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DRAFT MEMORANDUM

DATE: July 22, 2010

TO: Herring Committee Members

FROM: Lori Steele, Herring PDT Chair

SUBJECT: **Costs Associated with Catch Monitoring in the Atlantic Herring Fishery – Preliminary**

The purpose of this document is to begin to examine the costs of increasing monitoring in the Atlantic herring fishery, with specific focus on the costs associated with at-sea monitoring, or observer coverage. Operating costs and revenues are also presented to compare with and interpret the costs of observer coverage. Preliminary findings include:

- The full-cost of an observer day to the nation is $1,200 per day.
- The costs of observer, relative to producer surplus are not known.
- Relative to median operating costs, the costs of monitoring would be large: 120% of the daily operating costs for purse seine vessels and 59% of the daily operating costs for trawl vessels.
- The cost of comprehensive monitoring through observer coverage would be approximately 10% of the revenue of the fishery.
- The benefits of monitoring to the herring fishery and other commercial fisheries are unknown, but expected to be positive.
- The benefits of monitoring to the ecosystem are unknown, but expected to be positive.

Table 1 Summary Table of Preliminary Cost Information

	Total Estimated Cost
100% Observer Coverage	Between $1.88 Million and $2.36 Million
Dockside Monitoring	$127,000 for 50% of MA Landings $106,000 for ME DMR Program
Electronic Monitoring	
Owning	$8,950
Installation (per hour)	$36
Renting (per day)	$45
Daily Observer Coverage	$1,200
Median Cost per Day for Fishing Vessels	
Trawl, 2009	$2,525
Seine, 2009	$1,137
Trawl, 2008	$3,400
Trawl, 2008	$1,845
Median Cost per Trip for Fishing Vessels	
Trawl, 2009	$7,550
Seine, 2009	$2,035
Trawl, 2008	$9,400
Trawl, 2008	$2,893

The Amendment 5 catch monitoring program will presumably apply to vessels with limited access Category A (all management areas) and B (Areas 2/3 only) permits, and possibly to some or all limited access Category C permits. Table 2 summarizes the number of limited access permits held in the fishery since the implementation of Amendment 1 during the 2007 fishing year. There are about 48 Category A/B vessels in the Atlantic herring fishery, about 60% of which were active in the fishery from 2007-2009 (*active* is defined for this document as landing 2,000 pounds or more Atlantic herring).

Table 2 Number of Limited Access Herring Permits and Number of Active Limited Access Herring Vessels by Permit Category 2007-2009

	Number of Permits		Number of Vessels with 2,000 Pounds or More Herring Landings	
	Cat A/B	Cat C	Cat A/B	Cat C
2007	44	41	29	9
2008	48	56	28	7
2009	48	52	28	11

Based on dealer weighout reports, herring revenues by permit category during the 2008 fishing year were:

- Category A - $19.9 million;
- Category B – cannot report, less than three vessels;
- Category C - $19,500;
- Category D - $86,700.

A preliminary examination of 2009 dealer data suggests that the value of Atlantic herring landed by all permit holders during 2009 was approximately $22.5 million.

Note that in 2008 and 2009, TACs for Atlantic herring were substantially higher than they are for 2010-2012.

Costs of at-Sea Monitoring

The cost of an observer-day to the National Marine Fisheries Service in the Northeast Region is approximately $1,200. This includes marginal costs as well as an allocation of quasi-fixed costs associated with training observers, gear, data processing, and data storage.

Data provided by Maine DMR was used to calculate the total number of days fished by each limited access herring vessel. These were then aggregated by permit category. Results are presented in Table 3. Based on historical fishing patterns, 100% observer coverage on Category A/B vessels would cost between $1.88M and $2.36M per year. The herring fishing industry is likely to spend *fewer* days fishing in the future due to reductions in ACLs. Therefore, the cost of at-sea monitoring of the Category A and B vessels reported in this analysis may be interpreted as an *upper bound* of the cost of monitoring.

Category C vessels are only counted in Table 3 if they landed herring on a trip. The cost of observation should be regarded as a *lower bound* on the cost of monitoring the Category C vessels, when combined with Category A and B vessels. This analysis presumes that an observer would be placed to a Category C vessel only on trips that land more than 2,000 pounds of herring. The summary information presented in Table 4 suggests that costs could increase significantly if monitoring requirements are extended to Category C permit holders on all trips, not just herring trips.

Days fished and the costs of monitoring for the 2000-2006 period are presented in Table 3 for comparison purposes.

Table 3 Aggregate Days Fished and Implied Costs of At-Sea Monitoring for 2000-2009 by Herring Permit Category

	Category 1		Category 2		Category A/B		Category C	
	Days	Cost	Days	Cost	Days	Cost	Days	Cost
2000	1,765	$2,118,000	236	$283,200				
2001	2,676	$3,211,200	46	$55,200				
2002	2,178	$2,613,600	49	$58,800				
2003	2,302	$2,762,400	246	$295,200				
2004	2,019	$2,422,800	135	$162,000				
2005	2,077	$2,492,400	108	$129,600				
2006	2,025	$2,430,000	116	$139,200				
2007					1,700	$2,040,000	151	$181,200
2008					1,564	$1,876,800	22	$26,400
2009					1,969	$2,362,800	96	$115,200

Approximately 50 additional vessels possess limited access Category C permits (25 mt possession limit), but only about 20% (or less) of these vessels were active in the herring fishery from 2007-2009 (landed 2,000 pounds or more herring). Table 4 summarizes the **total** number of trips and days fished by Category C permit holders. The Herring Category-C permit holders were extracted from the Permit Databases, then cross-referenced with the Vessel Trip Report data for calendar years 2007, 2008, and 2009. Trips lasting a fraction of a day were rounded up to the next integer value. Both trips and days fished were then aggregated at the yearly level.

Table 4 Number of Trips and Days Fished By Category C Herring Permit Holders

Year	Trips	Days Fished
2007	2,832	5,252
2008	3,646	6,896
2009	3,407	6,605

Costs of Fishing

Variable cost data was extracted from NMFS datasets for observed trips which targeted herring using trawl and seine gear, and the cost-per-trip was calculated from the data. The data did not include the quasi-fixed of fishing such as wharfage, insurance, or capital (interest) costs. These costs also do not include gear/vessel damage costs. Fuel prices were imputed where missing. Seine vessels tend to fish for only one day, while trawl vessels tend to make multi-day trips. Cost-per-fishing day is presented in Table 5. Between 2003 and 2009, the median cost of a fishing day was $2,030 for trawl vessels and $1,000 for seine vessels.

Cost-per-trip is presented in Table 6. Between 2003 and 2009, the median cost of a fishing trip was $3,908 for Trawl vessels and $1,325 for Seine Vessels. Recently, costs are much higher due to the seasonal closure of Area 1A to trawl gear.

Benefits from Fishing

In 2007 and 2008, the herring fishery was worth approximately $19-20M in dockside revenues. Revenues are not necessarily a good measure of the benefits to the nation from the herring fishery. For example, herring is a commonly used bait in the lobster fishery. Disruption of bait supply may have large negative impacts on that fishery in a substitute bait is not readily available.

Benefits of Monitoring

The benefits of at-sea monitoring *to the herring fishing industry* are *unknown*. Relative to the status quo, there are few, if any, benefits to at-sea monitoring for the herring fishery. However, there may be benefits to at-sea monitoring relative to other management strategies under consideration.

The benefit of at-sea monitoring *to other fisheries is unknown, but likely to be positive*. The magnitude of benefits for other commercially harvested species, particularly species which are frequent bycatch in the herring fishery are *unknown*. These benefits depend on the bycatch level and life history traits of those species. At- sea monitoring may alter behavior of fishing vessels, leading to lower bycatch of some species, thereby increasing the amount of fish available for those directed fisheries. The magnitude of this effect is unknown. The magnitude of benefits to *non-commercially harvested species is unknown, but is likely to be positive.*

At-sea monitoring should also produce better estimates of bycatch, which should increase the precision of stock assessments for those species. This may allow for higher ACLs, ACTs, or ABCs for those species; however, the magnitude of this effect is unknown.

Table 5 Median Costs Per Fishing Day, Grouped by Gear Type and Year (nominal dollars per day)

	Trawl		Seine	
	Cost per Day	Number of Vessels	Cost per Day	Number of Vessels
2003	$1,140	(n=25)	--	--
2004	$1,542	(96)	$517	(n=26)
2005	$2,065	(115)	$970	(45)
2006	$2,350	(36)	--	--
2007	$2,425	(28)	$1,350	(11)
2008	$3,400	(57)	$1,845	(28)
2009	$2,525	(41)	$1,137	(15)
Total	$2,030	(438)	$1,000	(125)

Costs of observer coverage ($1,200 per day) are high relative to operating costs of fishing vessels. Costs of fishing have increased since 2003-2004 due to increased fuel prices and the seasonal closure of Area 1A to trawl vessels.

Table 6 Median Costs per Trip, Grouped by Gear and Year

	Trawl		Seine	
	Cost per Trip	Number of Vessels	Cost per Trip	Number of Vessels
2003	$2,500	(n=25)	--	--
2004	$1,820	(96)	$518	(n=26)
2005	$4,130	(115)	$1,100	(45)
2006	$2,590	(36)	–	--
2007	$8,675	(28)	$1,631	(11)
2008	$9,400	(57)	$2,893	(28)
2009	$7,550	(41)	$2,035	(15)
Total	$3,908	(438)	$1,325	(125)

Costs of observer coverage ($1,200 per day) are high relative to operating costs of fishing vessels, especially for vessels that fish with purse seines. Costs of fishing have increased since 2003-2004 due to increased fuel prices and the seasonal closure of Area 1A to trawl vessels.

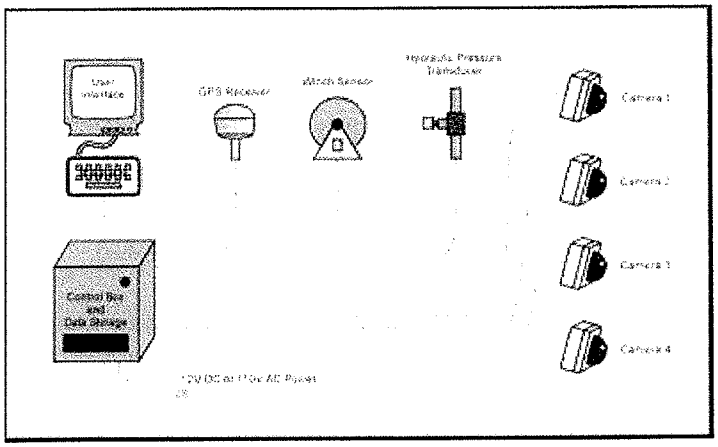
Costs of Dockside Monitoring

The costs of dockside monitoring of 50% of the herring catch in Massachusetts has been estimated at $127,000 per year. The cost of monitoring a portion of the herring catch in Maine has been estimated at $106,000 per year.

Costs of Electronic Monitoring – VBEM (Archipelago)

Below is a description of the most widely used third-party monitoring system, provided by Archipelago Marine Research Limited (Figure 1). The costs associated with this system are based on the Canadian Pacific Groundfish Fishery.

Figure 1 Common Design for Archipelago VBEM System



Rental and Purchasing Fees (Archipelago)

- $55/day rental for entire custom design weather and tamper-proof system – includes keyboard, monitor, CPU, 2 cameras, hydraulic pressure transducer, winch sensor, and GPS receiver
- $45/day rental for keyboard and CPU if vessel owner has purchased the peripherals (cameras, sensors, monitor - cost of $2000)
- $8950 to purchase entire system

Along with these various options for rental, there is also a rent to purchase plan where 95% of rental fee is applied against purchase price.

Installation and Analysis Fees (Archipelago)

- $36/hr servicing fee for installation, removal and repairs (average installation is 2-3 hours, average removal is 1 hour)
- $36/hr for analysis of logbook, imagery, and sensor data (analysis time ranges from 2 – 8 hours depending on trip length, # of sets and measurements, species diversity, and quality of data)

B.C. Groundfish Fishery – Monitoring Costs

In British Columbia, the groundfish fishery is managed through Individual Fishing Quotas (IFQs). The management system relies on 100% monitoring coverage to ensure up to date, accurate, and comprehensive accounting of catch for quota monitoring. Catch monitoring is achieved in three ways: first, there is 100% dockside monitoring by certified governmental observers; second, there are electronic monitoring systems that are strategically located on the vessels to monitor catch; and/or finally, there is the option to bring aboard an observer.

Dockside monitoring is achieved with 100% coverage by limiting the landing locations to 30 designated spots coast-wide. The landings are organized by species and the weighed on government-certified scales. After the catch has been sorted the dockside monitor records the numbers and the data is sent in along with the vessel-offloading log to the government for entry in to the Fishery Operation System (FOS).

- **Dockside Monitoring:** $72 per hour charge out rate for monitoring trawl offloads, $113 per hour for monitoring hook & line and trap offloads, and 15¢ per halibut tag
- **At-Sea Observers:** $567/day for a government certified at-sea observer (divided 30/70, government pays $202/day and the vessel pays $365/day)
- **Electronic Monitoring:** The pricing structure for the electronic monitoring equipment has been divided into three categories to facilitate easy integration regardless of financial capability at the time of purchase.
    - $55/day rental for entire custom design weather and tamper proof system – includes keyboard, monitor, CPU, 2 cameras, hydraulic pressure transducer, winch sensor, and GPS receiver
    - $45/day rental for keyboard and CPU if vessel owner has purchased the peripherals (cameras, sensors, monitor - cost of $2000)
    - $8950 to purchase entire system
    - They also implemented a rent to purchase plan where 95% of rental fee is applied against purchase price to more readily facilitate ownership of the technology.
    - Installation and Analysis fees
        - $36/hr servicing fee for installation, removal and repairs (average installation is 2-3 hours, average removal is 1 hour)
        - $36/hr for analysis of logbook, imagery, and sensor data (analysis time ranges from 2 – 8 hours depending on trip length, # of sets and measurements, species diversity and quality of data)

The costs of the monitoring program are distributed amongst the industry and the government. Industry pays for 100% of the dockside monitoring cost, hails, and 70% of the at-sea monitoring costs. The government is responsible for 100% of the fishery operations system (FOS) and 30% of the at sea monitoring costs. Industry costs are summarized in Table 7.

Table 7 Summary of Costs Associated with B.C. Groundfish Fishery Monitoring Program

FISHERY	Average Cost per Unit					Average Cost per Landed Pound					% Fishery Value
	Cost / Vessel	Cost / Trip	DMP / Trip	ASOP / day	EMP / day	BDC	DMP	ASOP	EM	Total	
BC Groundfish											
Hook and Line	$10,655	$1,618	$ 425		$ 154	$0.0020	$0.0240		$0.0660	$0.0910	3.05%
Bottom Trawl	$64,058	$3,897	$ 490	$ 558		$0.0005	$0.0050	$0.3300		$0.0380	7.58%
Midwater Trawl	$13,173	$ 589	$ 340		$ 107	$ -	$0.0020		$0.0010	$0.0040	3.71%

Source: PFMI 2009.

**DMP represents dockside monitoring program; ASOP represents at-sea observer program; EMP represents electronic monitoring program.*

***Approximately 300 vessels land a little more than 100,000 mt in the B.C. groundfish fishery.*