Draft Discussion Document

Industry-Funded Monitoring Omnibus Amendment

Observer Policy Committee
New England Fishery Management Council
September 28, 2015

Prepared by NOAA's National Marine Fisheries Service

Contents

Section 1: Summary of changes to IFM Amendment Environmental Assessment Relative to past Committee and Council Motions

*****All page numbers below reference the Draft Industry-Funded Monitoring Omnibus Amendment Environmental Assessment dated September 24, 2015.**

Section 1.0 Introduction and Background

- Revised to question and answer format, plain language (See pages 1-40)
- Included information on industry-funded monitoring levels for scallops and groundfish (See Q&A on p. 26 and 29)
- Included discussion of why NMFS and industry can't split cost of monitoring by some percentage (e.g., industry pays 30% and NMFS pays 70%) or dollar amount (e.g., industry pays $325, NMFS pays the rest) (p. 31)
- Included discussion on whether NMFS can accept funding from external groups to fund administrative costs for monitoring (p. 35)
- Included information on observer set-aside program for scallop fishery (See Q&As on pages 26 and 37)
- Included information on monitoring coverage levels in other fisheries/regions (See Q&A on p. 37)
- Included discussion of why IFM monitoring need government support/funding (e.g., can there be a fully industry funded program?) (See Q&A on p. 38)
- Revised the purpose and need for the herring and mackerel alternatives consistent with the July 1 Joint Herring/Observer Policy Committee motion (p. 39)

Section 2.1 Omnibus Alternative Description

- Expanded description of current monitoring types in the Greater Atlantic Region, namely NEFOP-level monitoring, fishery specific at-sea monitors, dockside sampling, and electronic monitoring (p. 43)

Standardized cost responsibilities

- Added NMFS estimated cost responsibilities for all current monitoring types in the Greater Atlantic Region (p. 49)
- Expanded description that EM/Portside for any fishery can be implemented via framework (throughout section)
- Included discussion of cost drivers for at-sea, electronic, and dockside monitoring programs (p. 62)

Standardized Monitoring Service Provider Requirements

- Included discussion of monitor education requirements (p. 76)
- Included information on Fair Labor Standards Act and Service Contract Act requirements with regards to direct contracts between service providers and industry (p. 78)
- Added discussion of considerations for streamlining the application process for observer service providers (p. 79)

Prioritization alternatives

- Discussed that weighting approach was optional for Councils if Omnibus Alternative 2.2 (Council-led Prioritization Process) is selected, but noted that this is the process that would be used if NMFS-led prioritization (Omnibus Alternative 2.1) is selected (p. 81)
- Added text to indicate that Joint Committee meeting most reasonable approach and forum to work through prioritization process (see Omnibus Alternatives 2.1 and 2.2)
- Expand coverage-ratio based prioritization alternative to include on favoring highest ratio and one favoring lowest ratio (See alternatives 2.4 and 2.5)
- Options for timing of NMFS- or Council-led prioritization are either 1) indefinitely until a new program is added or removed, or 2) every 3 years unless new programs are approved (p. 89)

Section 2.2 Herring Alternative Descriptions

- Discussed specific standards for herring industry funded monitoring service providers, including removal of requirement for herring monitoring service providers to not deploy observer on same vessel for more than 2 consecutive multi-day trips or more than twice in a given month, and noting that herring at-sea monitors would only be required to a high school diploma or equivalency (p. 122)
- Maintained Herring Alternative 2.1 in range, pending action by full Council
- Added description and costs of midwater trawl electronic monitoring and portside sampling program
- Discussed pre-implementation plan with EM/Portside alternative (p. 117)
- Moved fleet-based alternatives for herring monitoring coverage to considered but rejected (Section 2.2.3 on p. 125)
- Included alternative that would apply IFM monitoring requirements in groundfish closed areas (see Herring Alternative 2.6)
- Included 25% ASM option in Herring Alternatives 2.2 and 2.3
- Included wing vessel exemption option (See Herring Alternative 2 Sub-option 2)

- Included a 25 mt threshold to trigger IFM monitoring requirements (see Herring Alternative 2 Sub-Option 5)

Revised Impacts Analysis for of Herring and Mackerel Coverage Target Alternatives

- Expanded economic analysis to include fixed costs and operating costs of herring and mackerel vessels, including costs such as dockside pumping fees, and insurance, based on information obtained from a cot survey recently administered to industry participants
- Revised and expanded analysis of alternative packages on valued ecosystem components consistent with July 1 Joint Herring/Observer Policy Committee motions
- Will included effort, catch, and revenue information for groundfish closed areas (now in a separate document drafted by Lori Steele)
- Will include consideration of impacts of monitoring alternatives on other stocks and fisheries (groundfish) and in groundfish closed areas

Section 2: Omnibus Alternative 3--Framework Adjustment Process for Monitoring Set-Aside Programs

Alternative description

Omnibus Alternative 3 would include general language in the regulations of each fishery management plan (FMP) that would allow monitoring set-aside provisions to be implemented via framework adjustment. A monitoring set-aside program would devote a portion of the annual catch limit (ACL) from a fishery to offset the industry cost responsibilities for at-sea, electronic, or dockside monitoring. All potential monitoring set-aside programs should be considered as an alternative to off-set monitoring cost, and not be expected to fully cover monitoring costs. A majority of fisheries will not have enough value, capacity, or abundance/availability (i.e., stock size, distribution, etc.) to fully cover the costs of monitoring goals.

There are many possible ways to structure a monitoring set-aside program, and the details of each program would need to be developed on an FMP-by-FMP basis. One model for a monitoring set-aside program could consist of reserving some percentage of the ACL (e.g., up to 3 percent) for a particular fishery with possession limits to be allocated to certain vessels to help off-set the additional monitoring costs. In this example, if a vessel in that fishery is selected to carry an at-sea observer, that vessel would be granted a certain amount of pounds from the monitoring set-aside allocation to land above the possession limit. The revenue obtained from the sale of the additional landings would help offset the vessel's costs of carrying an at-sea observer. This example is very similar to the monitoring set-aside program that currently operates in the scallop fishery.

Absent this measure, a full FMP amendment would be required for all fisheries to implement a monitoring set-aside to defray industry costs for monitoring programs. **Adopting this measure would not implement a monitoring set-aside for any individual FMP.** Rather, it would expedite the development of monitoring set-aside provisions for FMPs in future framework adjustments.

Under Omnibus Alternative 3, the details and impacts analysis of any monitoring set-aside program would be specified and/or modified in a subsequent framework adjustment to the relevant FMP. These details may include, but are not limited to: (1) the basis for the monitoring set-aside; (2) the amount of the set-aside (e.g., quota, DAS, etc.); (3) how the set-aside is allocated to vessels required to pay for monitoring (e.g., an increased trip limit, differential DAS counting, additional trips, an allocation of the quota, etc.); (4) the process for vessel notification; (5) how funds are collected and administered from the industry to cover the costs of monitoring coverage; and (6) any other measures necessary to develop and implement a monitoring set-aside. Additional National Environmental Policy Act (NEPA) analysis would be required for any action implementing and/or modifying monitoring set-aside provisions, regardless if it required a framework adjustment or full amendment.

Considerations for monitoring set-asides

The text below outlines some of the concepts for the Councils and NMFS to consider when determining whether developing a future monitoring set-aside program for a given fishery could be successful.

Value of the resource

It is important to determine if the value of a monitoring set-aside program would be significantly beneficial for the goals of off-setting additional monitoring costs.

For example, in 2010, the stock wide Atlantic herring ACL was 201 million lb and the herring ex-vessel price was approximately $0.13/lb. Landings that year were approximately 145 million lb (approximately 72% of the ACL). If 3 percent of the ACL was set-aside for monitoring (6.03 million lb), that would equate to approximately $784,140 to cover monitoring costs in the Atlantic herring fishery. However, the fishery may only catch a portion of the monitoring set-aside. For example, if only approximately 72 percent of the monitoring set-aside was harvested, then only approximately $564,581 (72% of $784,140) would be available to cover monitoring costs for the entire fishery (all gear types and permit categories). There are also costs associated with fishing, and only the extra profits, not the full ex-vessel value, are a benefit to the fishermen.

Depending on the monitoring program in place, a set-aside would only partially cover monitoring costs. The high ex-vessel value of scallops currently allows for the scallop monitoring set-aside program to fully off-set the monitoring costs in the scallop fishery, but if ex-vessel value of scallops falls to a low enough level, it may not allow full funding in the future.

Management measures and fishery operations

When developing a monitoring set-aside program managers need to consider the operation of the fishery as well as the comprehensive management measures within a fishery to create a successful monitoring set-aside program. It is also important to consider fishery management partners when developing exemptions or measures for a monitoring set-aside program. Finally, and perhaps most importantly, there needs to be incentive and benefit to the vessels associated with the ability to harvest additional pounds to off-set additional monitoring costs.

In the scallop monitoring set-aside program, vessels can harvest additional scallops above the possession limit, or fish at a reduced days-at-sea accrual rate, when they carry an observer. This provides vessels additional revenue from that trip to off-set the costs of the observer. However, in a fishery like Atlantic herring, some limited access vessels do not have a regulated possession limit and often fish to the maximum capacity of the vessel. Since some vessels in this fishery do not have a possession limit, harvesting additional fish on a trip is not a useful option. However, there could be other management measure incentives such as allowing fishing during a closed season, in a closed area, or following a seasonal closure. However, benefits from such exemptions would only occur in some fisheries and may not offer an immediate return of funds to offset observer costs.

In the summer flounder, scup, and black sea bass fisheries, in addition to Federal possession limits, states often implement possession limits for these species. If vessels participating in these fisheries were provided exemptions to the Federal possession limits for a monitoring set-aside program, they would also need to be exempt from a state possession limit in order to land over the possession limit in that state. This type of monitoring set-aside program would require coordination with the states and the Atlantic States Marine Fisheries Commission, and create additional administrative burden for states.

ACL allocation within a fishery

FMPs use a wide range of structures to apportion ACLs to different fishery participants (e.g., commercial and recreational allocations). Monitoring set-aside program managers must consider how the ACL is distributed within the fishery when deciding how to structure the set-aside program. For example, in the Bluefish FMP, there is only one ACL from which a commercial and a recreational ACT are derived. If 3 percent of the ACL is allocated for a monitoring set-aside program, both the commercial and recreational ACTs would be reduced proportionally. However, it is most likely that only the commercial sector would have additional monitoring requirements, therefore the commercial fishery would benefit from the additional monitoring set-aside pounds to cover monitoring costs, but the recreational fishery would simply have a reduced quota.

On the other hand, Amendment 16 to the Northeast Multispecies FMP allows the Council to set sub-ACLs for groundfish stocks through framework adjustments. This vehicle could be used to create a monitoring set-aside program by designating sub-ACLs for some, or all, of the groundfish stocks. The landings allocated to those sub-ACLs could then be used to cover additional monitoring costs in that fishery. It is important to consider how quotas are allocated within the fishery and how to most appropriately distribute the monitoring set-aside pounds. As an aside, it is worth exploring whether the sub-ACL approach may be an alternative approach for establishing monitoring set-asides for the groundfish fishery.

Shared burden and benefit

It is important to consider whether the reallocation of quota for a monitoring set-aside program will be equally beneficial and/or burdensome to all fishery participants, and how monitoring set-aside programs could affect different permit categories or different gear types within a fishery. For example, in the Atlantic herring fishery, hypothetically a monitoring set-aside program would allocate 3 percent of the ACL to off-set monitoring costs. However, the monitoring alternatives under consideration for the herring fishery apply coverage to a subset of the herring fishery participants. For example, in some alternatives, the mid-water trawl vessels may be the only gear type that has industry-funded monitoring requirements. If a monitoring set-aside were established to offset the costs of this program, the mid-water trawl vessels would receive the benefits of additional pounds for monitoring costs, but the purse seine vessels would have a smaller annual quota to harvest, and may therefore endure increased hardship despite not having additional monitoring requirements.

In contrast, in the groundfish fishery, the burden of monitoring costs may be more evenly dispersed with the establishment of a monitoring set-aside program. Currently, not all vessels participating in sectors

are active in the fishery. Those inactive vessels lease their allocation to the active vessels, but the active vessels would be responsible for additional monitoring costs. If the monitoring set-aside program reserved 3 percent of the overall ACL, then the allocation to each vessel would be equally reduced, therefore sharing the burden more evenly among all participants in the fishery as opposed to just the active vessels.

Availability and prevalence of the resource

The health and availability of a fishery will dictate whether the fishery can sustain a monitoring set-aside program. For example, the Atlantic mackerel fishery has continually been underperforming and annual landings have been declining for approximately the past 10 years. At this time it is unclear if the mackerel stock is declining or if the fish are behaving differently in terms of migration or schooling. Providing mackerel vessels with additional pounds of fish to land to off-set additional monitoring cost would not be beneficial because the fish are predominately unavailable or unattainable and the quota has not been limiting.

Additionally, it is important to consider whether the monitoring set-aside program would affect fishing pressure on a sub-component of a stock. For example, if monitoring is only required for vessels fishing in certain areas, those vessels would be provided the additional monitoring set-aside pounds, and therefore could increase fishing effort in those areas. In this example, there may be disproportionate fishing pressure on a sub-component of the stock that exists in the area where additional monitoring is required. Managers need to consider the current health of the stock, the recent performance of the fishery, whether the current management measures appropriately address the potential for the effects of catch on different components of the stock, and how to create a dynamic monitoring set-aside program for changes in stock status and performance to develop a successful program.

Enforcement issues

How will the monitoring set-aside program be monitored and enforced to prevent abuse to the system? The Mid-Atlantic Research Set-Aside (RSA) program was recently suspended, in part due to issues revolving around enforcement and abuse of the program that resulted in overexploitation of some fisheries. Some monitoring set-aside models could be structured similarly to the Mid-Atlantic RSA program where vessels receive exemptions from certain regulations (i.e., possession limits or closed seasons/areas) to harvest monitoring set-aside pounds. Similar enforcement, monitoring, and reporting issues would need to be addressed when developing a monitoring set-aside program to prevent abuse and exploitation.

Estimated potential revenue for certain FMPs

An estimate of the amount of revenue that could be generated from a set aside is show in the table below. This table is generated using the lowest and highest average ex-vessel price of herring and mackerel from the 2010 - 2014 fishing years. Inability to locate either the herring or mackerel resources, reductions in ABCs, or lower prices would reduce expected revenues. In addition, changes to the management program (i.e., changes to the current unlimited possession limits for Category A herring

and Tier 1 mackerel permits) may be necessary, depending on the structure of the set aside. For the herring fishery, using 1 to 5 percent of the 2015 annual catch limit could fund 357 to 2,020 NEFOP-level monitoring days at $818 per seaday, and 411 to 2,327 at-sea monitoring days at $710 per seaday. For the mackerel fishery, using 1 to 5 percent of the 2015 annual catch limit could fund 110 to 1,131 NEFOP-level monitoring days at $818 per seaday, and 127 to 1,303 at-sea monitoring days at $710 per seaday.

Table 1. Potential proceeds from monitoring set-asides for the Atlantic mackerel and Atlantic herring fisheries, setting aside between 1 and 5 percent of the 2015 annual catch limit. Per metric ton prices are the average high and low prices between the 2010 and 2014 fishing years.

	2015 Total ACL	Available set-aside			Price per mt		Potential funding available to offset monitoring costs					
							5%		3%		1%	
Stock		5%	3%	1%	Low	High	Low	High	Low	High	Low	High
Atlantic herring	104,566	5,228	3,137	1,046	279	316	$ 1,458,696	$1,652,143	$875,217	$991,286	$291,739	$330,429
			Seadays at $818/seaday				1,783	2,020	1,070	1,212	357	404
			Seadays at $710/seaday				2,055	2,327	1,233	1,396	411	465
Atlantic mackerel	25,039	1,252	751	250	360	739	$450,702	$ 925,191	$270,421	$555,115	$ 90,140	$185,038
			Seadays at $818/seaday				551	1,131	331	679	110	226
			Seadays at $710/seaday				635	1303	381	782	127	261

Environmental Consequences of Omnibus Alternative 3: Framework Adjustment Process for Monitoring Set-Aside Programs

Effects on Biological Resources. Due to the nature of this alternative, which is limited to a decision regarding creating the mechanism needed to develop and implement monitoring set-aside programs, rather than actually implementing such programs, there are no direct or indirect effects on any biological resources (fishery resources, protected resources, or other non-fishery resources) anticipated for this alternative. Any impacts that may be associated with actually implementing a monitoring set-aside program through a framework adjustment to an FMP would be fully analyzed in the documents supporting the action.

Effects on the Physical Environment. Due to the nature of this alternative, which is limited to decisions regarding creating the mechanisms needed to develop and implement monitoring set-aside programs, there are no direct or indirect effects on any physical environment (including EFH) anticipated for this alternative. Any impacts that may be associated with actually implementing a monitoring set-aside program through a framework adjustment to an FMP would be fully analyzed in the documents supporting the action.

Effects on the Fishing Communities and Fishery-Related Businesses. The monitoring set-aside concept has the potential cost of removing harvest from a fishery, but the potential benefit of allowing parts of the fishery to defray costs for additional monitoring. However, due to the nature of this alternative, which is limited to decisions regarding creating the mechanisms needed to develop and implement monitoring set-aside programs, there are no direct or indirect socio-economic effects on fishing vessels, fleets, or ports anticipated for this alternative. Any impacts that may be associated with actually implementing a monitoring set-aside program through a framework adjustment to an FMP would be fully analyzed in the documents supporting the action.

Section 3: Possible revisions to Herring Alternatives 2.3 and 2.4

The Herring Advisory Panel and Committee expressed concern about the estimated costs of the electronic monitoring (EM) and portside sampling program for the midwater trawl fleet described in Herring Alternatives 2.3 and 2.4. In an attempt to address the Herring Advisory Panel and Committee concerns, the PDT/FMAT has developed a range of options to reduce estimated program costs.

The PDT/FMAT used the best available cost estimates to analyze the impacts of the proposed herring and mackerel coverage targets on fishing-related businesses. The costs for electronic monitoring and portside sampling used in the analysis in the draft environmental assessment are outlined in the table below. The assumptions used to generate these estimates are included at the end of this document.

Table 1: Summary of costs for Electronic Monitoring and Portside Sampling used in the Draft Environmental Assessment for the Industry-Funded Monitoring Amendment

Type of Monitoring	Electronic Monitoring	Portside Sampling
Industry Cost Responsibilities	**Year 1:** $15,000 start-up, plus $325 per seaday **Year 2:** $325 per seaday	$0.002 per lb

The cost estimates in the EA represent high-end estimates of program costs. While presenting and analyzing high-end program costs is alarming, it does give context for the potential impacts to industry, and is necessary in the absence of program cost estimates that directly match the Council's desired program design.

The electronic monitoring program estimate is based on very specific program design, and includes 100 percent video review. It is not clear how adjusting one aspect of program cost, for example, amount of video review, will affect other aspects of program cost. Thus, we are not able to reliably adjust variables related to program design within those estimates without making the estimates invalid.

The portside sampling estimate is based on the estimated cost of $5.12 per mt, based on the Massachusetts Department of Marine Fisheries (MA DMF) midwater trawl portside sampling program cost from 2010 to 2013. These costs include contracted port samplers, one full-time field coordinator, administration, supplies, and support to partner organizations. This cost includes program administration costs. We are unable to isolate the costs for portside sampling alone due to data confidentiality. We attempted to solicit service providers for cost estimates for the herring and mackerel at-sea monitoring and portside sampling programs as designed in the Industry-funded Monitoring Omnibus Amendment, but were unable to find three service providers willing to provide these estimates.

Options to revise EM/portside alternatives

We have very limited information available to show reductions the program cost estimates, however we revised our analysis of program costs in three ways:

1) **Used cost to review EM video footage only around haulback.** We were able to use information in the *Cost Comparison of At-Sea Observers and Electronic Monitoring for a Hypothetical Midwater Trawl Herring/Mackerel Fishery* (GARFO and NEFSC 2015) to generate an estimate of costs for an example EM program that would only review video around haulback. The report suggests that the data review costs (under "Data Services" costs) can be reduced by 51% if video is only reviewed around haulback. Only the data services costs are reduced with this change; equipment, field services, and program management costs were held constant with the pervious estimate. This change results in a per seaday cost of $248. This means that the **Year 1 costs would be $15,000 for equipment, plus $248 per seaday, and the Year 2+ costs would be $248 per seaday.**

   This reduction assumes that 100% of the video footage recorded around haulback is reviewed. NMFS and the Council may feel that reviewing a subset of haulback footage (e.g., 10% of all hauls or 15% of haulback video footage) is adequate to document retention on midwater trawl trips.

   We note that the analysis used review ratios (total video time/video review time) from the Pacific whiting project, which may not be entirely representative of the operational scenario for the herring or mackerel fleets.

   We also note that reductions in video review could affect a number of other variables, for example, the size of the hard drives necessary to record EM video footage. This adjusted estimate cannot account for other changes in program cost that may result from only reviewing video around haulback.

2) **Reduced percentage of trips covered with EM to 50 percent.** The most effective way to reduce costs of monitoring programs is to reduce total monitoring coverage level. We explored reducing both EM and portside sampling coverage to 50 percent for both the 100 percent video review EM program ($325 per seaday) and the haulback-only video review EM program ($248 per seaday). This means that we reduced coverage to 50 percent of trips.

3) **Reduced portside sampling coverage to 75%, 50% and 25%.** Consistent with a number of other herring and mackerel monitoring coverage alternatives currently under consideration, we evaluated the impact of reducing the amount of portside sampling coverage to 75%, 50% and 25% of seadays. Under these alternatives, we maintained 100% EM coverage with video reviewed only around haulback.

Summary of Modifications to Alternative 2.4

	Amount of EM Video Footage Review	EM Year 1 Startup Costs	EM Per Seaday Costs	Percentage of trips covered with EM	Percentage of trips covered with Portside Sampling
Alternative 2.4	100% (camera running all the time, all video reviewed)	$15,000	$325	100%	100%
Modification 1	Haulback Only (camera running only around haulback, 100% of haulback video reviewed)		$248	100%	100%
Modification 2	100%		$325	50%	50%
Modification 3	Haulback Only		$248	50%	50%
Modification 4	Haulback Only		$248	100%	75%
Modification 5	Haulback Only		$248	100%	50%
Modification 6	Haulback Only		$248	100%	25%

Discussion

The estimated reductions in returns-to-owner (RTO) for Alternative 2.4 are 44.3% in Year 1 and 35.1% for Year 2+ for paired midwater trawl and 23.7% for Year 1 and 12.5% for Year 2+ for single midwater trawl. While the reductions in RTO remained high for Year 1 across alternatives due to the initial investment in electronic monitoring equipment, reducing EM review to only around haulback, and reducing the level of portside sampling coverage led to lower reductions in returns to owner for Year 2+. All of the modifications have lower negative economic impacts on the average paired and single midwater trawl vessel than Alternatives 2.1 – 2.4 that are currently included in the Draft EA. The changes in program costs across the various modified alternatives is summarized in Table 2 below.

For modifications 4 – 6, the per seaday coast for Year 2 in Table 2 (highlighted in yellow) should be considered an average seaday cost for the entire year. The annual costs for portside sampling presented in the table are spread out over all of the trips that the vessel would take that year.

Practically, under modifications 4 – 6, vessels would pay the EM cost of $248 per seaday for each day at sea for all trips, and would then pay a cost for portside sampling for some subset of trips (25 percent, 50 percent, or 75 percent) that would fluctuate based on the amount of herring landed on that trip. Table 3 outlines the per trip cost for sampling based on a portside sampling cost of $5.12 per metric ton of herring, as well as the frequency of certain landings levels ranging from 25 mt to 454 mt. As an example, if a 3-day single mid-water trawl trip is selected for portside sampling and lands 300,000 lb of herring, the vessel would pay $248 per day for EM and $697 for portside sampling, for a total of $1,441 for the entire trip ($248 x 3 + $697), or an average of $481 per seaday.

We remind the readers that the portside sampling cost of $5.12 per metric ton used in this analysis, and the analysis in the Draft Environmental Assessment for the Industry-funded Omnibus Amendment, is the high end estimate of portside sampling costs because it includes program administration costs. The true portside sampling costs are likely to be lower than this estimate because fishery participants will not be expected to bear all of the costs for program administration. In addition, during the 2014 fishing year, 58% of all paired midwater trawl trips, and 72% of all single midwater trawl trips landed less than 300,000 lb of herring per trip. This means that, using the$5.12 per metric ton estimate, and assuming an average trip length of 3 days, a majority of trips can expect a portside sampling cost estimated at $232 per seaday.

Table 2.	Alt 2.4 - EM $325 per day; 100% Portside		Modification 1		Modification 2		Modification 3		Modification 4		Modification 5		Modification 6	
			Modified Alt 2.4 - EM $248 per day; 100% Portside		Modified Alt 2.4 - 50% EM at $325 per day; 50% Portside		Modified Alt 2.4 - 50% EM at $248 per day; 50% Portside		Modified Alt 2.4 - 100% EM $248 per day; 75% Portside		Modified Alt 2.4 - 100% EM $248 per day; 50% Portside		Modified Alt 2.4 - 100% EM $248 per day; 25% Portside	
	Paired MWT >1 lb	Single MWT >1lb	Paired MWT >1 lb	Single MWT >1lb	Paired MWT >1 lb	Single MWT >1lb	Paired MWT >1 lb	Single MWT >1lb	Paired MWT >1 lb	Single MWT >1lb	Paired MWT >1 lb	Single MWT >1lb	Paired MWT >1 lb	Single MWT >1lb
Total Revenue	$1.3M	$912,105	$1.3M	$912,105	$1.3M	$912,105	$1.3M	$912,105	$1.3M	$912,105	$1.3M	$912,105	$1.3M	$912,105
RTO	$163,080	$134,205	$163,080	$134,205	$163,080	$134,205	$163,080	$134,205	$163,080	$134,205	$163,080	$134,205	$163,080	$134,205
Cost of EM Year 1	$48,516	$22,300	$40,575	$20,570	$31,828	$18,703	$27,841	$17,826	$40,575	$20,570	$40,575	$20,570	$40,575	$20,570
Cost of EM Year 2	$33,516	$7,300	$25,575	$5,570	$16,828	$3,703	$12,841	$2,826	$25,575	$5,570	$25,575	$5,570	$25,575	$5,570
Cost of Portside	$23,684	$9,471	$23,684	$9,471	$11,403	$4,567	$11,403	$4,567	$17,763	$7,103	$11,842	$4,735	$5,921	$2,368
Total cost of monitoring Year 2	$57,200	$16,771	$49,259	$15,041	$28,231	$8,270	$24,244	$7,393	$43,338	$12,673	$37,417	$10,305	$31,496	$7,938
Per Seaday cost Year 2	$555	$762	$478	$684	$543	$752	$466	$672	$421	$576	$363	$468	$306	$361
EM & Portside as a % RTO -- Year 1	44.3%	23.7%	39.4%	22.4%	26.5%	17.3%	24.1%	16.7%	35.8%	20.60%	32.1%	18.9%	28.5%	17.1%
EM & Portside as a % RTO -- Year 2	35.1%	12.5%	30.2%	11.2%	17.3%	6.2%	14.9%	5.5%	26.6%	9.4%	22.9%	7.7%	19.3%	5.9%
Average # Seadays	103	22	103	22	52	11	52	11	103	22	103	22	103	22
					Portside sampling days				77	17	52	11	26	6

Table 3.		Paired MWT		Single MWT		
Pounds of herring landed	*MT of herring landed*	*Frequency*	*% of trips*	*Frequency*	*% of trips*	*Cost per trip at $5.12/mt*
Up to 25,000	up to 11 mt	9	4%	15	10%	$ 56
55,115	25	26	11%	40	27%	$ 128
100,000	45	30	12%	22	15%	$ 232
200,000	91	45	18%	25	17%	$ 464
300,000	136	32	13%	5	3%	$ 697
400,000	181	35	14%	8	5%	$ 929
500,000	227	28	11%	13	9%	$ 1,161
600,000	272	15	6%	7	5%	$ 1,393
700,000	318	7	3%	7	5%	$ 1,626
800,000	363	11	4%	3	2%	$ 1,858
900,000	408	6	2%	1	1%	$ 2,090
1,000,000	454	1	0%	1	1%	$ 2,322
More		0		1		
	Total trips	245		148		

Assumptions used to generate estimates of industry cost responsibilities in Draft Environmental Assessment for the Industry-Funded Monitoring Amendment

Midwater Trawl Portside Sampling Cost Estimate. The analysis uses estimated a cost of $0.002 per pound of herring landed, based on state dockside monitoring programs for herring, to analyze the economic impacts of Herring Alternative 2.3 and 2.4 and Mackerel Alternative 2.3 and 2.4.

Midwater Trawl Electronic Monitoring Cost Estimate. Sea day cost estimates for the example midwater trawl program presented in the electronic monitoring cost document include both one-time or periodic investments to implement and maintain the program, as well as ongoing annual operational program costs. Both the implementation and ongoing costs are summarized below, but additional detail is available in the full analysis, presented in the Appendix to the Draft EA. To account for startup costs, the electronic monitoring cost estimate includes a higher sea day estimate for Year 1 ($15,000 for start-up, plus $325 per seaday), and a lower sea day estimate for subsequent years ($325).

Start-up costs were binned into four broad categories: equipment, field services, data services, and program management. The example program model for the midwater trawl fishery assumes that 100 percent of the video from each trip is being reviewed and thus there are no additional data services costs associated with implementation of EM in the midwater trawl fishery. Implementation costs in the categories of equipment, field services, and program management represent different activities than under annual ongoing costs. Here, equipment costs include initial purchase and installation of the

cameras, associated sensors, integrated GPS, control box, and hard drives[1], at an average cost of $9,018 per vessel (Table 4). There may be additional costs, not estimated here, to make modifications to the vessels to accommodate the EM system, however because of the significant size of midwater trawl vessels, it is unlikely that many or expensive modifications would be needed.

Program management for implementation includes all the one-time labor, equipment, facilities, and administrative costs associated with getting the new EM program operational. The estimated program management cost was $31,439 (Table 4).

The field services costs of implementation are comprised of the technician's labor and travel associated with the installation of equipment, estimated here at $2,952 per vessel (Table 4). As with data retrieval services, the exact installation costs would depend on where the vessel was located relative to the technician's base of operations and the complexity of the installation.

The total estimated one-time investment of equipment, field services, and program management was $139,168 (Table 4). Divided equally among the 9 vessels in the example midwater trawl fleet, the total cost per vessel was $15,463 (Table 4).

Table 4: Electronic Monitoring Implementation Costs

	Average Estimated Cost	
Program Component	**Total**	**Per Vessel**
Equipment	$81,165	$9,018
Field Services	$26,564	$2,952
Program Management	$31,439	$3,493
Total	$139,168	$15,463

The average estimated annual ongoing costs for the midwater trawl electronic monitoring presented in the cost report was $472,391 (Table 5). This cost represents the ongoing annual operational costs of the EM program that would be expected to recur each year, including equipment, field services, data services and program management. The report assumed the camera systems would be purchased, instead of leased. Thus annual equipment costs estimated here include spare parts to replace broken or aging equipment, as well as licenses for the use of proprietary software. Field services includes labor, travel, and other costs associated with repairs, technical support, and retrieving hard drives from the vessels and shipping them to the service provider for analysis. Data services refer to the costs associated with review and analysis of the video, reporting to NMFS, and archiving of the data. Program management is composed of the costs of the day-to-day operations of the service provider for running

[1] For this analysis it was assumed that equipment was purchases rather than lease and therefore would represent an initial investment to be repeated periodically when the equipment needs to be replaced.

the EM program. The average estimated cost per sea day is $326[2], which was estimated by dividing the total program costs by 1,450 sea days (the total estimated sea days fished by the example midwater trawl fleet in the analysis).

Table 5: Annual Ongoing Electronic Monitoring Costs for Example Midwater Trawl Fleet

	Average Estimated Cost	
Program Component	**Total**	**Per Sea Day**
Equipment	$15,654	$11
Field Services	$112,490	$78
Data Services	$231,578	$160
Program Management	$112,669	$78
Total	$472,391	$326

In order to reduce the per-seaday EM cost presented in the cost analysis, we used the following text, found on page 15 of the cost analysis:

> "Ongoing annual costs are largely generated by data services (49 percent). Data services consist of video review and analysis, reporting and data archiving. Video review and analysis costs are driven by the amount of video being reviewed and the level of complexity of the review and analysis. For this cost exercise, we assumed that 100 percent of the video from each trip would be reviewed in order to identify discard events because discard events are a rare occurrence and low levels of review may miss them. Video review consists of a primary review and a discard compliance review. Primary review is the review of video during haul back and during catch sorting and pumping activities. Discard compliance review is the review of all remaining video not reviewed during primary review. The primary and discard compliance reviews have the same objective and are done in the same manner. Although both types of review can happen at greater than real-time speed, the review rate of the discard compliance review is typically faster than that of the primary review. The primary review observes video during fishing operations where on-board activity is more prevalent, resulting in slower review rates than the compliance review. Because the compliance review is applied to a greater portion of the total video, costs of the discard compliance review are generally greater than that of the primary review. Primary review accounts for 38 percent of data services costs while the discard compliance review accounts for 49 percent of data services costs. Due to the vast amount of footage generated from the hypothetical midwater trawl fleet's 500 trips, at 2.9 days each, the total review costs are substantial. We used review ratios (total video time/video review time) from the Pacific whiting project, which may not be entirely representative of an operational scenario."

[2] Sea day cost was calculated by dividing the total program cost by 1,450 sea days.

Based on this text, we reduced the data services costs by 49 percent to remove the discard compliance video review. This reduces the annual data services cost from $231,578 to $118,105, and reduces the per seaday cost for data services from $160 to $81. The updated cost of $248 per seaday, with review of 100 percent of the video footage recorded around haulback, is detailed in Table 6.

Table 6: Annual Ongoing Electronic Monitoring Costs for Example Midwater Trawl Fleet

	Average Estimated Cost	
Program Component	**Total**	**Per Sea Day**
Equipment	$15,654	$11
Field Services	$112,490	$78
Data Services	$118,105	$81
Program Management	$112,669	$78
Total	$472,391	$248

Herring 2.4 (100%) – EM cost at $248 per day

Per Vessel	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,338,354	$704,254	$912,105	$1,024,851
Annual Variable Costs	$318,252	$167,769	$264,620	$232,352
Annual Crew Share	$410,406	$213,633	$239,242	$297,854
Annual Repair/Maint/Haulout	$177,888	$98,231	$110,742	$90,131
Annual Fixed Costs	$268,728	$172,799	$163,296	$175,943
Annual Return-to-owner	$163,080	$89,827	$134,205	$310,157
Annual Cost of EM - year 1	$40,575	$11,532	$20,570	$4,057
Annual Cost of EM - year 2	$25,575	$11,532	$5,570	$4,057
Annual Cost of PS	$23,684	$15,503	$9,471	$16,229
Total Monitoring Costs as pct of RTO - year 1	39.4%		22.4%	
Total Monitoring Costs as pct of RTO - year 2	30.2%		11.2%	
Post-monitoring RTO -- year 1	$99,808	$75,633	$104,558	$293,665
Post-monitoring RTO -- year 2	$114,808	$75,633	$119,558	$293,665
Percent of Revenue from Herring	91.2%	9.5%	86.0%	16.3%
Percent of Revenue from Mackerel	13.9%	8.2%	15.5%	17.1%
Percent of Revenue from Squids			2.9%	
Percent of Revenue from Other Species	0.1%	0.1%	6.4%	15.5%
ASM as pct of herring RTO -- year 1	43.2%		26.0%	
ASM as pct of herring RTO -- year 2	33.1%		13.0%	
Average Number of Days at Sea	103	47	22	16
Average Number of Trips	34	16	18	18

Herring 2.4 (100%) – EM cost at $248 per day

Fleet Level	Paired MWT	Single MWT
Number of Vessels	8	8
Total Days at Sea	825	180
Total Number of Trips	275	140
Total Herring Revenue	$9,409,389	$3,873,778
Total Mackerel Revenue	$1,155,588	$570,248
Total Squid Revenue		$441
Total Other Species Revenue	$5,906	$50,421
Total Revenue	$10,570,883	$4,494,888
Total EM Cost - year 1	$324,600	$164,562
Total EM Cost - year 2	$204,600	$44,562
Total PS Cost	$189,470	$75,767
Total Monitoring Costs - year 1	$514,070	$240,329
Total Monitoring Costs - year 2	$394,070	$120,329
Monitoring Costs as pct of Total Revenue -- year 1	4.9%	5.3%
Monitoring Costs as pct of Total Revenue -- year 2	3.7%	2.7%
Monitoring Costs as pct of Herring Revenue -- year 1	5.5%	6.2%
Monitoring Costs as pct of Herring Revenue -- year 2	4.2%	3.1%

Herring 2.4 (50%) – EM cost at $325 per day

Per Vessel	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,338,354	$704,254	$912,105	$1,024,851
Annual Variable Costs	$318,252	$167,769	$264,620	$232,352
Annual Crew Share	$410,406	$213,633	$239,242	$297,854
Annual Repair/Maint/Haulout	$177,888	$98,231	$110,742	$90,131
Annual Fixed Costs	$268,728	$172,799	$163,296	$175,943
Annual Return-to-owner	$163,080	$89,827	$134,205	$310,157
Annual Cost of EM - year 1	$31,828	$7,448	$18,703	$2,642
Annual Cost of EM - year 2	$16,828	$7,448	$3,703	$2,642
Annual Cost of PS	$11,403	$7,366	$4,567	$7,793
Total Monitoring Costs as pct of RTO - year 1	26.5%		17.3%	
Total Monitoring Costs as pct of RTO - year 2	17.3%		6.2%	
Post-monitoring RTO -- year 1	$119,849	$81,592	$110,935	$301,490
Post-monitoring RTO -- year 2	$134,849	$81,592	$125,935	$301,490
Percent of Revenue from Herring	91.3%	9.4%	87.1%	14.7%
Percent of Revenue from Mackerel	14.2%	8.1%	15.5%	16.6%
Percent of Revenue from Squids			6.4%	
Percent of Revenue from Other Species	0.1%	0.2%	6.8%	16.1%
ASM as pct of herring RTO -- year 1	29.0%		19.9%	
ASM as pct of herring RTO -- year 2	19.0%		7.1%	
Average Number of Days at Sea	52	23	11	8

Herring 2.4 (50%) – EM cost at $325 per day

Fleet Level	Paired MWT	Single MWT
Number of Vessels	8	8
Total Days at Sea	414	91
Total Herring Revenue	$4,723,604	$1,945,129
Total Mackerel Revenue	$599,158	$313,537
Total Squid Revenue		$441
Total Other Species Revenue	$3,567	$33,188
Total Revenue	$5,326,329	$2,292,295
Total EM Cost - year 1	$254,625	$149,622
Total EM Cost - year 2	$134,625	$29,622
Total PS Cost	$91,224	$36,536
Total Monitoring Costs - year 1	$345,849	$186,158
Total Monitoring Costs - year 2	$225,849	$66,158
Monitoring Costs as pct of Total Revenue -- year 1	6.5%	8.1%
Monitoring Costs as pct of Total Revenue -- year 2	4.2%	2.9%
Monitoring Costs as pct of Herring Revenue -- year 1	7.3%	9.6%
Monitoring Costs as pct of Herring Revenue -- year 2	4.8%	3.4%

Herring 2.4 (50%) – EM cost at $248 per day

Per Vessel	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,338,354	$704,254	$912,105	$1,024,851
Annual Variable Costs	$318,252	$167,769	$264,620	$232,352
Annual Crew Share	$410,406	$213,633	$239,242	$297,854
Annual Repair/Maint/Haulout	$177,888	$98,231	$110,742	$90,131
Annual Fixed Costs	$268,728	$172,799	$163,296	$175,943
Annual Return-to-owner	$163,080	$89,827	$134,205	$310,157
Annual Cost of EM - year 1	$27,841	$5,683	$17,826	$2,016
Annual Cost of EM - year 2	$12,841	$5,683	$2,826	$2,016
Annual Cost of PS	$11,403	$7,366	$4,567	$7,793
Total Monitoring Costs as pct of RTO - year 1	24.1%		16.7%	
Total Monitoring Costs as pct of RTO - year 2	14.9%		5.5%	
Post-monitoring RTO -- year 1	$123,836	$82,317	$111,812	$301,887
Post-monitoring RTO -- year 2	$138,836	$82,317	$126,812	$301,887
Percent of Revenue from Herring	91.3%	9.4%	87.1%	14.7%
Percent of Revenue from Mackerel	14.2%	8.1%	15.5%	16.6%
Percent of Revenue from Squids			6.4%	#DIV/0!
Percent of Revenue from Other Species	0.1%	0.2%	6.8%	16.1%
ASM as pct of herring RTO -- year 1	26.4%		19.2%	
ASM as pct of herring RTO -- year 2	16.3%		6.3%	
Average Number of Days at Sea	52	23	11	8

Herring 2.4 (50%) – EM cost at $248 per day

Fleet Level	Paired MWT	Single MWT
Number of Vessels	8	8
Total Days at Sea	414	91
Total Herring Revenue	$4,723,604	$1,945,129
Total Mackerel Revenue	$599,158	$313,537
Total Squid Revenue		$441
Total Other Species Revenue	$3,567	$33,188
Total Revenue	$5,326,329	$2,292,295
Total EM Cost - year 1	$222,729	$142,604
Total EM Cost - year 2	$102,729	$22,604
Total PS Cost	$91,224	$36,536
Total Monitoring Costs - year 1	$313,954	$179,140
Total Monitoring Costs - year 2	$193,954	$59,140
Monitoring Costs as pct of Total Revenue -- year 1	5.9%	7.8%
Monitoring Costs as pct of Total Revenue -- year 2	3.6%	2.6%
Monitoring Costs as pct of Herring Revenue -- year 1	6.6%	9.2%
Monitoring Costs as pct of Herring Revenue -- year 2	4.1%	3.0%

Herring 2.4 (100% EM and 75% PS) – EM cost at $248 per day

Standard deviations not provided because this was not done through the simulation – just reduced average PS to 75%. Effort and percent revenue by species figures are for 100% of trips.

Per Vessel	Paired MWT	Single MWT
	Average	Average
Annual Gross Revenue	$1,338,354	$912,105
Annual Variable Costs	$318,252	$264,620
Annual Crew Share	$410,406	$239,242
Annual Repair/Maint/Haulout	$177,888	$110,742
Annual Fixed Costs	$268,728	$163,296
Annual Return-to-owner	$163,080	$134,205
Annual Cost of EM - year 1	$40,575	$20,570
Annual Cost of EM - year 2	$25,575	$5,570
Annual Cost of PS	$17,763	$7,103
Total Monitoring Costs as pct of RTO - year 1	35.8%	20.6%
Total Monitoring Costs as pct of RTO - year 2	26.6%	9.4%
Percent of Revenue from Herring	91.2%	86.0%
Percent of Revenue from Mackerel	13.9%	15.5%
Percent of Revenue from Squids		2.9%
Percent of Revenue from Other Species	0.1%	6.4%
ASM as pct of herring RTO -- year 1	39.2%	24.0%
ASM as pct of herring RTO -- year 2	29.1%	11.0%
Average Number of Days at Sea	103	22
Average Number of Trips	34	18

Herring 2.4 (100% EM and 75% PS) – EM cost at $248 per day

Fleet Level	Paired MWT	Single MWT
Number of Vessels	8	8
Total Days at Sea	825	180
Total Number of Trips	275	140
Total Herring Revenue	$9,409,389	$3,873,778
Total Mackerel Revenue	$1,155,588	$570,248
Total Squid Revenue		$441
Total Other Species Revenue	$5,906	$50,421
Total Revenue	$10,570,883	$4,494,888
Total EM Cost - year 1	$324,600	$164,562
Total EM Cost - year 2	$204,600	$44,562
Total PS Cost	$142,103	$56,825
Total Monitoring Costs - year 1	$466,703	$221,387
Total Monitoring Costs - year 2	$346,703	$101,387
Monitoring Costs as pct of Total Revenue -- year 1	4.4%	4.9%
Monitoring Costs as pct of Total Revenue -- year 2	3.3%	2.3%
Monitoring Costs as pct of Herring Revenue -- year 1	5.0%	5.7%
Monitoring Costs as pct of Herring Revenue -- year 2	3.7%	2.6%

Herring 2.4 (100% EM and 50% PS) – EM cost at $248 per day

Standard deviations not provided because this was not done through the simulation – just reduced average PS to 50%. Effort and percent revenue by species figures are for 100% of trips.

Per Vessel	Paired MWT	Single MWT
	Average	Average
Annual Gross Revenue	$1,338,354	$912,105
Annual Variable Costs	$318,252	$264,620
Annual Crew Share	$410,406	$239,242
Annual Repair/Maint/Haulout	$177,888	$110,742
Annual Fixed Costs	$268,728	$163,296
Annual Return-to-owner	$163,080	$134,205
Annual Cost of EM - year 1	$40,575	$20,570
Annual Cost of EM - year 2	$25,575	$5,570
Annual Cost of PS	$11,842	$4,735
Total Monitoring Costs as pct of RTO - year 1	32.1%	18.9%
Total Monitoring Costs as pct of RTO - year 2	22.9%	7.7%
Percent of Revenue from Herring	91.2%	86.0%
Percent of Revenue from Mackerel	13.9%	15.5%
Percent of Revenue from Squids		2.9%
Percent of Revenue from Other Species	0.1%	6.4%
ASM as pct of herring RTO -- year 1	35.2%	21.9%
ASM as pct of herring RTO -- year 2	25.2%	8.9%
Average Number of Days at Sea	103	22
Average Number of Trips	34	18

Herring 2.4 (100% EM and 50% PS) – EM cost at $248 per day

Fleet Level	Paired MWT	Single MWT
Number of Vessels	8	8
Total Days at Sea	825	180
Total Number of Trips	275	140
Total Herring Revenue	$9,409,389	$3,873,778
Total Mackerel Revenue	$1,155,588	$570,248
Total Squid Revenue		$441
Total Other Species Revenue	$5,906	$50,421
Total Revenue	$10,570,883	$4,494,888
Total EM Cost - year 1	$324,600	$164,562
Total EM Cost - year 2	$204,600	$44,562
Total PS Cost	$94,735	$37,883
Total Monitoring Costs - year 1	$419,335	$202,445
Total Monitoring Costs - year 2	$299,335	$82,445
Monitoring Costs as pct of Total Revenue -- year 1	4.0%	4.5%
Monitoring Costs as pct of Total Revenue -- year 2	2.8%	1.8%
Monitoring Costs as pct of Herring Revenue -- year 1	4.5%	5.2%
Monitoring Costs as pct of Herring Revenue -- year 2	3.2%	2.1%

Herring 2.4 (100% EM and 25% PS) – EM cost at $248 per day

Standard deviations not provided because this was not done through the simulation – just reduced average PS to 25%. Effort and percent revenue by species figures are for 100% of trips.

Per Vessel	Paired MWT	Single MWT
	Average	Average
Annual Gross Revenue	$1,338,354	$912,105
Annual Variable Costs	$318,252	$264,620
Annual Crew Share	$410,406	$239,242
Annual Repair/Maint/Haulout	$177,888	$110,742
Annual Fixed Costs	$268,728	$163,296
Annual Return-to-owner	$163,080	$134,205
Annual Cost of EM - year 1	$40,575	$20,570
Annual Cost of EM - year 2	$25,575	$5,570
Annual Cost of PS	$5,921	$2,368
Total Monitoring Costs as pct of RTO - year 1	28.5%	17.1%
Total Monitoring Costs as pct of RTO - year 2	19.3%	5.9%
Percent of Revenue from Herring	91.2%	86.0%
Percent of Revenue from Mackerel	13.9%	15.5%
Percent of Revenue from Squids		2.9%
Percent of Revenue from Other Species	0.1%	6.4%
ASM as pct of herring RTO -- year 1	31.3%	19.9%
ASM as pct of herring RTO -- year 2	21.2%	6.9%
Average Number of Days at Sea	103	22
Average Number of Trips	34	18

Herring 2.4 (100% EM and 25% PS) – EM cost at $248 per day

Fleet Level	Paired MWT	Single MWT
Number of Vessels	8	8
Total Days at Sea	825	180
Total Number of Trips	275	140
Total Herring Revenue	$9,409,389	$3,873,778
Total Mackerel Revenue	$1,155,588	$570,248
Total Squid Revenue		$441
Total Other Species Revenue	$5,906	$50,421
Total Revenue	$10,570,883	$4,494,888
Total EM Cost - year 1	$324,600	$164,562
Total EM Cost - year 2	$204,600	$44,562
Total PS Cost	$47,368	$18,942
Total Monitoring Costs - year 1	$371,968	$183,504
Total Monitoring Costs - year 2	$251,968	$63,504
Monitoring Costs as pct of Total Revenue -- year 1	3.5%	4.1%
Monitoring Costs as pct of Total Revenue -- year 2	2.4%	1.4%
Monitoring Costs as pct of Herring Revenue -- year 1	4.0%	4.7%
Monitoring Costs as pct of Herring Revenue -- year 2	2.7%	1.6%