

Options to address low selection rates in partial coverage

Prepared by the OAC Subgroup¹ for the Observer Advisory Committee
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Summary

In April 2017, the Council directed the Observer Advisory Committee (OAC) to consider options for increasing partial coverage selection rates. To address this, the OAC created a subgroup to work over the summer of 2017, to assess whether there are viable options that could increase selection rates and be an alternative to simply raising the observer fee. The subgroup’s task was to consider whether there are short-term options that can be addressed through changes to the ADP or the Catch Accounting System, and longer-term solutions that may involve regulatory change. An additional option, to consider whether there are changes to the partial coverage contract that could be incorporated by AGO on the Statement of Work for the rebidding of the contract, is mentioned in this paper, but was left to further discussion by the OAC in September.

This paper summarizes the scoping work conducted by the OAC subgroup for each of the options under consideration. The subgroup is not making specific recommendations about moving any of these options forward for further Council analysis, as that will be under discussion by the OAC. The subgroup did, however, highlight where an option does not seem to be viable under current conditions, and also identified next steps should the OAC want to recommend moving forward with the other options.

The scoping work is synthesized briefly in three summary tables in this section, and each option is discussed in further detail in the remainder of the paper. The three summary tables address: how the option would affect selection rates (Summary Table 1), implementation, workload, and next steps for the options (Summary Table 2), and a best case timeline for the option to have effect (Summary Table 3).

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Summary Table 1: How does the option affect selection rates?

Option	Does it increase coverage rates and by how much?	Comments
1. Federal funding	Yes. Directly translates to increased coverage, proportional to funding received. For 2018, NMFS anticipates additional Fed funding of \$1.8 million.	<ul style="list-style-type: none"> Without a change in Congressional appropriation for observer programs, funding requests must be solicited for each budget cycle, and the federal budget has been level or declining in recent years. National Observer Program is conducting a priority based resource process to determine funding needs for each program, which may affect Congressional appropriation or NMFS internal allocations.
2. Zero selection changes	Has potential to improve the efficiency of an EM program, but less certain what level of impact would be on observer deployment rates	<ul style="list-style-type: none"> Preliminary exploration of data looked at defining zero selection based on retained catch; indicated that only longline halibut fishery significantly affected. Intention would be to keep same amount of retained catch in the sample frame (in 2016, this was 87.5% of longline retained catch). For example, in 2016 there were 33 longline vessels <40 ft LOA, with more retained catch apiece than 225 vessels > 40 ft LOA. The shorter vessels fished 64 fewer trips and approximately 500 fewer days. This might be a way to improve efficiency for EM. A disadvantage of this approach is defining sampling frame based on previous vessel behavior, which is problematic
3. EM optimization	Has potential to reduce the overall (program-wide) daily cost of monitoring if EM achieves a higher selection rate for less daily cost, but EM costs not fully known.	<ul style="list-style-type: none"> EM vessels have high cost for initial equipment installation, but ongoing monitoring costs for EM data could be relatively low. Potential to optimize EM/observer balance to achieve higher selection rates within given budget. EM program not yet fully mature, so costs of the program are not yet stable or well understood
4. Monitoring cooperatives	Small expected impact. Effect would be indirect. Any positive effect would depend mostly on marginal savings in IFQ fisheries	<ul style="list-style-type: none"> Internal fleet management costs are likely to outweigh benefits under current conditions
5. Voucher program	Depends on the value assigned to the voucher (lower could mean more days afforded, but with "over and above" costs shifted to the vessels).	<ul style="list-style-type: none"> Initial setting of voucher cost is critical, as invoiced costs are unlikely to be lower Potentially relies on competition between providers to achieve lower prices Creates cost stability for observer program, but additional charges to vessel owners are uncapped and may be inequitable Vessels might alter trips to reduce out-of-pocket costs, introducing bias to random sample
6. Contract changes	Yet to be determined - OAC to review draft Statements of Work.	<ul style="list-style-type: none"> Integrating the EM and observer services into a single contract may create economies of scale and cross training opportunities that reduce costs.
7. Raising the observer fee	Yes. Directly translates to increased coverage, proportional to fee increase.	<ul style="list-style-type: none"> Based on adjusted calculations from fees collected in 2017, increasing the observer fee to 2% would generate an additional \$2.1 million. Split out by gear sector, that represents: \$200,000 from pot vessels, \$646,000 from trawl vessels, and \$1,250,000 from hook and line vessels. Fee analysis could include options to either increase the fee across the board, or to increase the fee differentially by sector.

Summary Table 2: Implementation, workload, and next steps for options

Option	Implementation requirements	Staff workload and resources	Next steps to move forward
1. Federal funding	None once funding is allocated. Agency is undergoing priority based resource assessment which could provide rationale for appropriating more observer funding in long term.	Minimal once funding is allocated. NMFS staff work to conduct assessment.	Funding received for 2018. Agency assessment underway. Further requests would be needed for outyears.
2. Zero selection changes	Can be implemented through the ADP.	OAC could work with NMFS to identify possible criteria for redefining zero selection.	Preliminary data queries provided. OAC will need to consider potential efficiency gain from redefining zero selection and work with NMFS for further evaluation of ideas
3. EM optimization	Can be implemented through the ADP.	Large component of work, developing EM cost methodology, is already tasked (although not completed). Requires staff work to model. OAC could work with NMFS to identify potential optimized scenarios.	EM service providers are collaborating on cost tracking data. AMR has provided EM cost forecast models. FMA has incorporated this info into 2018 ADP. Additional analysis on optimization is tasked.
4. Monitoring cooperatives	Analysis of impacts, regulatory amendment	Moderate implementation workload, but successful outcome relies heavily on industry and providers to identify and make real operational change.	None recommended at present. OAC should provide feedback on industry's desire to take on additional internal management responsibility.
5. Voucher program	Analysis of impacts, regulatory amendment	Large workload - similar to previous Observer Program restructure. Also ongoing work to set, monitor, and revise voucher values annually/regularly.	Engage observer providers with respect to information necessary to set voucher values.
6. Contract changes	NMFS will award new contract, effective mid-2019.	Observer program staff involved in contract development and award.	AGO scheduled to get feedback on draft Statements of Work during October Council meeting.
7. Raising the observer fee	Analysis of impacts, regulatory amendment	Moderate workload to analyze impacts of changing the fee, and implement regulatory change.	OAC subgroup has identified options for OAC and Council to consider

Summary Table 3 maps a best-case progression of the options discussed in this document over the next four years. Note that this is intended only for illustration. **In the context of this table, each option is treated as if it was the singular approach prioritized by the Council and NMFS, and that it was placed at or near the top of the Observer Program’s Analytical Task Status** (most recently updated on September 8, 2017 and available [here](#)). This table deals only with timing, and does not imply any equivalence between the options in terms of whether or how much the option would increase observer selection rates if implemented.

Summary Table 3: “Best case” timing of when considered options could impact selection rates

Option	2017 <i>Oct-Dec</i>	2018	2019	2020	2021
1. Federal funding	2018 \$ request	If successful, effective 2019 \$ request	2020 \$ request If successful, effective	If successful, effective 2021 \$ request	2022 \$ request... If successful, effective
2. Zero selection changes	Evaluate data	Identify possible changes Evaluate in ADP	Implement in the ADP	Evaluate and refine	Evaluate and refine
3. EM optimization	Method for EM cost prediction	Continue working on EM cost prediction Model interaction btwn EM and observer costs/ data quality Determine ideal balance, identify key EM vessels	Recruit ideal EM demographic into EM program	Evaluate and refine	Evaluate and refine
4. Monitoring coops	Initiate analysis	Initial/final review including implementation plan	Rulemaking	Fully effective	
5. Voucher program	Initiate analysis	Initial/final review including implementation plan	Rulemaking	Fully effective	
6. Contract changes	Input on Statements of Work	NMFS refines and releases RFP	Contract awarded New contract begins 6/15 Could impact after midyear	Fully effective with new ADP	
7. Raising the observer fee	Initiate analysis	Initial/final review	Rulemaking	Higher fees accruing (but 2020 ADP based on 1.25% fee)	Fully effective – fees available for contract

Key: Staff work in the Council and NMFS process, **Change in effect**

1 Introduction

In April 2017, the Council directed the Observer Advisory Committee (OAC) to consider options for increasing partial coverage selection rates. To address this, the OAC proposed an ad-hoc subgroup of the OAC, which has convened over the summer of 2017, to scope out short- and long-term options to address low selection rates in partial coverage, and provide comments back to the OAC in September 2017. The subgroup's task was to consider whether there are short-term options that can be addressed through changes to the Annual Deployment Plan (ADP) or the Catch Accounting System; and longer-term solutions that may involve regulatory change. An additional option, to consider changes to the partial coverage contract that should be incorporated by AGO as part of the Statement of Work, is briefly discussed below, but was left to further discussion by the OAC in September. The subgroup was created to assess whether there are viable options that could increase selection rates that would be an alternative to simply raising the observer fee.

The subgroup members worked individually and by email, and also held two teleconferences over the summer, on August 3rd and September 12th, in order to prepare and finalize this document for the OAC meeting. The intention was for the subgroup members to scope out a series of regulatory and/or non-regulatory options that may address low coverage rates in partial coverage.

A major accomplishment of the restructured Observer Program was the implementation of a scientific sampling plan for deploying observers. The Observer Program complies with the Magnuson-Stevens Act requirement that the program be reasonably calculated to gather reliable data by stationing observers on all or a statistically reliable sample of fishing vessels and processors necessary for conservation, management, and scientific understanding of the fisheries covered by the fisheries research plan. Only options that maintain the agency's current statistically-reliable random sampling model are considered, to be continued through the use of ODDS. Beyond this stipulation, this paper does not at this time attempt to evaluate the impacts of these changes on data users (stock assessments and scientific research, catch accounting and inseason management).

If the Council chooses to move any of these options forward, they would require detailed analysis either as a regulatory amendment or in the annual deployment plan process. For this preliminary evaluation, however, the subgroup tried to consider the following for each option:

- the ability of the option to increase coverage rates;
- the requirements for implementing the option;
- the timeframe for having an effect;
- staff workload and resources involved;
- a preliminary pro/con evaluation of how the option would change incentives or differentially impact constituents; and
- next steps to continue developing the option.

This paper summarizes the scoping work conducted by the OAC subgroup for each of the options under consideration. The subgroup is not making specific recommendations about moving any of these options forward for further Council analysis, as that will be under discussion by the OAC. The subgroup did, however, highlight where an option does not seem to be viable under current conditions.

2 What are reference points for increasing coverage?

In order to develop options for increasing coverage rates, it is helpful to identify reference points for coverage in each gear stratum. These reference coverage levels could help inform how to utilize the zero selection pool, EM optimization, contract changes, and options to increase the observer fee to achieve higher coverage rates in the partial coverage program.

In developing the restructured Observer Program, NMFS and the Council recognized that selection rates for any given year are dependent on available revenue generated from fees. The Annual Deployment Plan process allows deployment rates to be adjusted in each year so that sampling can be achieved within financial constraints. The description of reference points does not propose specific mechanisms by which coverage can be increased nor does it preclude coverage rates adjusting annually within a given budget in the future. The purpose of reference points is to provide scale for developing potential alternatives for increasing coverage levels. It is intended to show how much additional funding is needed in each gear stratum to reach different coverage levels, which may help the Council determine a reasonable suite of options to achieve higher coverage.

Approach for setting proxy reference points

1. Identify a range of reference points for coverage in each gear stratum, or a reference point in which spatial and temporal ‘boxes’ were sufficiently met (for example, coverage rates in 2016).
2. Translate these coverage levels into the number of trips, and then sea days, that would be monitored.
3. Assign a portion of the current budget based on fees to each gear stratum based on the number of sea days to be monitored.
4. Identify two approaches to achieve the coverage reference points, either by reducing the daily observer cost to the level that would be required to fit within the assigned budgets based on the current observer fee, or by finding additional funding to meet the monitoring total at the current daily cost.

Methods to achieve coverage rates within the gear strata’s assigned portions of the available budget could be different for each stratum. The example reference points provided here by the OAC subgroup should be considered as OAC discussion points only, and could include:

- **Equal Base Rate:** The Observer Science Committee identified a flat 15 percent selection rate across all strata to address coverage needs for catch accounting purposes (based on gap analysis). They also suggested a hurdle approach (evaluated in 2018 ADP).
- **Gear Specific Base Rate:** The OAC and AP recommended a strata specific approach to the “hurdle” concept, an example of which could be expressed as a 10/15/25 percent (pot/longline/trawl) reference point.
- **2016 Rate:** The 2016 actual coverage rates of 15/15/28 percent have also been identified as a starting point where the 2016 annual report shows the spatial and temporal needs of the catch accounting program were satisfied.
- **30% Base Rate:** The 2010 Observer Restructuring analysis assumed a 30 percent selection rate across all strata as a base starting point.
- **High Reference Point:** A high reference point could be expressed as a 15/20/40 percent scenario.

Other reference points could potentially be based upon a variety of other factors including:

- Reducing the observer effect
 - Obtaining a representative sample given the gear/target fishery complexity of the various strata
 - Minimum levels of coverage needed to minimize fishing behavior effects
 - The ability to detect/evaluate/report observer effects at the needed resolution (i.e. target fishery level) by stratum.
- Fishery-level priorities for estimation of species of concern such as PSC or other identified species.
- Operational priorities of fishery participants (multi-area fishing, tender deliveries, rare species precision, etc.)
- Compliance with regulations (careful release, area reporting, etc.)

Budgets resulting from example reference points

Table 2 illustrates the procedure outlined above for the five example reference points provided by the OAC subgroup. Note that the coverage rates listed in the reference points were based on trips, translated into sea days. The total number of actual trip days by gear type stratum comes from the 2016 Annual Report, in Table 3-1 (page 61). The total number of trips by gear type also comes from the Annual Report, from Table 3-3 and Table 3-4 (page 63-64).

Table 1 shows the calculated average number of days per trip by gear stratum.

Table 1 Number of trips and number of trip days in 2016, by gear strata.

2016	Number of trips	Number of trip days	Days/trip
Trawl	2,518	7,192	2.86
Hook and Line	2,274	13,493	5.93
Pot	1,158	4,622	3.99
Total	5,950	25,307	4.25

Source: 2016 Observer Program Annual Report.

To calculate the current budget based exclusively on fees, the subgroup began with the 2016 Annual Report, Table 2-1 (p. 24), which shows that approximately \$3.77 million in fees were collected from industry in 2017. This estimate was adjusted downward, to take into account recent information about the loss of \$200,000 in fees due to one non-payment and the uncertainty associated with the amount of sequestered funds and carry over funds actually available in 2018. **The adjusted budget of \$3.5 million was used in this exercise to reflect the total revenue from the observer fee.** The subgroup then apportioned the annual fee revenue among strata by simply identifying the percentage of total sea days assigned to each stratum under the various reference scenarios, and assign the same portion of the annual budget based on fees to those strata.

Table 2 Total cost of monitoring, by gear sector, under five reference point scenarios, and targets to achieve that monitoring

		Calculation of Total Cost of Monitoring for each Reference Point						Targets to achieve monitoring cost		
Stratum	Selection rate	Table 3-3 # trips	Ave Trip length	Calculated total days	Calculated Observed Seadays	% Total Sea Days	Total Cost	Current budget (adjusted) from fees	Reduce \$/sea day to:	Find additional funding if using 2016 daily rate \$1,049
Equal Base Rate										
Pot	15%	1,158	3.99	4,622	693	18%	\$727,272	\$639,230	\$922	\$88,041
HAL	15%	2,274	5.93	13,493	2,024	53%	\$2,123,124	\$1,866,104	\$922	\$257,019
Trawl	15%	2,518	2.86	7,192	1,079	28%	\$1,131,661	\$994,666	\$922	\$136,996
Total		5,950	4.25	25,307	3,796	100%	\$3,982,056	\$3,500,000	\$922	\$482,056
Gear Specific Base Rate										
Pot	10%	1,158	3.99	4,622	462	11%	\$484,848	\$377,601	\$817	\$107,247
HAL	15%	2,274	5.93	13,493	2,024	47%	\$2,123,124	\$1,653,496	\$817	\$469,628
Trawl	25%	2,518	2.86	7,192	1,798	42%	\$1,886,102	\$1,468,903	\$817	\$417,199
Total		5,950	4.25	25,307	4,284	100%	\$4,494,073	\$3,500,000	\$817	\$994,073
2016 rates										
Pot	15%	1,158	3.99	4,622	693	15%	\$727,272	\$512,903	\$740	\$214,369
HAL	15%	2,274	5.93	13,493	2,024	43%	\$2,123,124	\$1,497,318	\$740	\$625,806
Trawl	28%	2,518	2.86	7,192	2,014	43%	\$2,112,434	\$1,489,779	\$740	\$622,655
Total		5,950	4.25	25,307	4,731	100%	\$4,962,829	\$3,500,000	\$740	\$1,462,829
30% equal base rate										
Pot	30%	1,158	3.99	4,622	1,387	18%	\$1,454,543	\$639,230	\$461	\$815,313
HAL	30%	2,274	5.93	13,493	4,048	53%	\$4,246,247	\$1,866,104	\$461	\$2,380,143
Trawl	30%	2,518	2.86	7,192	2,158	28%	\$2,263,322	\$994,666	\$461	\$1,268,657
Total		5,950	4.25	25,307	7,592	100%	\$7,964,113	\$3,500,000	\$461	\$4,464,113
High Reference point										
Pot	15%	1,158	3.99	4,622	693	11%	\$727,272	\$387,090	\$558	\$340,182
HAL	20%	2,274	5.93	13,493	2,699	43%	\$2,830,831	\$1,506,708	\$558	\$1,324,123
Trawl	40%	2,518	2.86	7,192	2,877	46%	\$3,017,763	\$1,606,202	\$558	\$1,411,561
Total		5,950	4.25	25,307	6,269	100%	\$6,575,866	\$3,500,000	\$558	\$3,075,866

Discussion points:

- Allocating the fees based on percentage of total trips per sea days can be used to maintain the principle that all sectors benefit from the at-sea data collected by the observer program through the sharing of the 1.25% base fee, yet allow consideration of sector specific supplemental fee increases to meet target coverage levels.
- The tables assume the daily rate continues at \$1,049/sea day. The column entitled ‘additional funding needed using 2016 daily rate’ shows how much additional funding is necessary by stratum to reach the coverage target. The purpose is to inform options to achieve those funding/coverage rates.
- The \$/sea day target column helps scale the type of measures for all strata needed to meet the target coverage rate without a fee increase. It can also be used to inform discussions on optimizing the number of EM vessels and EM selection rate in fixed gear strata to meet the coverage target within a combined observer/EM budget.
- Under equal base rate scenarios (15% or 30%) the number of HAL assigned sea days is approximately two times that of trawl. Across the other three reference points, the number of sea days for HAL and trawl are about the same.
- Under equal base rate scenarios (15% or 30%) the apportioned budget (based on percent of sea days) for fixed gear strata is approximately \$2.5 million (HAL \$1.86 million + Pot \$640,000) and trawl is approximately \$1 million. Across the other three reference points, the apportioned budget

for fixed gear strata is approximately \$2 million (HAL \$1.5 million + Pot \$500,000) and trawl is approximately \$1.5 million. These numbers are pretty stable across a range of reference points.

As an additional reference, Table 3 shows how much the observer fee would need to be increased to meet the different coverage rates if no other mechanism was used. This is a reality check on what the current fee authority can fund, which can only be increased to a maximum of 2 percent, and does not reflect a preference for increasing fees as the option by which to increase coverage. The tables also reflect two different options for how to adjust fees to account for additional coverage, which have been discussed by the OAC subgroup. Option 1 shows the fee percentage change if the fee is increased equally for all sectors, similar to the way the 1.25 percent fee is applied in the status quo. Option 2 increases the fee differentially by sector, to meet the additional coverage needs specific to that sector over and above the current 1.25 percent. A final column is included to show the difference between the two options.

Table 3 Percentage fee increase required to meet the additional funding needed under five reference point scenarios, based on a daily rate of \$1,049/day, if the fee is increased equally across partial coverage (Option 1), or differentially by sector (Option 2).

Stratum	Selection rate	Total cost for reference point	Current budget (adjusted) from fees	Additional funding needed if using 2016 daily rate \$1,049	Option 1 Increase fee equally	Option 2 Increase fee by sector to meet need	% difference between options
Equal Base Rate							
Pot	15%	\$727,272	\$639,230	\$88,041	1.42%	1.58%	11.07%
HAL	15%	\$2,123,124	\$1,866,104	\$257,019	1.42%	1.40%	-1.29%
Trawl	15%	\$1,131,661	\$994,666	\$136,996	1.42%	1.41%	-0.94%
Total		\$3,982,056	\$3,500,000	\$482,056	1.42%	1.42%	
Gear Specific Base Rate							
Pot	10%	\$484,848	\$377,601	\$107,247	1.61%	1.65%	2.89%
HAL	15%	\$2,123,124	\$1,653,496	\$469,628	1.61%	1.53%	-4.60%
Trawl	25%	\$1,886,102	\$1,468,903	\$417,199	1.61%	1.73%	8.02%
Total		\$4,494,073	\$3,500,000	\$994,073	1.61%	1.61%	
2016 rates							
Pot	15%	\$727,272	\$512,903	\$214,369	1.77%	2.05%	15.79%
HAL	15%	\$2,123,124	\$1,497,318	\$625,806	1.77%	1.63%	-8.34%
Trawl	28%	\$2,112,434	\$1,489,779	\$622,655	1.77%	1.97%	11.25%
Total		\$4,962,829	\$3,500,000	\$1,462,829	1.77%	1.77%	
30% equal base rate							
Pot	30%	\$1,454,543	\$639,230	\$815,313	2.85%	4.30%	51.23%
HAL	30%	\$4,246,247	\$1,866,104	\$2,380,143	2.85%	2.68%	-5.95%
Trawl	30%	\$2,263,322	\$994,666	\$1,268,657	2.85%	2.72%	-4.35%
Total		\$7,964,113	\$3,500,000	\$4,464,113	2.85%	2.85%	
High Reference point							
Pot	15%	\$727,272	\$387,090	\$340,182	2.35%	2.52%	7.43%
HAL	20%	\$2,830,831	\$1,506,708	\$1,324,123	2.35%	2.04%	-13.02%
Trawl	40%	\$3,017,763	\$1,606,202	\$1,411,561	2.35%	2.89%	22.90%
Total		\$6,575,866	\$3,500,000	\$3,075,866	2.35%	2.35%	

Pros and cons of developing coverage level reference points and fee allocations by stratum

- Pros:**
- Helps provide scale for developing alternatives for increasing coverage to meet reference points.
 - Enables discussion of fee allocation alternatives that is conceptually less complex than optimization
 - Provides a starting point to evaluate the number of EM boats needed to meet cost targets for fixed gear vessels
 - Supports further work on EM optimization in fixed gear stratum and changes to the zero selection pool
 - Aligns incentives to support sector-specific supplemental fees options
- Cons:**
- Reference coverage rates are policy driven, albeit informed by four years of annual reports
 - Reflects a problem/solution-oriented approach, rather than optimizing for maximum efficiency across the whole program.

Ongoing work to evaluate the Catch Accounting System

At the August 3rd teleconference, the subgroup discussed the reference point for a 15% minimum coverage rate that was an Observer Science Committee recommendation in the 2016 Annual Report. This recommendation was based on gap analysis that is done each year in the Annual Report as well as the results from a simulation analysis in the supplemental environmental assessment (SEA) for the observer program.

In the SEA, evaluation of 2014 data showed that most observer data gaps disappeared or were severely minimized at deployment rates greater than or equal to 15% (relative to a 50% probability of a post-strata being empty; NMFS 2015). The analysis used the estimation and post-stratification methods currently configured in the Catch Accounting System (CAS). For example, the current methods in CAS uses the predominant species caught on a trip (called the trip target) as a post-stratification factor used to estimate groundfish and prohibited species. In the SEA, NMFS explained that some of the data gaps could potentially be addressed by changing the methods for estimating discarded catch by modifying the level of data aggregation (e.g., by combining several flatfish fisheries in the Central GOA into a single fishery category for purposes of applying discard estimates). During the subgroup meeting, it was noted that trawl fisheries have many targets and this approach can result in many post-strata “boxes” for estimation. NMFS is conducting ongoing analysis of catch and bycatch estimation methods, including incorporating variance from at-sea sampling through to the trip-level and then assessing post-strata definitions. Results from this work could inform gap analysis in the future if, for example, post-strata definitions changed.

However, it is important to recognize in the annual reports and prior ADPs have also analyzed sample size by using a gap analysis to determine whether enough samples were collected to ensure adequate spatial and temporal coverage. In those analyses, the approach has been a bit simpler and looked for gaps at the level of gear and NMFS reporting area, but has not include all of the trip target post-strata from CAS. The results in 2016 were similar to previous years and illustrated that the likelihood of at least one observation is increased with fishing effort and the probability of no observer data within a NMFS Reporting Area increased at low observer coverage rates. Since these results are similar to what was found in the SEA it is unlikely that changes to the methods in CAS will lead to vastly different recommendations for minimal coverage rates. Based on results from both the the SEA and Annual Report, NMFS recommendation in the 2016 Annual Report is that, within budget constraints, sampling rates be high enough in each stratum to reasonably expect three observed trips in each federal reporting area.

3 Discussion of options

3.1 Option 1: Federal Funding

More money to fund the partial coverage contract is the most direct way to increase selection rates. When additional Federal funding is successfully solicited, the increase in observer coverage rates is proportional to the amount of additional funding received. NMFS provided some level of supplement to the observer fee each of the first four years of the restructured program, until NMFS headquarters decided that the cost of at-sea observer coverage should be entirely borne by industry. This decision resulted in the low 2017 coverage levels that precipitated the subgroup's current work. While there appears to be some immediate traction in NMFS for providing funding for at least 2018, there is no certainty that this option will be a long-term solution. Monies must be solicited by the Council and/or the Alaska region in each budget cycle, with no guarantee of success.

In June 2017, the Council sent a letter to NMFS requesting additional funding for the partial coverage program, while the Council is evaluating options, such as those discussed in this paper, for increasing sampling rates. In the 2018 Annual Deployment Plan, NMFS reports that some additional revenues have been found from Federal funding to support deployment in 2018. While the final budget for 2018 observer deployment is not yet certain, these include a certain amount of carryover funds from the 2017 fiscal year, and a \$1 million increase in Federal funding in fiscal year 2018. Because the timing of the \$1 million depends on Congressional approval of a 2018 fiscal year budget, the money will be used to fund the next option year on the partial coverage observer provider contract, which occurs both during calendar years 2018 and 2019. For that reason, some of the benefit of this additional funding will also be available for the 2019 ADP. For 2018, the anticipated budget in the draft 2018 ADP is \$5.36 million.

The following table puts the anticipated 2018 budget in context with the reference points identified in Section 2, basing the total cost on an observer daily cost of \$1,049/sea day.

Revenue expected from fees collected in 2017 (adjusted)	Reference points	Selection rate % pot/longline/trawl	Total cost at \$1,049/day	Anticipated 2018 budget from the draft ADP
\$3.5 million	Equal (15%)	15/15/15	\$3.98 million	\$5.36 million
	Gear-specific	10/15/25	\$4.49 million	
	2016	15/15/28	\$4.96 million	
	30%	30/30/30	\$7.96 million	
	High	15/20/40	\$6.58 million	
				Proposed 15/16/19 % selection rates

In order for more federal funding to become available as a longer-term solution, Congress would need to appropriate additional funds for observer programs, or NMFS would need to reallocate existing funds for observer programs (see below). The Council has requested supplementary NMFS funds for observer coverage on several occasions in the last few years, but additional funding has not been available. The federal budget, including funding for observer programs, has been level or declining in recent years thus reducing the likelihood of additional federal appropriations. However, that said, it appears in FY2018 NMFS will provide supplemental funding for observer coverage in the Alaska groundfish fisheries. If the funding was received prior to finalizing the ADP, staff workload and resources required to process additional federal funds would be fairly minimal. The most logical next steps to requesting and possibly obtaining additional federal funding are described in the subsection below.

Ideally any additional federal funding would be received before the Annual Deployment Plan is finalized in December so that the observer deployment rates beginning on January 1 of the new fishing year could reflect the increased funding level. If funds are not received before December, there may still be options

to obligate funds to the partial coverage contract which could potentially increase observer coverage rates mid-season. There are a number of reasons not to change/increase observer deployment rates during the middle of a fishing year, including: 1) vessel owner/operators make decisions on whether to be in the observer pool or the electronic monitoring (EM) pool based in part on deployment rates published in the ADP, and 2) changing deployment rates in the middle of a fishing year adds to the number of strata. This impacts how NMFS does catch estimation and increases the strata that must be analyzed in the Annual Report further complicating our ability to determine if deployment performance metrics were met.

Pro/con evaluation: Additional federal funding would increase observer coverage rates which would improve the quantity of data collected and reduce uncertainty in management decisions. Increasing observer coverage rates could impact vessel owner/operators' decisions on whether to be in the observer pool or EM pool. Ideally, prior to NMFS finalizing decisions regarding allocation of limited funding for each of the NMFS's observer programs, a full priority based resources (PBR) evaluation would be undertaken. That way, specific objectives could be compared across regions, and a more optimal allocation of National Observer Program funds would be achieved.

Opportunities under the current priority-based resource initiative for national observer programs.

The National Observer Program has engaged in a priority based resource (PBR) process to determine funding needs for each of the NMFS observer programs, with the goal of identifying gaps or unfunded needs that currently exist. Although this option has the potential to result in additional federal funding it is too early in the process to determine what the outcome might be. The PBR process requires significant staff time in developing ranking criteria, preparing activity plans, and scoring activity plans. The National Observer Program Advisory Team will discuss the PBR process at their next meeting in the fall of 2018, and compare how each region of NMFS participated in the process.

3.2 Option 2: Zero selection

Under this option, the subgroup considered methods to change which vessels are in the zero selection pool. Currently, vessels are placed in zero selection primarily on the basis of vessel size and gear – hook-and-line and pot vessels 40 ft and over (and all trawl) are included in the sampling frame. Changing the definition of zero selection would not require a change in the regulations, as the criteria for who is in zero selection are contained in the ADP.

To explore this option, the subgroup looked at vessel demographics and fishing patterns to see if there are vessels that could be moved in or out of zero selection to improve efficiency, without reducing the amount of catch that has occurred in the sampling frame. Between 2013 and 2016, vessels fishing hook-and-line gear in partial coverage accounted for 87.5% of the retained catch in the hook-and-line sample frame (i.e., on vessels 40 feet LOA or longer). During the timeframe, pot vessels within the sampling frame accounted for 99.9% of the retained catch in the pot gear sample frame.

As a preliminary step to explore this option, a dataset was prepared that sorted all hook-and-line vessels by the amount of their retained catch from highest to lowest. Then all the hook-and-line vessels that contributed 87.5% of the retained catch, regardless of vessel size, were put into a new "in-frame" group. All remaining vessels, regardless of size, were considered to be in a new "out-of-frame" group. The same process was done for vessel with pot gear using the 99.9% of retained catch as the cut off.

In each year under the restructured observer program, there are hook-and-line vessels less than 40 feet LOA that have more retained catch than vessels greater than 40 feet LOA. These "highliner" vessels less than 40 feet LOA have collectively fished fewer total trips than the vessels greater than 40 feet LOA that are identified as non-highliners. In addition, the less than 40 ft highliner vessels average many more trips

per vessel. In 2016, for example, there were 33 hook-and-line catcher vessels in partial coverage < 39 ft LOA, with more retained catch apiece than 225 vessels 40 ft LOA or greater. The shorter vessels fished 64 fewer trips and approximately 500 fewer days. The overall difference in total trips and days fished for the <40' highliner and > 40' non-highliner vessels seen in 2016 is predominantly due to the halibut fishery; and the majority of the less than 40 ft LOA highliners were homeported in Homer, Kodiak, and Sitka.

This preliminary scoping indicates that the less than 40 ft LOA highliner vessels might be good candidates for EM, and changing the definition of zero selection has the potential to improve the efficiency of an EM program, since the initial cost of equipping an EM vessel is high compared to the data review costs/trip. There was less agreement among the subgroup about whether this increases observer deployment efficiency; however, the group agreed that it warrants further analysis.

An important factor for consideration and further analysis is to characterize the feasibility of defining the sampling frame based on a vessel's prior history (e.g. total retained catch in the previous year). The current sampling design provides a well-defined sampling frame based on vessel length from which each unit has an assigned probability of selection, thus allowing statistical inference from sampled trips to the unsampled trips. Defining the sampling frame based on previous vessel behavior is problematic and there would likely be differences between what is realized in the current year compared to past behavior, which would create an incomplete sampling frame. In addition, about a third of the vessels less than 40 ft LOA fish in back-to-back years, so using the previous year catch history would further complicate this approach.

Another idea in evaluating zero selection options is whether the Council and NMFS should develop a periodic supplemental observer program which requires vessels that are usually in zero selection to have some level of observer coverage every few years. This alternative could be combined with periodic increases in the fee to fund the expanded coverage years. Other ideas are to platoon the "core" HAL fleet to increase coverage rates on an annual basis to reduce the observer effect are also under discussion by the OAC workgroup, and may be refined in conjunction with the periodic supplemental expanded sampling concept if directed by the Council.

To move any of the zero coverage options forward, the OAC will need to consider the potential for efficiency gain from redefining zero selection criteria. This would require staff to work with the OAC or representatives to identify possible criteria, with a view to presenting ideas by June 2018 for detailed NMFS consideration in the 2019 ADP.

3.3 Option 3: EM optimization

The subgroup considered whether it is possible to improve coverage rates by optimizing monitoring between vessels that participate in the EM selection pool and those that take observers. As with the zero selection option, this would not require a change in the regulations, but could be accomplished through encouraging vessels that make the EM program cost effective to opt into the EM selection pool, ideally freeing up funding for observers.

In 2018, the EM selection pool will still have independent funding, and the EM Workgroup is actively working with NMFS staff to develop the best way to understand and predict EM costs into the future. The first step towards optimization is to understand the relative costs of EM versus observers. The EM program is not yet fully mature, which also means that costs of the program are not yet stable or perfectly understood. By June 2018, the intention is for NMFS to have developed a methodology for dividing the partial coverage budget between EM and observers. This methodology needs to take into account: a) the

cost forecasts for the predicted EM volunteer pool of vessels; b) a study of how an EM pool of that size affects how much biological sampling data or monitoring data on interactions with protected species are needed both to supplement the EM data being collected and to furnish data to stock assessments or other research; and c) gap analyses by EM or observer strata (e.g., whether there will be a minimum of three observations in each reporting area). The methodology will also account for how sampling rates for EM and observer strata combine to achieve an overall coverage rate for the fixed-gear fleets.

The development of this methodology should provide the requisite data to begin thinking about how best to optimize the EM fleet. To determine the optimal EM fleet, the OAC and NMFS will need to consider factors such as the size of the EM pool, how many vessels are supported by a particular EM service port, the number of trips taken by a vessel annually, and the longevity of vessels within the EM pool (whether they remain in the pool after their initial installation and socialization to the program). Once we have determined what the optimal EM fleet looks like, the Council and the OAC can encourage ideal candidate vessels to opt in to EM, or encourage NMFS to set criteria in the ADP to limit which vessels can be in the EM pool.

Once we better understand the cost differences between EM and the human observer pool, it will also be possible to consider cost optimization for a balanced EM and observer monitoring program. While the initial cost of installing equipment on EM vessels is relatively high, vessels that remain in the program (stratum) produce data for multiple years at lower ongoing monitoring costs (primarily maintenance, licensing, and data review). The intention is for EM to be able to achieve a higher selection rate for less cost than the current cost per observer day, even when considering the cost of video data review. This is a major difference between EM and human observer monitoring, where the daily cost of observing vessels is fairly stable but relies on a great deal of human capital and frequent travel. Under an optimized EM/observer program it may be possible to achieve the monitoring goals identified in the reference points in Section 2 by reducing the average daily cost of monitoring for the program as a whole.

In terms of timing, it is possible that we could begin to optimize the EM pool beginning with the 2019 ADP, but it is also likely that this will be an iterative process that will take 2-3 years. The first step to move this option forward is to prepare the methodology for splitting the fee, on which an optimization discussion will build. Staff are already tasked to develop this methodology, and an initial step is included in Appendix B of the 2018 Annual Deployment Plan. Once the cost models are understood, the OAC or representatives could work with the agency to evaluate different scenarios for cost optimization between EM and observers.

3.4 Option 4: Monitoring cooperatives

This section considers the feasibility and utility of establishing cooperatives as a mechanism to reduce monitoring costs and, in turn, increase monitoring rates in the partial coverage category. This section addresses the first and fifth bullets listed for consideration in the introduction (Section 1):

- Ability of the option to increase coverage rates;
- A preliminary pro/con evaluation of how the option would change incentives or differentially impact constituents.

In order to achieve partial coverage or electronic monitoring at lower costs, cooperatives would need to create efficiencies in service delivery. The primary limit on creative and cooperative actions to reduce costs is that all measures are presumed to occur within the existing random trip selection program that is implemented through ODDS, which is explicitly not designed to be cost-minimizing. The potential benefit of reduced service costs must be weighed against personnel costs (co-op managers), additional

complexity for observer or EM providers, and unintended effects that might differentially impact certain constituents. If cooperatives' tools to reduce costs involve a very hands-on approach – potentially altering fishermen's trip plans, fishing schedules, or responsibilities – stakeholders would likely require a reasonable expectation that savings (or the increase in coverage rates) will be significant.

A program to allow or encourage monitoring cooperatives would first need to address whether participation in a cooperative is mandatory or elective for vessel owners. Voluntary cooperatives typically bring together like-minded individuals with similar goals and objectives, and who would respond similarly to a set of incentives. However, voluntary systems must also maintain options for vessels who do not join cooperatives. A vessel might choose not to co-op because the cooperative's cost-reducing measures are onerous to that vessel in particular – e.g., commuting to hub ports to pick up observers, or delaying departure to align trips selected by ODDS. If the vessels that do not co-op emerge as a more expensive subset of the partial coverage fleet to service, their costs might swamp the marginal savings that co-op vessels have gone out of their way to achieve. Vessels might also choose to free ride, so a voluntary cooperative would need to provide material incentives to participate (beyond the shared notion that higher coverage rates benefit fishermen). The most appealing incentives to fishermen probably relate to increased flexibility regarding whether a trip selected by ODDS can be shifted to another vessel within the cooperative if there is an opportunity to reduce observer travel or lodging expenses. An incentive of that type might not be acceptable to the observer program, as it cuts against the core principle of random selection. Requiring partial coverage vessels to join a cooperative removes the inefficiencies that could arise from a patchwork of vessels in and out of cooperatives. Establishing cooperatives by regulation would provide stability in terms of co-op formation and participation, which might in turn make it easier for both vessels and service providers to make commitments to cost saving actions. However, mandatory cooperative participation creates some risk that a vessel will be forced to co-op with a group that is not a natural fit in terms of fishing patterns or delivery locations.

Cooperatives could form by port location, gear type, fishery, monitoring method (humans/EM), or combinations thereof (e.g., port*gear). While observer selection strata are currently defined by gear type, defining cooperatives by gear is less appealing because many vessels fish more than one gear. Requiring membership in multiple cooperatives would increase complexity for fishermen and put up unnecessary walls between individuals who might otherwise have coordinated activity for cost saving. In general, cooperatives with a larger vessel membership are expected to find more opportunities for cost trimming, and minimizing the total number of cooperatives reduces the aggregate expense of co-op management labor. Cooperatives might naturally form around existing industry groups² that have varying amounts of staff capacity and might be able to take on monitoring responsibilities without creating a full FTE position. However, it is not assumed that existing groups, in aggregate, represent every vessel that operates in the partial coverage category. If cooperative participation is mandatory, industry groups might need to extend their representation or the work of their staff if that staff assumes the role of a cooperative manager. If participation is voluntary and cooperatives coalesce around existing groups, the Council or NMFS might need to oversee that independent vessels do not fail to opt in because they were not already associated with a group that has management capacity.

Cooperatives for human coverage strata

The cooperative mechanism to increase coverage rates is the reduction of observer costs, allowing the same amount of funds to purchase more sea-days, all else equal. The observer provider charges a daily rate and for the observer's travel and housing, including shore time when an observer is in the field but not at sea. The main leverage point for cost reduction is to reduce observers' down-days and travel through efficient deployment. This might take the form of aligning selected trips in time so that deployed observers are stringing together trips out of the same port to the extent possible. Approaching that goal

² Examples: NPFA, AGDB, ALFA, SEAFA, FVOA, KVOA, PVOA, PFC, UCB

requires cooperative coordination between fishermen, some sort of fleet manager, and the service provider. Observed trips are selected randomly in ODDS, and randomization occurs at the gear strata level across the entire North Pacific region, so chances for efficiencies may be limited and must be seized opportunistically. It is not possible to forecast how many down-days could be eliminated in a future year, but it is certain that isolated observer trips that get delayed by weather cannot be avoided completely.

Controlling down-days and travel costs will always be challenged by external factors that affect the timing of fishing trips and are beyond a co-op manager's control. This is especially the case in limited access (non-IFQ) fisheries, and even more so in derby style fisheries that are limited by TAC or PSC. Limited access fisheries are structured to manage fishing fleets, not individual vessel's fishing plans. Trip timing may be dictated by price strikes, stand-downs to address bycatch rates, sudden PSC closures, and market forces (e.g., pollock roe season). As is often discussed in the development of bycatch caps, limited access fisheries lack certain "tools" that IFQ fisheries have. The timing of both IFQ and limited access fisheries is impacted by bad weather and the quality of fishing (CPUE). Overall, IFQ fisheries provide a clearer opportunity to reduce costs through trip coordination, but the size of the benefit is uncertain and not guaranteed to outweigh the financial and time costs of running a cooperative. The expected savings might be greater if a cooperative was granted the ability to shift randomly selected observed trips from one vessel (originally selected in ODDS) to another, similar, vessel that might be planning a trip that dovetails nicely with an available observer.

Options to reduce observer housing costs between trips are limited to minimizing the time between selected vessels leaving port. An observer cannot stay on his/her assigned vessel for more than 24 hours before/after the trip, and even then regulations require the vessel operator or a crew member to be aboard as well. Many partial coverage vessels are operated by Alaskan residents who live in the communities out of which they operate. These fishermen prefer not to stay on the boat while in a home port only to lower the invoice to the program for observer housing.

All vessel owners in the partial coverage category pay the same percentage monitoring fee, but only those selected for observed trips would bear the costs of changing trip plans, commuting to hub ports to pick up observers, housing observers in port, and whatever other cost-cutting measures the cooperative develops. As a result, fishermen might need to be incentivized to join a voluntary cooperative where the costs are evident and the benefits are uncertain. If cooperative membership is required by regulation, incentives might also be an important factor in building industry support for the necessary regulatory change. Existing incentives for observer coverage – such as ability to fish IFQ in multiple areas – might be restricted to vessels that co-op. Alternatively, vessels that co-op might be able to receive a rebate on their monitoring fee, compensated by higher fees on those that do not. The possibility of a two-tiered fee structure would require NOAA GC review and, if permitted, would require a regulatory change.

While the outcome of the 2018 partial coverage Federal contracting process is unknown, NMFS has not signaled that it is considering awarding the contract to multiple providers. A single provider will have a contracted daily rate, and therefore the Subgroup does not expect monitoring cooperatives to introduce an element of price bargaining or competition between providers, as might exist in the full coverage category.

Cooperatives for EM strata

The Council's EM Workgroup specifically recommended that cooperatives be considered as an action that would trail EM integration. EM cooperatives might work to increase coverage rates in three ways. Cooperatives might reduce the cost of the EM program by taking on some of the functions that drive up service providers' costs, thus taking a smaller portion of the monitoring fee budget away from purchasing human observer sea-days. If multiple competing providers are able to operate in the North Pacific EM

program and contract directly with cooperatives, a cooperative might collectively bargain for lower service prices, or at least work with the provider and member vessels to coordinate more efficiently timed and collocated service events. Also, a cooperative might work out internal agreements to record video data on all trips, allowing NMFS to increase the effective trip coverage rate with only the cost of additional video review/storage and not the cost of rotating EM control centers between selected vessels.

It is not clear that a cooperative could do the work of a service provider at a cost savings that justifies the expense and effort of running a cooperative. Cooperatives would be well suited to take over minor tasks such as data submission (mailing hard drives, transferring effort logbooks) and coordinating service schedules, but the major cost drivers are service “touch time” and travel, which is sometimes needed at unpredictable times or in locations where the cooperative would be no more likely than the provider to have a trained and approved technician. It is not clear that cooperatives could legally take over responsibility for technical service work on system functionality because it could be construed as creating an opportunity to tamper with the recording of information needed for law enforcement. In practice, giving cooperatives the responsibility for field service is not effectively different from having the EM provider train up a qualified technician in each port. Moreover, EM providers might object to the reduction in field service responsibilities, which factor into the value of their contract. If providers determine that it is not profitable to simply sell EM equipment while leaving service and other functions to cooperatives then the EM program might lose buy-in from valuable industry partners.

Cooperatives could conceivably provide a venue for video data quality control and feedback to crews on ways to improve or adhere to their vessel monitoring plans. A tighter feedback loop might reduce data loss compared to a situation where quality issues are not identified until the video is reviewed by PSMFC. This, however, would require onsite video review, which is being tested in the Pacific cod pot gear EM program but is not part of the longline pre-implementation plan. Onsite review could also increase the speed and precision with which NMFS inseason managers can make decisions about closing fisheries that are PSC limited. With the exception of the longline Pacific cod limited access fishery, those fisheries are primarily in the trawl limited access sector, and thus are at least several years away from deploying EM.

The Subgroup also discussed whether a cooperative that contained both EM and human coverage vessels could “trade coverage” on selected trips in order to reduce costs. For example, a cooperative could coordinate to shift a vessel from the human coverage pool to the EM pool if the vessel’s fishing plan takes it to a remote port for a portion of the year. Conversely, if a vessel in the EM pool is selected by ODDS but would require expensive service or technician travel before it could begin its trip, the cooperative could arrange for a human observer to cover that trip. The use of this tool would be contingent upon the observer program changing the way that it places EM and non-EM vessels in separate selection strata, since changing the monitoring mode affects stratum-level selection rates.

Cooperative Conclusions

If one presumes that observer selection rates are trending towards a level that is lower than the Council would like, then the benefit of establishing monitoring cooperatives is best evaluated against the alternative of increasing the 1.25% monitoring fee. The cost of establishing cooperatives falls into two categories: the labor cost of managing the cooperative, and the time and effort that fishermen would expend in altering their normal business practices to seek out marginal cost efficiencies. While it is likely that cooperatives would identify opportunities for savings “around the edges,” it is not obvious that these savings would outweigh the aforementioned costs under current conditions. The Subgroup also notes that opportunities for cost savings through coordinated trip planning might be expected in the IFQ fishery, and to a somewhat lesser extent in the pot cod fisheries, but are not expected to be significant in the trawl limited access fisheries. The Subgroup internally concluded that monitoring cooperatives could be a

useful tool in the future, but that they would only likely achieve a net benefit if other changes to the fisheries' structure that provided additional control over coordination and timing occurred first.

The greatest potential for cost savings and the associated increase in available observer sea-days lies in cooperatives' ability to collectively bargain with service providers for a lower-cost contract. That outcome is not one that can be counted on in the near term.

3.5 Option 5: Voucher program

One option to optimize coverage rates by creating efficiencies is to use the 1.25% landings fee to reimburse vessels for coverage at a set daily amount rather than using the fees to fund a Federal contract with an observer provider company, as is currently the case. Under this "voucher" approach, a vessel owner would be responsible for securing an observer to monitor his/her trip when selected in ODDS. The provider would charge a market rate that encompasses the daily rate to cover that vessel's trip, as well as associated variable costs (travel and board). If the market rate exceeds the fixed daily rate dollar value ascribed to the voucher, the vessel owner selected for coverage would pay the difference directly to the provider.

Why voucher value matters

Prices for goods or services are typically established through either market competition or competitive bidding. In a market with multiple buyers and sellers, the price of a good or service is established as suppliers offer the good/service at a level that covers their own costs but does not exceed the demand market's willingness to pay. This is called price discovery. A market price is struck somewhere above the average supplier's cost of production/provision and below the average customer's willingness to pay, creating economic benefits on both sides of the transaction. Individual buyers and sellers vary in their production/provision costs and the willingness to pay, so the benefits of a market price transaction are distributed along a range. A different kind of discovery exists when the price of a service is put out to competitive bidding. The contracted price should reflect the lowest level at which one of the competing suppliers is willing to provide service, reflecting their estimated costs and required margin. The contract should not be signed if the bid price exceeds the demand side willingness to pay.³

The prescribed sea-day value of the voucher sets the market for observer providers, effectively creating a price floor without regard to the true cost of operation. Without incentive, providers would not offer their services at a rate less than the publicized voucher value. This limits the potential effect of competition in a multi-provider contracting scenario, and thus the potential savings that could be used to afford more observer sea-days with a constrained budget. Unless limited by competition, providers would be able to charge amounts over and above the cost of service with no maximum; selected vessels would have no option but to pay to fish.

The ascribed voucher value is critical. It can either be based on a formula that calculates the actual cost of service, or a simpler translation of the coverage target divided by the amount of funds available. Given the ever-changing nature of cost drivers – inputs to travel/housing costs, inflation – asking a regulator or a working group to set voucher values would be challenging, and would not utilize the economic principles described above. The persons responsible for setting voucher values would need to repeat the exercise regularly, if not annually. That group would require exceptionally active and candid participation by observer providers, which also happen to be private businesses in competition with each other. The latter

³ In the case of partial coverage observer contracting, NMFS represents the demand-side and has an obligation to secure service. If the lowest bid contract price is high, NMFS has two options: reduce coverage rates at a potential risk to data quality, or increase vessel/processor monitoring fees.

approach (coverage target divided by available funds) is the most practical approach, but is unlikely to result in a value that equals actual costs.

Unintended market inefficiencies would occur if the voucher value is set too high or too low, and could benefit or disadvantage certain entities. The following are considerations on the effect of price setting relative to what would otherwise have emerged as the market price.

Too Low – If a voucher does not cover the invoiced cost of a sea-day, we presume that the vessel owner is responsible for paying the provider the difference.⁴ This represents an adverse effect on the owners of vessels that are *randomly* selected by ODDS, with the magnitude of the impact varying by the accuracy of the deemed voucher value and the random number of times that a vessel is selected for coverage. The random selection process is designed to treat vessels equally over a length of time, but in the short-term – which can be critical to individual operations facing thin margins and high costs – some vessels might bear a disproportionate cost. If voucher values are established at a flat rate across all geographies in the partial coverage program, adverse impacts would be more dramatic in remote communities where the variable costs of taking an observer to sea are greater.

Too High – If the voucher fully covers the provider’s cost plus operating margin and we assume that a provider will simply invoice that amount, then each dollar of over-estimation accrues to the provider in the form of economic rents (“producer surplus”). One must conclude that if providers are not invoicing vessel owners on top of the voucher value, then the voucher was set too high. However, it is not clear how Observer Program managers would know the extent to which the cost of a sea-day (voucher value) was over-estimated. Presuming that voucher payments would be transacted directly between the provider and the program managers (or a third party, e.g. PSMFC), we do not foresee a situation where randomly selected vessels receive a rebate or windfall if the cost of a sea-day comes in below a deemed value that was set too high.

Setting voucher value by port/location

When the West Coast observer program transitioned to industry payment, it started out with a flat rate “subsidy” (~voucher) that was reduced each year for five years until it went away. In Alaska, travel and board are the main non-labor cost drivers for the invoiced price of an observer sea-day. Housing/board costs are assumed to be roughly equivalent across Alaskan ports. Travel costs, however, will be a differentiating factor in daily rates across locations. Establishing tiered voucher values based on location would reduce the likelihood that vessels operating out of more expensive ports bear an inequitable share of monitoring costs. Getting these values correct would be a laborious but important task, since low values shift additional costs to fishermen and high values could yield excessive economic rents for providers.

In setting voucher value by port location, the Council should consider (1) whether tiered voucher values would be permissible under the larger NOAA contracting process, (2) who would determine specific values, and (3) where the necessary information to set these values can be found. In terms of useful, relevant information, the person(s) responsible for this task might rely on invoices from full coverage providers. Unfortunately, that information is not public and, if it were, would cover only a small fraction of the ports out of which partial coverage vessels operate. It is also important to avoid setting the partial coverage voucher value higher than the full coverage daily rate in ports that also have full coverage vessels, such as Kodiak. Such a mismatch seems almost certain to occur if providers and partial/full coverage participants – e.g., CGOA vessels that fish in both the Rockfish Program and limited access fisheries – are not willing or able to share past invoices.

⁴ Note that this cost is additional to the 1.25% ex-vessel fee already being levied. Typically that fee is split 50/50 between the vessel owner and the processor.

Potential path to cost reduction

If perfect price-setting information was available, voucher values could be set just below the cost of coverage for the average fisherman in a given location. This would represent an efficient use of funds and incentivize vessel owners to reduce costs at the margin, potentially by working with providers to harmonize observer travel logistics with shared fishing plans. Understanding that perfect information is a high bar – coastwide or by location – a simpler approach is required. The Observer Program could back its way into the voucher value using the coverage needed (selection rate * projected effort) and the budget available (previous year's fees collected), and allow provider competition to achieve the coverage target at the lowest possible cost. A multi-tiered voucher value system could be used to control for the most obvious circumstances where travel to remote ports creates distributional effects. However, this approach relies heavily on the emergence of competition between providers, and places cost-risk on the vessel operator. If the margin between the voucher price and the actual invoiced amount is too high, the fleet (or sector of the fleet) may request that fees be increased. Whether or not fees may be increased for a subset of the partial coverage program would require NOAA GC review, and would impact processors as well as harvesters.

Other comments and considerations

- A voucher system appears to be a tool for sea-day cost predictability and cost control, rather than cost reduction. The Observer Program might be assured that variable cost overruns (travel/board) will not cut into the number of sea-days required to achieve a random monitoring sample for catch accounting. The voucher system places the risk of higher-than-anticipated daily costs on vessel owners. Vessel owners would have an incentive to work with providers to ensure that costs do not exceed the voucher value – perhaps taking steps to limit observer down-days or otherwise coordinate to minimize travel costs – but those incentives diminish or disappear where costs approach the deemed voucher amount. Observer providers face no downside risk as long as they are able to invoice vessel owners for costs that exceed the voucher value. Setting the voucher value conservatively high (to protect randomly selected vessel owners) essentially eliminates incentives to seek measures that reduce costs. A conceivable path to cost reduction would be to set the voucher value low, hoping that competing providers will work with vessel owners to reduce costs to that level. This approach is risky because – again – the downside is all on the vessel owners. Moreover, it is not clear that multiple providers would actually compete on price with each other *within the same port*. Very little competition exists under the current partial coverage program, and limited competition exists in full coverage where providers tend to carve out fleets or fisheries in which they specialize.
- The current proposal assumes that voucher value(s) would be set before the fishing season begins, such that one day of observer coverage is worth \$XXX in reimbursable funds. We also assume that the total annual amount of money available to fund vouchers is static and known at the beginning of the year (based on the monitoring fees collected in the previous year). When given a fixed budget (\$) and pre-fixed “prices” (\$/day), it would seem that the total number of sea-days that can be reimbursed (fully or partially) is also fixed.⁵ The Subgroup should consider what happens if actual fishing effort outpaces the projections used in the ADP to set the ODDS selection rates. Would ODDS stop selecting trips when no more vouchers are available? This seems unlikely. If all voucher-days are expended, would vessel owners be responsible for 100% of the observer cost for selected trips? If so, one might expect vessels to stop logging trips at the end of the year to avoid the risk of being selected for a trip that would cost them up to several thousand dollars out-of-pocket *in addition* to their monitoring fee. This response would be even

⁵ If, for example, the partial coverage program has \$3 million in available funds and vouchers have a flat value of \$800/day, then the partial coverage category would be limited to 3,750 reimbursable sea-days.

more likely for vessels that fish out of remote ports, where observer costs are the most expensive. An observer funding scheme that reduces fishing effort at certain times of year or in certain ports is inequitable, could introduce bias into the random selection model, and might also impact the achievement of OY if vessels reduce effort in response to monitoring costs. As such, the formula used to calculate the value of a sea-day voucher might also need to factor in a buffer (i.e., intentionally over-estimate the total number of sea-days needed).

It is worth noting that the current contract-based service delivery model *also* faces a constrained number of sea-days and a finite budget in the current partial coverage system. The program built in a buffer and made inseason adjustments to selection rates in the first year of partial coverage (2013). Since then the Observer Program has hit its ADP target coverage rates within the budgeted number of contract days, though this is expected to become more challenging as non-fee funding sources become less available.

- While vouchers might create a sense of cost stability for the Observer Program, vessel operators could face additional cost uncertainty relative to the status quo. The total number of vouchers available might be unknown, the value of the voucher could change year-on-year, and vessel owners' costs "over and above" the voucher value would vary on an individual basis since providers compete for business ad hoc (and could require different travel/housing arrangements). Compared to the pre-2013 partial coverage program (featured a fairly stable "prevailing daily rate") and the status quo (all vessel costs captured in the 1.25% fee), the combination of vouchers and random selection could reduce individuals' ability to plan for monitoring costs in the near-term.
- The Council might consider whether processors could be responsible for any of the invoiced amount when sea-day costs exceed the voucher value. Under the current partial coverage program, processors are theoretically responsible for half of the 1.25% ex-vessel monitoring fee.
- In order to work directly with a provider to achieve cost savings, each vessel in the partial coverage category might need to have an independent contract with an observer company that assures the vessel that an observer will be made available when and where one is needed. That burden currently resides with NMFS as the contracting agency.
- The net utility of monitoring cooperatives is more fully described in the preceding section of this paper. Below are three instances where cooperatives might play a role in a system where vouchers are assigned a dollar/day value and used to front the cost of observer-days that vessel owners and providers contract directly.
 - Co-ops could coordinate or contribute to the regular – in not annual – process of establishing appropriate voucher values. Co-ops could be particularly helpful in this process if values are allowed to vary by port. It should be noted, however, that we do not assume each port would have its own monitoring cooperative, and so cooperative managers might be naturally better suited to serve the interests of some members relative to others. The value-setting process could be time-intensive and contentious, stretching the bandwidth of organizations with part-time staff. There is no particular reason to believe that a co-op manager has access to unique information that reveals the efficient sea-day cost of an observer; this task could end up as a blend of fleet coordination, travel agency work, and collective bargaining.
 - A co-op manager could work with member vessels to minimize observer down-days and keep total costs (observer labor + variable costs) from exceeding the voucher amount. This might include coordinating vessel trips selected by ODDS to align in time (for the IFQ fleet) or working with a provider company to staff ports in the most efficient possible manner. Note that keeping actual costs from exceeding the voucher amount limits downside risk for the

- vessels who would be paying any overage, but does not present a cost-reducing upside if we proceed with the assumption that vouchers set a price floor for the daily rate.
- If a third party such as PSMFC is not involved in the distribution of voucher funds and invoicing of excess payments (i.e., when actual costs exceed the voucher value), cooperatives could fill that role. If, for some reason, the provider bills less than the established voucher amount, the co-op could be the entity that holds the unused value in escrow and either returns it to the Observer Program or uses it to cover sea days at the end of the season if the allocated number of voucher-days run out. This work represents a significant administrative task that would increase the cost of running a cooperative.

Legal considerations

The Subgroup asked NOAA GC for guidance regarding relevant MSA considerations in developing an observer program funding alternative that would use fees collected under the MSA observer fee authority to fund a contract or grant (e.g. with PSMFC) that would provide a fixed reimbursement (voucher) to a NMFS-certified observer provider to apply toward the observer coverage cost for a selected vessel. The Subgroup noted that the most comparable existing model seems to be the West Coast Observer Program, but recognizes that the funding source and the mechanism for reimbursement were different from what is considered here. The west coast program used NMFS funds from 2011 to 2015 to pay for a grant with PSMFC. That grant, in turn, was used to reimburse industry for a portion of the observer cost while transitioning to a fully industry-funded program.

The Subgroup posed the following three questions. NOAA GC's written response is included in the bullets below:

1. What MSA considerations should we be aware of in scoping/developing an observer program funding alternative that would use fees collected under the MSA observer fee authority to fund a contract or grant (e.g. with PSMFC) which would provide a fixed amount of reimbursement or "voucher" to a NMFS certified observer provider to apply toward the observer coverage cost for a selected vessel? The observer provider would then bill the vessel owner directly for any difference between the voucher and actual costs.
 - Any observer program funding alternative must comply with Sec. 313 provisions, particularly its fee use limitations. Particular considerations include that any funding mechanism be fair and equitable to all participants. Fees may not, for example, be used to pay any administrative overhead costs that may be associated with using Pacific States Marine Fisheries Commission (PSMFC) as a contractor or administrator. The supporting analysis would have to show whether PSMFC administrative fees are appropriately paid with fee revenue.
 - Original restructuring and Sec. 313 fee program goals included eliminating the conflicts of interest connected to the business relationship between vessel owner/operators and observer providers. The contractual relationship between vessel owner/operators and observer providers resulted in inherent data-bias. While it is within NMFS' authority to use additional program funding mechanisms to establish an observer program, adding pay-as-you-go (assuming vessels would contract for observer services) would re-introduce conflicts of interest and data bias that were eliminated in the restructuring. Thus, because the rationale supporting Sec. 313 fees was based, in part, on eliminating the conflicts of interest and establishing authority for NMFS to contract for observer services, it would be difficult to create a sufficient record supporting continuation of Sec. 313 fees.

2. Does NMFS have the authority to annually collect the observer fee from industry as we currently do, translate it into a fixed amount of reimbursement (e.g. \$600, \$700) to be provided back to the observer provider to use toward observer coverage costs for that particular vessel, as described above? If so, what mechanism could be used to reimburse observer providers. Would it need to be a) through a grant program similar to the West Coast program, b) through a contract with observer providers, or c) could NMFS provide the reimbursement directly to observer providers without using a grant or contract? If not, what agency authorities might allow establishing an analogous arrangement?
 - Establishing a payment figure reflecting daily observer costs does not appear to conflict with Sec. 313, which allows that the fee system may vary by fishery, management area, or observer coverage level. Sec. 313 does not specify or define how the fee system must be configured. Although Sec. 313 does not specify any particular funding mechanism, the records supporting the 1994 and 2012 research program rule-makings are based on determinations that government contracts funded by fees are the appropriate mechanism. Contracts between NMFS and observer providers would provide the benefits described in past records, including flexibility, control over providers, elimination of conflicts of interest, and higher quality data. A payment figure(s) and reimbursement approach would have to be clearly explained in the record, supported by rationale.
 - For several years the West Coast Observer Program used a grant through PSMFC to reimburse observer providers. The situation was unique in that it was a new pilot program that was under development and in the process of transitioning to 100% industry funding. During the pilot program period, NMFS reimbursed observer providers a fixed amount based on available NMFS funding. The fixed amount of reimbursement declined over time until the program was fully paid by industry. This is different from the North Pacific Observer Program which is fully established and functioning, and a grant could not be used to obtain these services. Thus, NMFS would be required to use a contract for observer services with whatever entity provides observers.
3. Could the federal government also require the vessel to pay additional funding (out of pocket) if the cost of an observer day exceeds the cost of the reimbursement? The intent would be to distribute reimbursements equal to the target number of observer days, but if the observer costs exceeded the reimbursement, the vessel would be required to pay the additional cost to the observer provider company. The goal is to have enough vouchers to cover all observer needs within a calendar year with vessels paying above that amount if the daily rate exceeds the voucher amount (not that we run out of vouchers and some vessels have to pay-as-you-go late in the year).
 - Aside from the Sec. 313 fee provision, NMFS has authority to require fishing vessels to pay for observer services. The best example of the use of this authority is found in the full observer coverage category where participating vessels are required to obtain and pay for observer services. Furthermore, Sec. 313, while authorizing NMFS to collect fees to pay for the costs of stationing observers or EM, does not preclude the use of other funding sources. (See Sec. 313(b)(2)(D)). If a vessel was selected for observer coverage and there was a shortfall of fees to fund an observer, NMFS could use its authority to require the vessel to pay for additional observer costs. As in all actions, however, the funding mechanism, including the use of vouchers or other observer cost payment mechanism, would have to be consistent with the MSA and supported by an adequate decision record. In particular, the decision record would likely have to show how fees would continue to be fairly and equitably applied when only operators whose vessels randomly selected for observer coverage would be required to pay additional observer costs and those operators whose vessels that aren't selected have no additional cost.

Voucher Discussion Summary

Incorporating a voucher system into the fee-based observer funding structure would be a substantial change to a program that was restructured only four years ago. The most obvious benefit would be cost stability for the observer program, but not necessarily for individual operators. The subgroup spent considerable time identifying the potential pitfalls of the voucher idea, which stakeholders are more exposed to higher costs, and how the program would be scrutinized in relation to the MSA. Because the Subgroup was “testing” the ability of a novel idea to stand up to reality, this section tended to focus on the negative. That said, the Subgroup is not making a negative or positive recommendation at this time as to whether the voucher model should go forward for further review.

The functionality of a voucher program and the distribution of any adverse impacts (additional costs borne by individuals) depends foremost on setting of the voucher value. The voucher value affects the strength of the incentive to reduce costs, the number of sea-days that the program could cover, the distribution of “over and above” costs paid by individual vessels, and could even have a price-setting effect on sea-day rates. Determining how to set that value, how often to revisit it, and who is the responsible party are all important considerations at an early stage. A voucher program might need to include remedies for situations where the voucher value contributes to inequitable monitoring costs for individuals, and the question of whether fees could be increased for subsets of the partial coverage fleet was identified for future study.

The effectiveness of vouchers as a tool to incentivize cost savings would seem to rely on competition between multiple observer providers, so that providers share that incentive and are not merely the recipients of uncapped payments “over and above” the voucher amount. NMFS FMA cannot manage multiple separate contracts with different providers, but the current Statement of Work for the Federal contract does not preclude more than one provider from working together. Whether such an arrangement is likely to emerge remains to be seen. Any further steps toward developing and analyzing a voucher system will require buy-in, cooperation, and some amount of transparency from observer providers to help staff and NMFS understand sea-day price factors and how they vary by location or from one year to the next.

Both the discussion of economic incentives and NOAA GC’s comments above highlighted the question of whether a voucher system might create inequitable outcomes, and whether fishermen’s expected response would be to behave in a way that biases the random sampling model (altering or canceling trip plans). Resolving inequity and collecting statistically reliable data were central to the restructuring of the observer program and shift to a fee-supported contract in 2013. A change to the system, such as allowing payments over and above the fee, would need a supporting rationale that demonstrates that the original purpose of the fee is not undercut.

3.6 Option 6: Contract changes

The draft Statement of Work for the upcoming contract for both observers and EM in partial coverage was recently released for review. The OAC subgroup did not discuss potential changes to the contract, as this will be a major agenda item for the OAC in September.

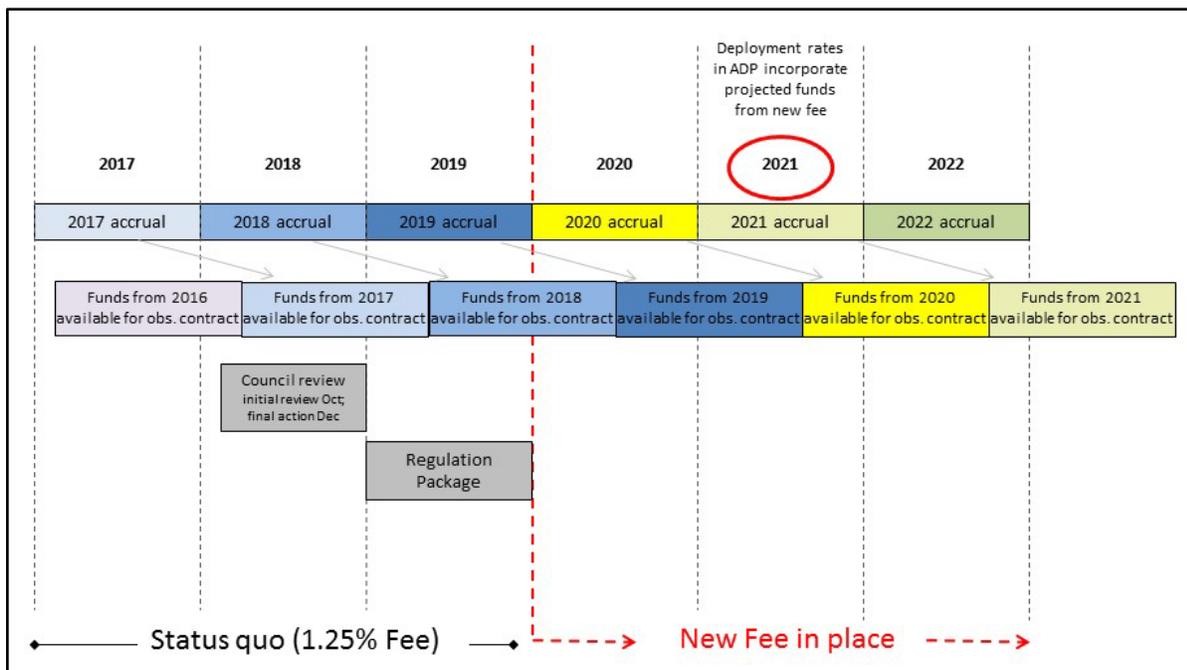
In general, under this option the OAC will scope out whether it is possible to build efficiencies into the contract that would reduce the program-level daily cost for observer days. The contract as currently structured includes a fixed daily cost for an observer sea day, and reimburses actual travel costs for transporting observers to and from deployments. The current daily program-level cost of \$1,049 for 2016 averages both of these cost elements over the total number of observed days in partial coverage in 2016.

Additionally, because the agency is intending to put out a contract for an EM service provider to begin in mid-2019, the OAC will consider whether integrating the EM and observer services into a single contract may create economies of scale and cross training opportunities that reduce costs.

3.7 Option 7: Raising the observer fee

The purpose of creating the subgroup was to consider whether there are viable alternatives to address low selection rates in partial coverage other than raising the industry fee. As with the Federal funding option, any increase of money into the partial coverage contract would directly affect selection rates. This option would require a regulatory amendment, as the fee percentage is established in regulation. Additionally, the timeframe for seeing results from this option is extended, because the regulatory change needs to be implemented first, and then fees need to accrue at the new level, before the money can be collected and spent on increasing coverage rates. Figure 1 lays out in detail an ambitious timeline for this option that would see a change in selection rates occurring at the earliest in the 2021 ADP.

Figure 1 Ambitious timeline for Council action, rulemaking, and implementation of an observer fee increase



Based on information in the 2016 Annual Report, the fees collected for 2016 at the 1.25 percent rate, adjusted to \$3.5 million, are distributed among gear sectors as described in Table 4. The gross ex-vessel revenue by sector is then calculated, and the amount of revenue that would be generated by a 2 percent fee is illustrated. The table also identifies what the difference in revenue, by sector, results from raising the fee to 2 percent.

Table 4 Difference in revenue from current 1.25% observer fee and maximum 2% observer fee.

Fees collected in 2017 (adjusted)			Gross revenue by sector	Projected fees by sector at 2% fee	Difference
Gear sector	Fees by sector at current 1.25% fee	Sector's percent of total fee revenue			
Pot	\$333,733	10%	\$26,698,644	\$533,973	\$200,240
Hook and line	\$2,085,638	60%	\$166,851,020	\$3,337,020	\$1,251,383
Trawl	\$1,077,434	31%	\$86,194,680	\$1,723,894	\$646,460
Jig	\$3,196	0%	\$255,656		
Total	\$3,500,000	100%	\$279,744,344	\$5,594,887	\$2,094,887

Fees collected in 2017 are based on the 2016 Annual Report, Table 2-2, as adjusted according to the description in Section 2 of this document. Gross revenue is calculated based on the adjusted fee by sector representing 1.25% of the gross revenue.

If the Council were to move forward with an analysis to raise the observer fee, the OAC subgroup recommends considering two different options in that analysis:

Option 1: Raise the fees across the board to 2 percent.

This would provide \$5.59 million in revenues based on 2016 data which would be sufficient for 5,300 observer days at \$1,049/sea day. This is slightly more than the 4,731 observer days used in 2016 at the 15/15/28 percent rates.

Option 2: Supplemental fee increases by sector to achieve monitoring targets.

This option would share the 1.25 percent base fee according to some guideline formula, and have different supplemental fee increases for each sector that would be dedicated to meeting a monitoring target for that sector.

The following paragraphs evaluate each sector in the context of the revenue raised by sector's proportion of the fee and how that would translate to a sector-specific selection rate selection rate under the current 1.25 percent, and if the fee were raised to 2 percent.

- **Pot Sector:** Based on the 2016 June annual report data that 113 pot boats fished 1,158 trips with an average trip length of 3.99 days, the \$333,733 in fees paid by the pot gear sector can support a 7% selection rate at \$1,049/sea day. If the pot sector's fee is raised to the maximum 2%, this would generate an additional \$200K and would be sufficient to support an 11% selection rate. This calculation does not account for any changes in cost structure associated with implementing EM.
- **Trawl Sector:** Based on the 2016 June annual report data that trawl vessels boats fished 2,518 trips with an average trip length of 2.86 days, the \$1,077,434 in fees paid by the trawl gear sector can support a 15% selection rate at \$1,049/sea day. If the trawl sector's fee is raised to the maximum 2%, this would generate an additional \$646K and be sufficient to support a 23% selection rate.
- **Longline Sector:** Based on the 2016 data prepared by NMFS in order to evaluate zero selection, which states that 507 boats over 40' LOA fished 2,860 trips with an average trip length of 5.0 days, the \$2,085,638 in fees paid by the longline gear sector can support a 14% selection rate at \$1,049/sea day. If the longline sector's fee is raised to the maximum 2%, this would generate an additional \$1,251,383 and be sufficient to support a 22% selection rate. This calculation does not account for any changes in cost structure associated with implementing EM.

3.8 Options to modify deployment design to increase efficiency

One of the conditions of the subgroup's scope of work was to look at options that maintain the agency's current statistically-reliable random sampling model should be considered, to be continued through the use of ODDS. During the subgroup's discussions, ideas were raised as to whether there are efficiencies that could be gained through changes to the current method of randomly selecting trips. For example, perhaps using random vessel selection for a longer period would lower costs (one suggestion was even to do vessel selection for 1-year time period). While there have been sampling frame errors in the past using vessel selection, it could be feasible to develop a vessel-selection system that meets that is both scientifically defensible and meets the needs of the fleet. Alternatively, the the group wondered if it be more efficient if a vessel were selected to carry an observer on its next two trips, to minimize observer travel costs.

It would be possible for NMFS staff to evaluate alternative sampling designs in the context of improving cost efficiencies (e.g., lower travel costs). This analysis would involve the same AFSC and AKRO staff that work on many of the other projects and priorities discussed in this paper including: the Annual Report, ADP, catch accounting methodologies, and allocation of fee budget between EM and observers. If the OAC requested an additional project to evaluate alternative sampling designs, the project would need to be prioritized relative to other priorities on the list analytical projects.