**NMFS Report on EM Costs**
**PFMC Meeting, Costa Mesa, CA**
**November 14-20, 2019**

At its September 2019 meeting, the Council requested updated cost estimates for the groundfish EM program, including past and projected future costs and funding sources. NMFS is providing information in this report to fulfill the Council's request and to assist vessel owners and service providers in estimating costs for the EM program.

## Summary of EM Costs

Table 1 summarizes the estimated total annual government and industry costs from the EM EFP program 2015-2020 and the future regulatory program beginning in 2021. Note that costs are shown in fiscal years (FY; October 1-September 30) to correspond with the NMFS appropriations cycle.

*Government Costs*

For the EM EFP, government costs consist of NMFS's own costs plus the Pacific State Marine Fisheries Commssion's (PSMFC) costs. NMFS's own costs consist of labor and non-labor (e.g., equipment, travel, overhead). We show these categories separately in the table to differentiate those costs that we would recover through cost recovery when the program transitions to regulations under our current policy (labor only) from the total costs of the program (labor and non-labor). Time spent working on the EM EFP program has not been charged to cost recovery; this information is provided strictly to inform cost estimates for future years under the regulatory program. We are currently revisiting the decision not to recover non-labor costs through cost recovery and expect to have a decision in time for our annual cost recovery report to the Council in April 2020.

During 2015-2020, NMFS's own costs consisted of the labor to administer the EM EFP program, including developing and issuing EFPs and VMPs, reviewing drive reports and EM data provided by PSMFC, and conducting outreach with captains. Most of these duties were completed by Permits Branch staff, but also included participation from the Office of Law Enforcement (OLE), General Counsel Northwest Section (GCNW), West Coast Groundfish Observer Program (WCGOP), the Groundfish/CPS Branch, and Northwest Fisheries Science Center (NWFSC) Information Technology (IT). This time spent working on the EM EFP program has not been charged to cost recovery.

NMFS staff have also been working on the development of the regulations for the EM program, including attending Council and GEMPAC meetings, completing rulemaking packages and associated analyses, and planning for implementation. NMFS staff time working on the regulations has been charged to cost recovery. Time has been charged to the shorebased IFQ sector (75%) and the mothership sector (25%) based on the proportion of EM seadays. It was not possible to exactly determine the amount of time spent by NMFS staff on the EM EFP program or the EM regulations for Table 1, because NMFS staff time is not tracked at this level.

Our best estimate is that the EM program as a whole, including EM EFPs and EM regulation development, has annually accounted for approximately 1.5 FTEs from 2015-2020. NMFS labor for EM activities is charged to either National Catch Share Program line, Fish Management Base line, or cost recovery (in the case of incremental costs).

In FY2019, the NWFSC received $410,000 to cover one-time start-up costs for the regulatory program to begin in 2021, including a temporary program coordinator ($150,000), contract labor for database development ($160,000), and equipment ($100,000). Beginning in FY 2020, we anticipate approximately $450,000 in annual NMFS costs to administer the EM program. Labor costs consist of a full-time coordinator for the WCGOP ($150,000) and a full-time coordinator for the Permits Branch ($150,000). Non-labor costs are estimated at $150,000 for equipment, licenses, and data storage. Non-labor costs are expected to decline over time as technology improves and equipment becomes less expensive.

PSMFC's costs in the table show the amount of funding NMFS provided to PSMFC to manage the EM EFP annually since 2015. PSMFC's activities have included logbook data entry, review of the video data, reporting discard estimates to NMFS, data storage, and analysis to support reports to the Council and rulemakings. NMFS provided a lump sum in FY 2016 to fund PSMFC's work on the EM EFP FY 2016-2019. These funds were supplemented in FY 2018. Additional funds are planned to be provided in FY 2020 and FY 2021 (fall 2020) to continue the EM EFP through calendar year 2020 since implementation of the regulations has been delayed to January 1, 2021. This results in an annual average of $345,072 for PSMFC's costs for the EM EFP program. All funding for PSMFC to date has come from the National Catch Share Program funding line. Funding sources for FY 2020 and 2021 are still to be determined.

*Industry Costs*

Due to confidentiality requirements, we have little information about industry costs for the EM EFP that can be shared publicly. During the EFP, vessel owners were responsible for purchasing or leasing and installing EM systems, and for service and maintenance of the EM systems. Our understanding is that PSMFC provided units to initial participants at little or no cost, so vessel owners would have been responsible only for the cost to maintain the units during the EFP. We estimate the costs of these field services to be approximately $300,000 per year for the entire fleet (45 vessels), including field service visits to maintain and repair the EM systems, 24-hour technical support by phone and email, and program management. Some participants may have received federal or private grants to offset maintenance costs in the early years of the EFP, which is not reflected in Table 1.

When the EM program transitions to regulations in 2021, vessel owners will be responsible for purchase or lease and maintenance of the EM systems, as well as review of the video data, reporting of data to NMFS, and storage of the EM data and other records. We estimate the annual cost to the fleet from these services to be $622,444 per year (Table 1). An equivalent number of seadays using a human observer is estimated to cost $1,298,000 annually (assuming a cost of $500/sea day). We discuss the methods we used to estimate these industry costs in more detail in the following sections.

Industry costs beginning in 2021 would also include cost recovery fees for incremental costs of the EM program. Estimated changes to the cost recovery fees for the shorebased IFQ sector and the mothership sector are shown in Table 2. We estimate the annual incremental costs from the EM program to be $450,000 (Table 1). This amount would be apportioned between the shorebased IFQ sector ($337,500) and mothership sector ($112,500) based on the proportion of EM seadays (75 shorebased IFQ:25% mothership). The resulting change in the cost recovery fees would depend on the amount of other incremental costs to be recovered and the ex-vessel value in any given year. We have provided an example in Table 2 using the FY 2018 cost recovery fees for these two sectors. Based on Table 1 in the 2018-2018 Annual Cost Recovery Report, the total recoverable costs in FY 2018 were $1,753,653.57 for the shorebased IFQ sector and $71,400.39 for the mothership sector. Note that the mothership sector was not charged cost recovery fees in 2019 due to a credit balance. However, in order to estimate effects to future fees from EM we used the total recoverable costs from FY 2018 to calculate a baseline fee (pre-EM) for comparison in Table 2. Had the mothership sector been charged a fee, the baseline fee would have been 0.63% based on 2018 ex-vessel value. The addition of the mothership sector's share of recoverable EM costs would result in an estimate of $183,900 of total annual recoverable costs or 1.62% based on 2018 ex-vessel value. The shorebased sector's recoverable costs would increase to approximately $2,091,154 or 3.45% based on 2018 ex-vessel value. Due to the 3% cap on cost recovery fees, the shorebased sector fee would be rounded down to 3%. These estimates assume both labor and non-labor costs will be recovered. If only labor costs are recovered, the fees would be $1,978,654 or 3.26% (3%) for the shorebased IFQ sector and $146,400 or 1.29% for the mothership sector.

**Detailed Industry Costs**

Table 2 shows detailed estimates of EM costs by gear type and for different program components. The top section of the table contains information on EFP participation and effort and other "cost multipliers," such as the amount of data generated per sea day, that we used to generate the cost estimates in the lower sections of the table. This information is based on 2017 EM EFP data. In 2017, PSMFC had EM program staff record the amount of time it took to complete specific tasks, which can be used to generate more accurate cost estimates. EM tasks have not changed since 2017, so these time estimates (i.e., review hours per haul, program hours per sea day) are not expected to have changed and still represent the best available information. 2017 EFP effort information was also used to ensure an apples-to-apples comparison with the EM task information.

The cost multipliers were multiplied against PSMFC labor cost estimates ($50/hour) and expanded using the EFP effort information to get a total annual cost for the fleet and a cost per sea day per gear type for each program component. We understand these estimates may differ from the likely costs of a private sector service provider in that PSMFC's labor or overhead costs may be lower and not incorporate a profit margin or investment in product development. Due to confidentiality requirements, we are not able to share private sector service provider cost information publicly. However, we have provided the cost multipliers for vessel owners and service providers to use to develop cost estimates that better reflect their individual business plans and private sector costs.

Total estimated costs to the fleet for EM would be $622,444 annually. This total cost consists of the following components:

- Equipment ($90,000) - Equipment includes the purchase or lease and installation of an EM system. We estimated that each unit installed would cost $10,000 and assumed that the lifetime of the unit is 5 years.
- Video Review ($126,470) - Review costs include labor to review the video and sensor data and report discard estimates to NMFS. Estimates are shown for both 100% review of all gear types and based on recommended sampling rates in NMFS Report 4 (25% for optimized retention bottom trawl and fixed gear). The review cost from the recommended sampling rates was used to calculate the total costs in the table. Estimates are based on an assumed $50/hour labor rate.
- Program Management ($57,220) - Program management costs include labor for vessel outreach, generating and submitting drive reports to NMFS, and other administrative activities. Estimates are based on an assumed $50/hour labor rate.
- Data Storage ($48,754) - Data storage costs were based on 4 years of data storage on local servers at the rates and effort levels shown in Table 3.
- Service & Maintenance ($300,000) - Service and maintenance fees include the cost of routine maintenance, repair and replacement of EM system components, and 24-hour technical support.

If camera costs are not included, the total estimated cost to the fleet would be $532,444 annually. This compares to an estimated $1,298,000 annually for the same number of seadays using a human observer (assuming a cost of $500/seaday). The resulting savings to the fleet are an estimated $675,556 (with equipment costs) and $765,556 (without equipment costs) annually. Total costs per sea day per gear type range from $149/seaday for a whiting trip (without equipment costs) to $489/seaday for a bottom trawl trip (with equipment costs). Note that per seaday costs estimates for non-whiting midwater trawl trips are likely an overestimate and not an accurate estimate of seaday costs for this gear type because it does not incorporate the bottom trawl and whiting activities that are also part of these vessels' portfolios.

**Table 1. Summary of Estimated Annual EM Costs**

| | FY2015 | FY2016 | FY2017 | FY2018 | FY2019 | Anticipated FY2020 | Anticipated FY2021 | Annual Avg EM EFP 2015-2020 | | Est. Annual 2021-Beyond |
|---|---|---|---|---|---|---|---|---|---|---|
| **Government Costs** | | | | | | | | | **Government Costs** | |
| **NMFS costs** (EFP program administration, regulatory development) | See text | | | | | | | | **NMFS costs** (program administration) | $450,000 |
| **Labor** | See text | | | | $310,000 | $300,000 | $300,000 | | **Labor** | $300,000 |
| **Non-labor** (e.g., equipment, overhead) | See text | | | | $100,000 | $150,000 | $150,000 | | **Non-labor** (e.g., equipment, overhead) | $150,000 |
| **Funding source** | National Catch Share Program, Fish Management Base, Cost recovery | National Catch Share Program, Fish Management Base, Cost recovery | National Catch Share Program, Fish Management Base, Cost recovery | National Catch Share Program, Fish Management Base, Cost recovery | National Catch Share Program, Fish Management Base, Cost recovery | TBD | TBD | | **Funding source** | TBD |
| **PSMFC funding** (video review, logbook data entry, analysis, data storage) | $250,000 | $1,748,501 | $0 | $140,000 | $0 | $208,000 | $69,000 | $345,072 | **PSMFC funding** | |
| **Funding source** | National Catch Share Program | National Catch Share Program & Fishery Managment Programs | | National Catch Share Program | | TBD | TBD | | **Funding source** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Industry costs** (equipment, service & maintenance) | $300,000 | $300,000 | $300,000 | $300,000 | $300,000 | $300,000 | $300,000 | $300,000 | **Industry costs** (equipment, service & maintenance, video review, reporting, data storage) | $622,444 |

**Table 2. Estimated Cost Recovery Fees**

| **Labor Only** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Sector** | **Share of EM Costs** | **EM Costs (labor only)** | **Total Annual Recoverable Costs (pre-EM)** | **Total Annual Recoverable Costs (w/EM, labor only)** | **2019 Ex-vessel Value** | **Fee Percentage (pre-EM)** | **Fee Percentage (w/EM, labor only)** | **Difference (labor only)** |
| **Shorebased IFQ** | 75% | $225,000 | $1,753,653.57 | $1,978,653.57 | $60,624,195.00 | 2.90% | 3% (3.26%) | 0.1% (0.36%) |
| **Mothership** | 25% | $75,000 | $71,400.39 | $146,400.39 | $11,350,915.58 | 0.63% | 1.29% | 0.66% |
| **Labor and Non-Labor** | | | | | | | | |
| **Sector** | **Share of EM Costs** | **EM Costs (labor + non-labor)** | **Total Annual Recoverable Costs (pre-EM)** | **Total Annual Recoverable Costs (w/EM, labor + non-labor)** | **2019 Ex-vessel Value** | **Fee Percentage (pre-EM)** | **Fee Percentage (w/EM, labor + non-labor)** | **Difference (labor + non-labor)** |
| **Shorebased IFQ** | 75% | $337,500 | $1,753,653.57 | $2,091,153.57 | $60,624,195.00 | 2.90% | 3% (3.45%) | 0.1% (0.55%) |
| **Mothership** | 25% | $112,500 | $71,400.39 | $183,900.39 | $11,350,915.58 | 0.63% | 1.62% | 0.99% |

**Table 3. Detailed Estimates of Annual Industry Costs**

| Cost multipliers | Total annual | Bottom trawl | Non-whiting midwater trawl | MSCV | Fixed gear | Shorebased whiting |
|---|---|---|---|---|---|---|
| # of vessels | 45 | 11 | 9 | 14 | 9 | 22 |
| Total annual sea days | 2,596 | 369 | 72 | 578 | 274 | 1,303 |
| Average sea days per vessel | | 33.55 | 8.00 | 41.29 | 30.44 | 59.23 |
| Average review hours per haul | | 2.39 | 0.48 | 0.28 | 0.76 | 0.38 |
| Average review hours per sea day | | 5.06 | 0.48 | 0.50 | 2.78 | 0.37 |
| Program hours per sea day | | 0.57 | 0.52 | 0.37 | 0.46 | 0.41 |
| Average TB per sea day | | 0.06 | 0.06 | 0.04 | 0.06 | 0.04 |
| **EM Cost** | **Total Annual** | **Per Sea Day** | | | | |
| Equipment cost | $90,000 | $60 | $250 | $48 | $66 | $34 |
| Review cost† | $172,378 | $253 | $24 | $25 | $139 | $19 |
| Review cost at reduced rate | $126,470 | $177 | | | $74 | |
| Program costs†* | $57,220 | $29 | $26 | $19 | $23 | $21 |
| Data storage cost** | $48,754 | $25 | $24 | $24 | $16 | $15 |
| Service & maintenance fees | $300,000 | $199 | $833 | $161 | $219 | $113 |
| **Total EM Cost** | **Total Annual** | **Per Sea Day** | | | | |
| EM cost w/camera | $622,444 | $489 | $1,157 | $278 | $397 | $201 |
| EM cost w/o camera | $532,444 | $430 | $883 | $204 | $332 | $149 |
| Observer cost | $1,298,000 | $500 | $500 | $500 | $500 | $500 |
| **EM Savings** | **Total Annual** | **Per Sea Day** | | | | |
| With camera cost | $675,556 | $11 | -$657 | $222 | $103 | $299 |
| Without camera cost | $765,556 | $70 | -$383 | $296 | $168 | $351 |