%20WCGOP%20April%20CS%202011.pdf](http://www.nwfsc.noaa.gov/research/divisions/fram/observer/pdf/cs_manual_2011/Chapter%202%20WCGOP%20April%20CS%202011.pdf).

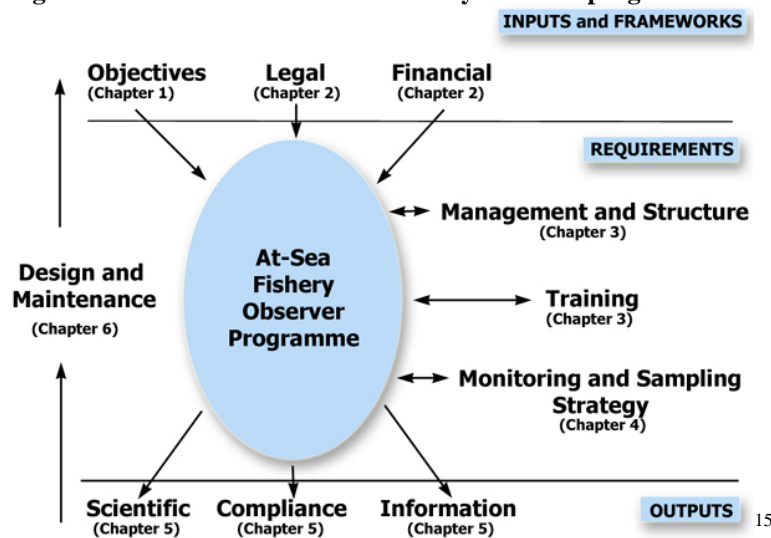
slightly differently as “to improve total catch estimates by collecting information on the discarded catch (fish returned overboard at-sea) of west coast groundfish species.”<sup>14</sup>

Together, these examples from other regions serve as examples of the types of goals that may be adopted in order to design a monitoring system that meets the most critical management objectives while keeping overall industry costs down.

Summary:

It is useful to keep in mind this overarching framework from the FAO guidelines in order to visualize how objectives fit into an overall monitoring program.

**Figure 1 – Structure for an at-sea fishery observer program**



The authority for creating fisheries observer and monitoring programs come from the Magnuson Act, but aside from allowing monitoring for collecting necessary data its guidance is vague. In the current groundfish rules for New England, Amendment 16 mentions the goal of verifying sector catch but some of the standards it adopts seem to imply other goals. Several guidance documents are available that describe different categories of goals. The FAO’s guidelines divides goals into those relating to science and compliance and the Archipelago report differentiates between managers’ and industry’s goals, while the MRAG report reiterates those categories and stresses the need for evaluation and adaptive planning. While all the reports outlined the need to identify goals and principles for monitoring in order to craft a closely-tailored, cost-effective, and useful system, they also noted that goals may need to change based on changing data needs, and should be reviewed periodically.

<sup>14</sup> Bellman, M.A., A.W. Al-Humaidhi, J. Jannot, J. Majewski. 2011. Estimated discard and catch of groundfish species in the 2010 U.S. west coast fisheries. West Coast Groundfish Observer Program. National Marine Fisheries Service, NWFSC, 2725 Montlake Blvd E., Seattle, WA 98112. p. 6. Available online at: [http://www.pcouncil.org/wp-content/uploads/E2c\\_NWFSC\\_ELECTRIC\\_NOV2011BB.pdf](http://www.pcouncil.org/wp-content/uploads/E2c_NWFSC_ELECTRIC_NOV2011BB.pdf).

<sup>15</sup> Davies, S. 2003.



In other regions with mixed-stock fisheries that are managed by catch shares, different goals have been adopted that shape the structure of their monitoring systems. The Canadian framework for monitoring introduces the idea that monitoring and reporting information is necessary, as is the ability to gather it from different sources. In eastern Canada in the 1980's, monitoring goals were narrowly defined, and the Quebec region gathers information on catch, effort, and discards in order to support conservation, fisheries management, and science activities. The goals in Pacific Canada are broad-ranging but strategically closely tied to program implementation and periodic review, and in the West Coast groundfish fishery the goals are very specifically attached to estimating total mortality including discards.

The following table summarizes some example goals for a comprehensive monitoring program that have been gleaned from the above literature as well as comments at the NEFMC sector workshop. The goals are separated based on whether they relate to science or management goals as suggested by the FAO paper. Some of the items in the table may be contradictory or partially or wholly redundant with other items, but all are provided as possibilities for consideration. Also included is a statement of whether the goals are being met or performed by NEFOP at this time and, in some cases, the current sector at-sea monitoring program (ASM).

**Table 1 – Sample goals for monitoring programs**

Category	Goal	Does NEFOP Do This?	Notes
Science	Determine total catch and effort of target or regulated species	YES	
Science	Determine total catch and effort of non-target or non-regulated species	YES	
Science	Biological sampling	YES (NO DNA w/ASM)	Spawning condition, fish size, disease rates, shell condition?
Science	Environmental parameters	YES (LIMITED w/ASM)	
Science	Monitor for high-grading	YES	
Science	Determine condition of caught and released species	YES	
Science	Protected species monitoring or sampling	YES (NO DNA w/ASM)	
Science	Determining gear effectiveness	YES (LIMITED w/ASM)	
Science	Estimates of pollution levels	NO	
Science	Production estimation	YES if all discards assumed dead; otherwise estimates of viability must be applied to discards	Must include caution not to introduce a deployment bias
Science	Determine discard rate	YES	
Science	Quantify total mortality including discards	YES	
Science	Gather data to determine mortality rate	NO for groundfish (YES for some species - mammals, turtles, birds, sharks, sturgeon, tuna)	Species of fish, condition identifiers, gear used, fishing depth, or length of fishing time

Science	Determine catch by area	YES	
Science	Obtain accurate catch and effort information	YES	From BSAI crab rationalization
Science	Describe fishing practices	YES (LIMITED gear characteristics w/ASM)	From BSAI crab rationalization; Potential socioeconomic benefit
Compliance	Area and gear restrictions	YES	
Compliance	Illegal discarding	YES	
Compliance	Prohibited species	YES	
Compliance	Size limits	YES	
Compliance	Validate vessel logbooks	NO	
Compliance	Labeling of processed fish (?)	NO	
Compliance	Monitor overall ACL	YES	
Compliance	Monitor sector catch in order to prevent overage and coordinate ACE transfer	YES	
Compliance	Protection of non-biological resources	NO	I.e. shipwrecks, telecom cables in Canada
Other	Affordability	YES (i.e. competitive pricing with cost-to-value consideration)	
Other	Improved communication with fishermen	YES	
Other	Improve stock assessment inputs	YES	Coordination needed with NEFSC to determine how data can be improved for ready incorporation
Other	Promote fairness among industry participants	YES	
Other	Allow for improved business planning	DON'T THINK SO	
Other	Provide greater operation flexibility	YES	
Other	Remove need for certain management measures	NO	Rolling closures, trip limits, etc.
Other	Reduce management and/or biological uncertainty	YES	
Other	Improve asset value of allocations	YES	More clearly defined access and improved economic returns
Other	Develop timely entry of fishery data into searchable databases	YES	From BSAI crab rationalization
Other	Review monitoring program for effectiveness	YES	
Other	Have individual accountability	NO	From BSAI crab rationalization
Other	Transparency	YES	From Pacific Canada
Other	Consistency	YES	
Other	Tailored requirements for different fleet components	NO	
Other	Shared accountability and/or access	YES	

## **Section 2: Case Studies in Monitoring Requirements and Benefits in Other Regions**

*To be completed*

## **Section 3: Monitoring Program Standards**

*To be completed*

*Data Needs and Other Monitoring Outputs as Determined by Program Goals*

*To be completed*

*Current Requirements under Amendment 16: Are Goals Being Met?*

*To be completed*

*Other Considerations*

### **Observer Bias**

*To be completed*

### **Funding Mechanisms**

*To be completed*

### **Observer/Crew Interactions**

*To be completed*

*What Changes Are Needed to Meet Goals?*

*To be completed*

### **Dockside Monitoring**

*To be completed*

### **At-Sea Monitoring**

*To be completed*

### **Electronic Monitoring**

*To be completed*

## **Section 4: Conclusions and Next Steps**

*To be completed*