Informational Report 2
September 2021

Electronic Monitoring in the West Coast Groundfish Fishery • Exempted Fishing Permit Report • 2015-2020 •

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Executive Summary

The California Groundfish Collective (CGC) and The Nature Conservancy (TNC) have managed an Exempted Fishing Permit (EFP) project in the West Coast groundfish Individual Fishing Quota (IFQ) fishery beginning in 2014. The goals of this project were to 1) develop and implement the use of electronic video monitoring (EM) in lieu of human observers for catch compliance purposes; 2) inform the development of new regulations while preserving community access to the West Coast fishery through an alternative catch monitoring option; and 3) inform proposed EM programs in other fisheries.

Since the West Coast groundfish fishery transitioned to an IFQ program with individual accountability requirements in 2011, it has faced new monitoring challenges, including high costs and logistical problems associated with the requirement for 100% human at-sea observer coverage. The EFP process in the West Coast groundfish fishery provides important opportunities to demonstrate the use of EM across multiple gear types as an option for compliance monitoring.

From 2015-2020 this EFP project deployed EM systems on three trawl vessels and three fixed gear vessels operating out of the ports of Fort Bragg, Half Moon Bay, and Morro Bay, California. Three other EM EFP projects were also initiated in 2015, and additional vessels have participated in existing or new EFPs in the years since. Pacific States Marine Fisheries Commission (PSMFC) is conducting EM video review for the EFP projects. The National Marine Fisheries Service (NMFS) monitors and enforces the terms of the EFPs. Vessels participating in the project follow catch-handling requirements for video review per a Vessel Monitoring Plan (VMP) and use state logbooks as well as specific EM logbooks developed by PSMFC to report priority species catch and discard data. This EFP project has produced a total of 519 unique fishing trips, with all resulting video reviewed by PSMFC staff.

Participants in this EFP project are members of the CGC, which is a voluntary collective agreement between fishermen that creates an insurance pool of quota for constraining groundfish species. Fishermen in the CGC collect and share information about the catch of constraining species and use spatial fishing plans to mitigate risk. This annual arrangement has helped participating members maintain a lower utilization rate of overfished species and a higher utilization of target species.

Many of the key lessons learned over the course of the six-year project were learned in the first two years, these include:

- EM systems can accurately validate logbook data provided by fishermen and are comparable to human at-sea observers in validating required discard information.
- Fishermen can develop and adapt new catch handling techniques to meet review requirements, reduce review time, and ensure the success of EM.
- Collaboration and regular communication between fishermen, NMFS, PSMFC, and private EM service providers is critical to success of the program. Establishing a single point of contact for a group of vessels can improve communication among stakeholders and streamline administration.
- A Collective Enforcement Agreement creates an opportunity for a cooperative approach to implementing EM that may increase efficiency for industry and managers.

The dedicated efforts of the project partners, fishermen, PSMFC and NMFS staff resulted in the initial project goals and objectives being met, and this project has provided valuable insight into the ongoing efforts to advance EM at the regional and national level. The learning generated through this EFP project and other concurrent EFP projects has informed the Pacific Fishery Management Council (PFMC) discussions and deeming of draft regulations.

A key learning from this and other EFP projects has been that costs associated with implementing an EM program are variable and highly dependent on final program design. The primary program design considerations that impact costs to the fishing industry and how data confidentiality will be managed are both critical to program success. Accordingly, beginning in April of 2017, stakeholders on the West Coast raised concerns about the costs of the regulatory model requiring third party review of video and associated secondary review costs. This EFP's project partners and other concurrent EFP projects have collaborated and continued to engage with NMFS and PMFC from 2017 – 2021 through Council meetings, the Groundfish Electronic Monitoring Policy Advisory Committee (GEMPAC) and additional workshops and meetings with stakeholders from regions around the country. Stakeholders collectively have continued to request clarification of data confidentiality provisions and clear assessments of program costs prior to regulatory implementation. In June 2021, the PMFC requested NMFS delay implementation of EM regulations to allow for additional review of the third-party model.

Background

The West Coast groundfish fishery includes 90 different species that live on or near the bottom of the ocean. This diverse group of species including Pacific whiting, sole, rockfish, lingcod, and sablefish are harvested using different gear types such as trawl, Scottish seine, longline, and pot gear. For generations, this fishery has contributed to the cultural and economic fabric of coastal communities in Washington, Oregon and California, including the homeports of the vessels participating in this project: Fort Bragg, Half Moon Bay and Morro Bay.

The Magnuson Stevens Fishery Conservation and Management Act guides the PFMC and NMFS in managing the West Coast groundfish fishery, which has five main components: limited entry trawl, limited entry fixed gear, open access, recreational, and tribal. The limited entry trawl sector transitioned to an IFQ management program in 2011. Since the implementation of the IFQ program, vessels operating with limited entry trawl permits may use alternative gear types (e.g., fixed gear) to harvest groundfish.

The IFQ program includes requirements for 100% monitoring for compliance at sea, and 100% monitoring of landings on shore to ensure full accounting of every pound of retained and discarded IFQ species. Fishermen are required to use logbooks to report all fish retained and discarded during each fishing event (haul or pull) on every trip. Human observers verify and quantify discards at sea and Catch Monitors (CM) verify and quantify retained catch during offload. Though vessels are required to contract at-sea human observers, and offload company/first receivers are required to provide CM, the same qualified human observer has typically performed both at-sea and offload duties.

The monitoring requirements of the IFQ program have presented challenges such as high costs and logistical problems associated with requiring the use of human observers. As of 2015**,** the fishing industry has been responsible for covering all costs associated with at-sea compliance and CM/shoreside monitoring. The average daily cost for an at-sea observer is estimated at $500[1], and fishing trips tend to last between two and five days. Monitoring is conducted during and after fishing to ensure accurate reporting of discards. During any given fishing trip, vessels can spend many hours steaming to fishing grounds and setting gear, which can result in a day or more of paid observer coverage during which there is no fishing activity to observe. Based on information from NMFS's Economic Data Collection program, observer costs can be upwards of 30-60% of an average fixed gear or trawl vessel's total cost net revenue.[2] In some regions, particularly in smaller and more remote ports, deployment of human observers results in

Figure 1© Gulf of Maine Research Institute

[1]http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/electronic_monitoring/em_draft_impact_review.pdf

[2] https://www.nwfsc.noaa.gov/research/divisions/fram/economic/economic_data_reports.cfm

significant inefficiencies due to the logistical and operational challenges of moving people between port locations along the coast. These inefficiencies tend to be passed onto fishermen by restricting when fishing can occur – sometimes resulting in lost fishing windows - and requiring vessels to pay for observer travel fees in addition to daily rate charges.

These monitoring challenges are not unique to the West Coast. In May of 2013, NMFS issued a policy directive to all regions of the U.S. urging consideration of and providing guidance on the adoption of electronic technology solutions for fisheries monitoring.[3] At the same time, the PFMC was moving forward with consideration of regulatory objectives for electronic monitoring. In 2012, the PFMC commissioned a research project for PSMFC to partner with vessels and test the feasibility of EM for catch and discard accounting. Fishing vessels volunteered to test this technology while also carrying a human observer. The learning from the PSMFC research project informed the PFMC decision to permit out-of-cycle applications from interested stakeholders for Exempted Fishing Permits (EFPs) to test EM without the use of at-sea observers. The EFP process in the West Coast groundfish fishery has provided an important opportunity to demonstrate the use of EM across multiple gear types in a high-volume, multi-species fishery, proving it can serve as a key option for catch compliance monitoring.

Project Description

The CGC and The Nature Conservancy (TNC) have managed an EFP project in the West Coast groundfish fishery since 2014. The goals of this project were to 1) develop and implement the use of EM in lieu of human observers for catch compliance purposes; 2) inform the development of new regulations while preserving community access to the West Coast fishery through an alternative catch monitoring option; and 3) inform proposed EM programs in other fisheries.

During late 2014 and early 2015, the project partners collaborated with PSMFC to build upon the lessons learned from previous research projects and worked with NMFS staff to develop terms and conditions for EFPs. Participants in this EFP project are members of the CGC, which is a voluntary collective agreement between fishermen that creates an insurance pool of quota for constraining groundfish species. Fishermen in the CGC collect and share information about the catch of constraining species and use spatial fishing plans to mitigate risk. Launching this EFP project required drafting and submitting EFP proposals, assessing vessels' interest in participation, reviewing, and negotiating exempted permit terms, developing vessel participation selection criteria, and attending and providing public comment at PFMC and advisory body meetings. The EM EFPs were recommended for approval by the PFMC and issued by NMFS in June 2015, permitting the project partners to include up to seven groundfish IFQ vessels (three fixed gear and four bottom trawl) to carry EM systems in lieu of human observers.

[3] https://media.fisheries.noaa.gov/dam-migration/04-115.pdf

Under the EFPs, NMFS is responsible for monitoring and enforcing the terms of the EFPs, while PSMFC conducts all video review. Vessels participating in the project follow catch-handling requirements for video review per a Vessel Monitoring Plan (VMP) and use state logbooks as well as specific EM logbooks developed by PSMFC to report priority species catch and discard data.

Over the project period from 2015-2020, EM systems were deployed on three trawl and three fixed gear vessels (Table 1). EM systems consist of video cameras, gear sensors (e.g., hydraulic pressure sensors), an EM computer (e.g., control box and monitor), and a GPS receiver (Figure 1).

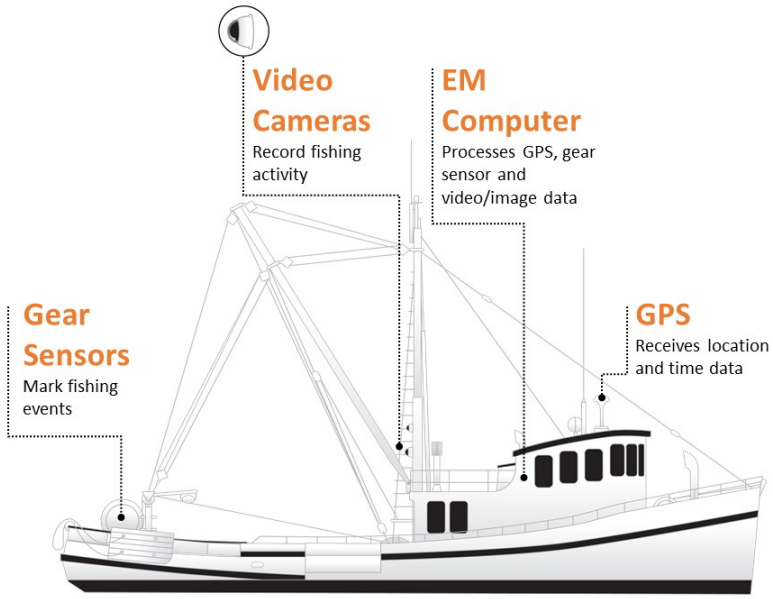

Figure 2: Illustration of an EM system on a typical groundfish vessel © TNC

This integrated system collects video imagery and fishing activity information on a hard drive that vessel operators remove and mail to PSMFC for analysis and review following fishing trips. All equipment is designed to be tamper evident.

During this EFP project, the NMFS covered its own administrative costs, as well as the cost of PSMFC conducting video review and storage. The project partners were responsible for equipment costs, EM service costs, and other related expenses. During the 2015-2020 period, project costs paid by the project partners and participating vessels were covered using a combination of public and private grant support and individual contributions.

This EFP project resulted in video footage gathered during 519 individual fishing trips, representing approximately 1297 sea days and 4701 individual fishing hauls (see Table 1).

Table 1: Total EFP participation by gear type 2015-2020

	Bottom Trawl	Fixed Gear
Vessels	3	3
Trips	371	147
Hauls	2174	2527

Over the project period, more than 6,111 hours of sorting time were reviewed resulting in approximately 3,052 hours of video review (see Table 2).

Table 2: Total hours of video review of sorting activity by gear type 2015-2020

	Bottom Trawl	Fixed Gear
Total Video Review Hours	2492	563

YEAR ONE (2015)

After receiving approved EFPs in June 2015, the project partners developed and distributed a request for bids for EM service providers. After considering five proposals, the project partners hired Archipelago Marine Research (AMR) for the 2015 fishing season to provide, install and service EM systems, assist in the development of initial VMPs, and establish a network of service technicians in primary service ports. The project partners also hired a Project Manager, Ms. Lisa Damrosch, to coordinate all parties involved in the EFP, facilitate data collection to meet project goals, assist in development and troubleshooting of the VMP development, address technical and logistical challenges, assist in representing the project in public forums, and collaborate with external parties on compliance and reporting issues.

Participation: In 2015, five vessels (three fixed gear vessels and two trawl vessels) participated in the EFP, completing 32 trips. In July 2015, NMFS revoked the privilege to obtain an EFP from one trawl vessel as a result of the vessel failing to meet eligibility criteria. This has been the only compliance issue during the project.

Results: In 2015, PSMFC reviewed a total of 425 hours of video, representing 384 individual hauls (95 bottom trawl and 289 fixed gear) from this EFP project.

Estimated discard weights recorded in logbooks were compared to estimated discard weights recorded by video reviewers. Logbook estimates for trawl vessels in total differed by 713 lbs compared to EM video review estimates. Fixed gear vessel logbook estimates differed by 320 lbs.

YEAR TWO (2016)

The project partners secured approval to continue the EFP project in 2016 and add up to 10 additional vessels. In January 2016, the project partners began working with NMFS and PSMFC to develop a new, singular EFP document for 2016 that incorporated a Collective Enforcement Agreement (CEA).

The CEA is a cooperative approach to implementing EM in which all involved vessels and parties assume responsibility for compliance with the terms and conditions of the EFP and individual VMPs. This approach is intended to reduce NMFS enforcement costs related to an EM program. Given the need to ensure accurate catch accounting, NMFS Office of Law Enforcement needs a timely way to respond to technical issues, as well as noncompliance with provisions of EM VMPs. However, regulations and corresponding due process requirements may make timely response difficult. Under a CEA option, agreements would become one of the criteria that vessels must satisfy to qualify for authorization to carry EM in lieu of an at-sea observer. This option also provides fishermen members with the ability to adapt monitoring plans more easily and quickly.

The CEA must be vetted with NMFS and must be developed in cooperation with participating vessels. The core components of a CEA include criteria for participation, EM program and VMP requirements, prohibited activities, responsibility for enforcement, penalties and other remedial actions, and individual and collective liability.

As a condition of issuing this new type of EFP, NMFS required the project partners to assume primary responsibility for ensuring that vessels, vessel owners, and vessel operators participating in operations under the EFP complied with the terms and conditions of the EFP and CEA (however, NMFS retained full discretion to independently enforce the terms and conditions of the EFP). NMFS issued the new EFP referencing the CEA in August 2016 and all vessels switched to operating under this agreement at that time.

After distributing a request for bids for EM services, the project partners again hired AMR for the 2016 fishing season to provide, install and maintain EM systems.
At the March 2016 meeting, the PFMC chose to extend the expiration date of the EM EFPs for the bottom trawl, non-whiting mid-water trawl, whiting mid-water trawl, and fixed gear sectors through 2018.

In April 2016, the PFMC deemed draft regulations for whiting and fixed gear EM programs. After taking PFMC recommendations into consideration, NMFS published a proposed rule for whiting and fixed gear EM programs in September 2016. and took final action on whiting and fixed gear EM in April of 2017 and on third party review in November of 2017.

Participation: In 2016, four vessels (two fixed gear vessels and two trawl vessels) participated in the EFP, completing 48 trips. One fixed gear vessel did not fish in 2016 due to vessel construction, and a Scottish Seine vessel was added as a second trawler.

Results: In 2016, PSMFC reviewed a total of 748 hours of sorting time, representing 645 individual hauls (230 bottom trawl and 415 fixed gear) from this EFP project.

Estimated discard weights recorded in logbooks were compared to estimated discard weights recorded by video reviewers. Logbook estimates for trawl vessels in total differed

by 544 lbs total for the year, compared to EM video review estimates. Fixed gear vessel logbook estimates total for the year differed by 575 lbs.

YEAR THREE (2017)

During 2017, project partners continued to work with vessels and NMFS and PSMFC to fine tune VMPs and increase catch handling efficiency.

In April of 2017, the PFMC heard updates on EM EFP projects and took final action to approve EM programs for the bottom trawl and non-whiting midwater trawl sectors. At this meeting, the California Groundfish Collective provided public comment and a collaborative letter with other industry partners requesting that the third-party model be tabled to ensure the most cost-effective program moving forward. The Council provided direction to NMFS to examine the feasibility of using a sole video review provider (PSMFC) model indefinitely. The Council also provided direction to NMFS to develop a process that does not require rulemaking to adjust the discard species list in a VMP. Based on the experience and evidence provided by this EFP project and others, the Council direction and revisions to the draft regulations added the following species to the allowable discard list: Deep-sea sole, sanddabs, and starry flounder.

In November 2017, project partners, industry, Council members and others reiterated cost concerns, and the Council took final action to move forward with the third-party service provider model as the only feasible way to move forward with EM regulations.

Participation: In 2017, six vessels (three fixed gear vessels and three trawl vessels) participated in the EFP, completing 94 trips.

Results: In 2017, PSMFC reviewed a total of 1,281 hours of sorting time, representing 920 individual hauls (468 bottom trawl and 452 fixed gear) from this EFP project.

Estimated discard weights recorded in logbooks were compared to estimated discard weights recorded by video reviewers. Logbook estimates for trawl vessels in total differed by 2,973 lbs total for the year, compared to EM video review estimates which represented a difference of less than 3%. Fixed gear vessel logbook estimates total for the year differed by 499 lbs.

YEAR FOUR (2018)

Following an extension of EFPs into 2019, project partners developed and distributed a request for bids for EM service providers. After considering five proposals, the project partners hired AMR to extend services for the 2018 fishing season.

The project partners also continued to engage in the regulatory process, participating in GEMPAC meetings and working to clarify cost analyses and advocate for preferred options to include in the pending trawl and mid-water trawl sectors EM program regulations.

In 2018, the GEMPAC met to review NMFS's draft Procedural Directive on Cost Allocations in Electronic Monitoring Programs and made recommendations related to the need to engage constructively with NMFS to support the development of guidance documentation for the groundfish EM program. Concerns were raised related to the planned transition to third-party service provider model, given lack of clarity on draft business rules that would govern primary and secondary video review and video storage requirements, given their significant impact on the cost of the program for participating vessels.

Participation: In 2018, five vessels (two fixed gear vessels and three trawl vessels participated in the EFP, completing 108 trips.

Results: In 2018, PSMFC reviewed a total of 1298 hours of sorting time, representing 899 individual hauls (350 bottom trawl and 549 fixed gear) from this EFP project.

Estimated discard weights recorded in logbooks were compared to estimated discard weights recorded by video reviewers. Logbook estimates for trawl vessels in total differed by 7,589 lbs total for the year, compared to EM video review estimates which represented a difference of less than 5%.

YEAR FIVE (2019)

With the EFP extended, the California Groundfish Collective continued to work on fine tuning catch handling protocols and engaging in the regulatory process.

Project partners participated in GEMPAC meetings in 2019 and in September, the California Groundfish Collective signed onto an industry letter with other EFP participants expressing concern about pending implementation of regulations that would require the third-party service provider model.

Participation: In 2019, five vessels (two fixed gear vessels and three trawl vessels) participated in the EFP, completing 129 trips. One vessel uses both gear types, so there are four physical vessels participating, but for reporting purposes one vessel appears twice by gear type.

Results: In 2019, PSMFC reviewed a total of 1,234 hours of sorting time, representing 979 individual hauls (426 bottom trawl and 406 fixed gear) from this EFP project.

Estimated discard weights recorded in logbooks were compared to estimated discard weights recorded by video reviewers. Logbook estimates for trawl vessels in total differed by 12,711 lbs total for the year, compared to EM video review estimates which represented a difference of less than 7%. Fixed gear vessel logbook estimates total for the year differed by 242 lbs.

YEAR SIX (2020)

Following the extension of EFPs into 2020, project partners developed and distributed a request for bids for EM service providers and after reviewing three proposals hired AMR to extend services for the 2020 fishing season.

A National EM Workshop was held in early 2020 where questions related to data confidentiality and disclosure as well as EM program cost allocation were raised and discussed during plenary sessions. Fishing activity continued during the COVID-19 pandemic, but market impacts resulted in fewer fishing trips and lower catch volumes.

In 2020, project partners and other EFP programs provided public comments to the GEMPAC and Council requesting the extension of EFPs and delay in regulatory implementation until cost and confidentiality questions could be adequately addressed.

Participation: In 2020, five vessels (two fixed gear vessels and three trawl vessels participated in the EFP, completing 108 trips.

Results: In 2020, PSMFC reviewed a total of 1,126 hours of sorting time, representing 874 individual hauls (406 bottom trawl and 468 fixed gear) from this EFP project.

Estimated discard weights recorded in logbooks were compared to estimated discard weights recorded by video reviewers. Logbook estimates for trawl vessels in total differed by 2123 lbs total for the year, compared to EM video review estimates which represented a difference of less than 3%.

EFP SUMMARY: 2015-2020

Participation 2015-2020

A total of seven vessels participated in this EFP project. One vessel uses both gear types, so for instance in 2020 there were four physical vessels participating, but for reporting purposes one vessel appears twice by gear type. Of the three vessels that are no longer operating under the EFP, one vessel was unable to meet the catch handling requirements and has returned to taking an observer. Two vessels have sold, one remained in the program for one additional year but has since stopped participating in the West Coast IFQ fishery and the other vessel has transitioned to operating under a different EM EFP project.

A total of 519 trips have been completed (371 bottom trawl and 148 fixed gear) (see Table 3).

Table 3: EFP participation by gear type

	Vessels		Trips		Hauls	
	Bottom Trawl	*Fixed Gear*	*Bottom Trawl*	*Fixed Gear*	*Bottom Trawl*	*Fixed Gear*
2015	2	3	14	18	95	289
2016	2	2	31	17	230	415
2017	3	3	73	21	468	452
2018	3	2	92	16	350	549
2019	3	2	88	41	426	553
2020	3	2	73	35	406	468
Total			**371**	**148**	**1975**	**2726**

Costs 2015-2020

Many costs associated with implementing an EM program are variable and highly dependent on final program design. EFP costs are broken down into the following categories:

- **Equipment and installation** - includes EM system control box, cameras, sensors, removable hard drives, monitors and other related components which are amortized across a five-year period, as well as equipment installation costs
- **Fixed annual costs** – includes technical support for hardware systems, program management costs, and annual software license fees
- **Variable annual costs** – includes program coordination, research and development and on-the-ground technical support or repair costs
- **Annual video review and data analysis** – includes costs associated with viewing video footage, analyzing the data collected, video review, data analysis, data storage, and reporting.

Because annual video review and data analysis costs are currently paid by NMFS, this report includes estimates of those costs based on data provided by NMFS on video review and storage costs in the Regulatory Impact Review and Initial Regulatory Flexibility Analysis for the proposed rule for whiting and fixed gear EM programs.[4] The video review and storage costs estimates provided by NMFS are based on cost per sea day; therefor we estimated the annual video review and data analysis costs for this EFP based on the information provided by NMFS. These estimates may be higher than actual costs given continued improvement in storage costs or other efficiencies. Otherwise, reported costs are based on actual expenditures during the project period.

[4] https://www.fisheries.noaa.gov/resource/document/regulatory-impact-review-and-final-regulatory-flexibility-analysis-regulatory-0

The estimated annual average total cost per vessel during the project period was $13,659. The share of the average cost per vessel of EM by cost category shifted over the course of this EFP project (see Figure 3). The increase in video review costs (and to a lesser extent storage costs) as a percentage of total cost are a result of increased fishing activity under the EFP. Meanwhile, equipment and installation costs drop off after the five-year amortization period ended in 2019. Program fees make up on average almost 40% of the total estimated costs.

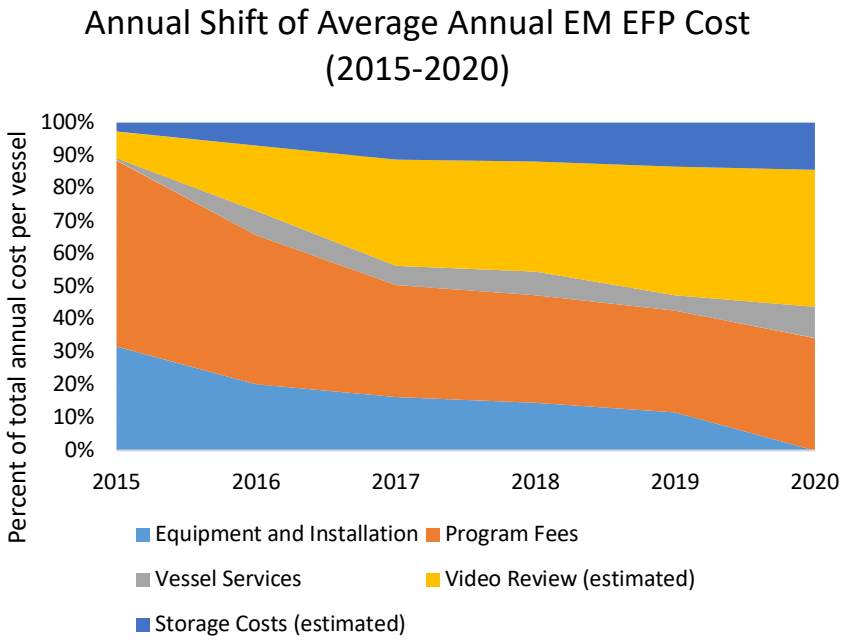

Figure 3: Breakdown of EM costs by category as a percentage of total annual cost for vessels participating in this EFP from 2015-2020.

Results 2015-2020

Comparison of Logbook Data and EM Data (2015-2020)

Over the six-year project period, EM was used successfully to audit and validate logbook data. For bottom trawl vessels, the difference between logbook estimates of discards and EM video review estimates is less than 2%. For fixed gear, less than 17,000 lbs were discarded over the six-year project period and captains estimated 14% *more* discards than the EM reviewers (see Figure 4).

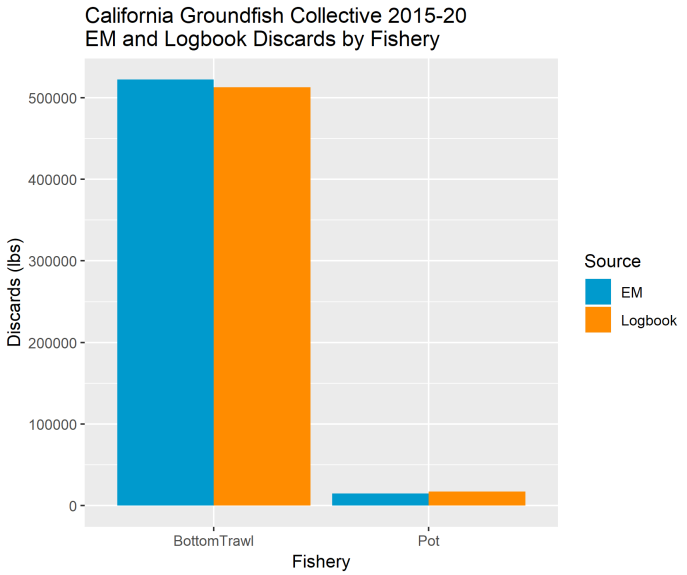

Figure 4: Comparing estimated weights of discarded species based on EM review and logbooks for bottom trawl and fixed gear (pot) vessels from 2015-2020.

Over the project period, when comparing logbook estimates to EM video review estimates there is no significant difference (see Figure 5).

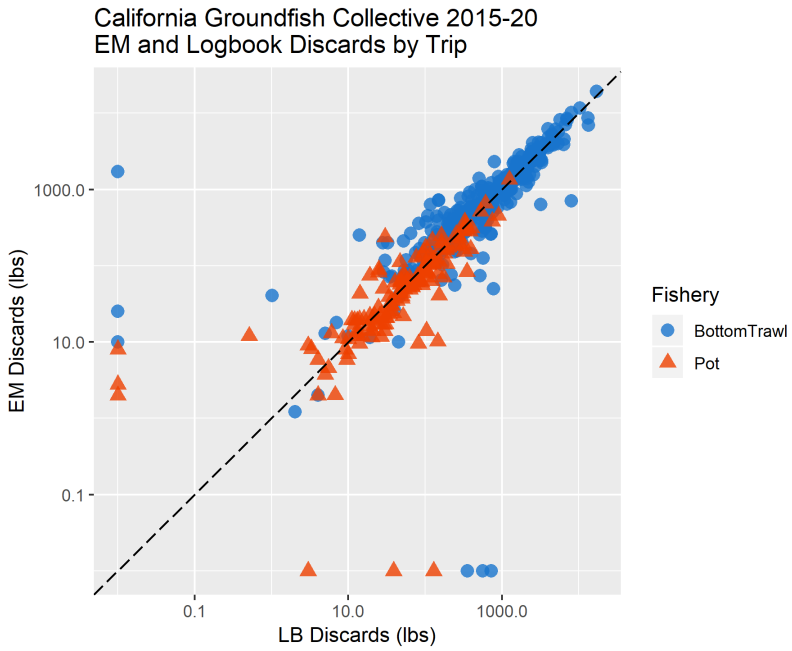

Figure 5: Estimated discards (lbs) by trip for bottom trawl and fixed gear (pot) vessels based on EM video review and logbook (LB) reports for 2015-2020, courtesy PSMFC.

Lessons Learned

This six-year EFP project has resulted in useful learning and recommendations that have directly influenced the development of EM regulations. The results of this EFP can also provide insight for future EM program development in other fisheries.

EM systems can accurately validate logbook data provided by fishermen.

This EFP project and others have demonstrated that EM systems can be used to accurately validate logbook data reported by fishermen. This remained true even as vessels were allowed to discard additional species due to better video review capabilities. The weight of discards made by trawl vessels participating in this project increased by 85% from 2016 to 2017, but the difference between logbook discard estimates and EM discard estimates remained at under 3%.

Fishermen can develop and adapt new catch handling techniques to ensure the success of EM.

Participating fishermen have demonstrated that when committed to using EM, they can change onboard behavior to meet video review requirements, reduce video review time, and ensure the success of EM in meeting compliance monitoring requirements. However, potential future participants in EM programs should understand that EM is not a passive replacement for human observers due to additional commitment of crew and other required shifts to workflow. Changes to catch handling may influence costs to the vessel due to increased sorting time, increased retained catch, and other considerations. Additionally, near real-time communication between video reviewers and captains and crew can aid catch handling adaptation and improve video review.

Collaboration across stakeholders is essential.

Captain and crew participation, collaboration across all involved stakeholders, and frequent and coordinated communication was essential during the development and implementation of this EM project. This type of collaboration and communication should be incorporated into the development of EM programs from the beginning. In addition, working with a single point of contact for a group of vessels can improve communication, coordination, and streamline administration of an EM program.

Many costs associated with implementing an EM program are variable and highly dependent on final program design.

Results from the project indicate that EM systems have the potential to reduce existing monitoring costs without compromising data quality or integrity. Actual costs, however, will depend on program goals (e.g., regulatory compliance vs. full catch accounting), associated video review requirements (e.g., partial review vs 100% video review), and program design (including standards to guide secondary review, or auditing, of video). Fishery characteristics such as the relative geographic isolation and number of ports, and

the amount of fishing activity (by vessels or fleetwide) also influence EM costs.[5] In addition, any analysis of cost-effectiveness of EM depends on a detailed accounting of the cost of alternatives, such as human observers. This project can inform the relative cost picture and help shape perspectives on how to advance EM regulations that have a likelihood of being more cost-effective than current monitoring approaches.

A Collective Enforcement Agreement (CEA) creates an opportunity for a cooperative approach to implementing EM that may increase efficiency for industry and managers.

The use of a CEA requires close collaboration with NMFS to ensure compatibility with existing rules and regulations. The benefits of a CEA include:

- Reduced need for direct enforcement actions, reducing NMFS administration and enforcement costs while retaining flexibility
- Collective oversight and collective incentives for vessels to comply with EM rules and regulations
- Allows for more timely response to technical challenges or misuse of EM
- Non-compliance can be quickly addressed (the exemption to use EM systems can be quickly nullified for non-compliant vessels)
- Ability to enter into collective agreements with service providers, if desired
- Provides centralized contact points for service providers, PSMFC and NMFS
- Allows for adaptation of monitoring plans as needed without requiring revision of all EFP documents

The challenges of a CEA include:

- Developing and vetting the components and terms within the agreement in collaboration with all stakeholders, including NMFS
- Securing final approval and signatures
- Ensuring compliance if participation is widely distributed geographically

Conclusion

This EFP project has served as an important demonstration of the use of EM in lieu of at sea human observers for compliance monitoring in the West Coast groundfish fishery. This project implemented EM across multiple gear types in a high-volume, multi-species fishery, and project results have informed the development of new EM regulations. The full cost of an EM program is dependent on final EM program design, and pending decisions related to issues such as what parties conduct video review, how that review should be conducted, and how any auditing or confirmation of video review should be done will significantly impact the full cost of the groundfish EM program as well as vessel participation. Nevertheless, this EFP project indicates that EM has the potential to reduce

[5] Sylvia, Gil; Harte, Michael; Cusack, Chris. 2016. Challenges, Opportunities, and Costs of Electronic Fisheries Monitoring. Environmental Defense Fund. https://www.edf.org/sites/default/files/electronic_monitoring_for_fisheries_report_-_september_2016.pdf

existing monitoring costs without compromising compliance data quality or integrity and therefore should be used as an alternative compliance monitoring option.

The project partners look forward to continuing to work with the PFMC, NMFS, and other stakeholders to reach successful implementation of EM in the groundfish fishery.

Acknowledgements

The project partners would like to thank staff members at PSMFC, NOAA's West Coast Region and Science Centers, EM service technicians and staff at Archipelago Marine Research, and Captains, Vessel Owners and Crew of the F/V Moriah Lee, F/V Mr. Morgan, F/V Donna J, F/V Blue Pacific, F/V Miss Moriah, F/V Brita Michelle.