

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE REPORT ON PROPOSED ELECTRONIC MONITORING PROGRAM ALTERNATIVES

The California Department of Fish and Wildlife (CDFW) provides some perspective on video retention and video storage costs for the Electronic Monitoring (EM) Program. Additionally, CDFW provides some feedback from industry on the developing EM program.

Video Retention and Storage Costs

The cost of video storage was recently estimated at the November 2019 Council meeting where NMFS provided a report on cost estimates for the EM program ([Agenda Item H.3.a, supplemental NMFS Report 6](#)). However, estimates in the report were based only on data stored on a physical server. At the April 2016 Council meeting, the Council voted to require video storage for three years, based on the Enforcement Consultants (EC) recommendation, despite hearing that the upcoming Policy Directive would likely have a lower minimum storage time. At the April 2020 Council meeting, the Council reaffirmed the desire for 3 years of video retention.

At the April 2020 Council meeting, the finalized National Policy Directive on Third-Party Minimum Data Retention Period for EM programs ([Agenda Item G.5, Supplemental Attachment 4](#)) was presented to the Council. This Policy Directive requires a minimum data retention period of one year beyond the fishing and management period, defined as the fishing year plus the time needed collect, process and analyze the data. For the west coast groundfish fishery that would result in a minimum retention period of 15 to 27 months, depending on the month the trip was taken. Following repeated advice from the EC, despite the new flexibility offered by the newly-finalized National Policy Directive, at the same meeting (April 2020) the Council reaffirmed its desire for a three-year (36 month) retention period.

Deep Storage

At the February 2020 West Coast Electronic Monitoring Workshop, an EM Service Provider discussed placing video in deep storage in the cloud as a way to reduce costs. Cloud storage costs are based on the amount of data being stored and how readily available it is. The advantage to readily accessible storage is that it can be accessed quickly and there are no retrieval costs, but it costs significantly more per month to store it. The advantage to deep storage in the cloud is that storage costs are a small fraction of what they are in readily accessible storage, but there is a cost to retrieve the data if it is needed.

For video data held in current fishing and management period, it would be best to store it either in a readily accessible format or on physical servers, in case additional review is required. Once that period is over and the books are closed for the year, the video data could be transferred into deep storage in the cloud, as the data would likely be accessed infrequently. Deep-storage costs are minimal, and once the retention period is over, the data can be deleted. Deletion can be automatically set to occur at the end of the 36-month retention period, or whatever timetable is chosen. There is no cost to delete data.

CDFW analyzed cloud-based video storage costs using cost information available online from Amazon Web Services (AWS). Using the average terabyte (TB) per sea day and the average sea days per vessel per year for the bottom trawl fleet identified by NMFS in its November 2019 EM Cost Report, CDFW estimated the cost of video storage over the 36-month retention period. Due to potential need for additional review during the current fishing year and management period, the video data should be stored in a readily accessible format in this initial time period, (e.g., AWS Simple Storage Service (S3)) and then transferred to deep storage (e.g., AWS Glacier).

Given that the amount of time the data would be in readily accessible storage versus deep storage varies depending on what month the trip occurred, costs were calculated for each month of the fishing year and then averaged (Table 1). For bottom trawl, the average cost per trip to store the video for up to 15 months in readily-accessible storage followed by the transfer to deep storage for the remainder of the three-year retention period, would be \$22.77 per trip, totaling \$764 for one year of average fishing effort. For shoreside whiting, the cost would average \$15.18 per trip, or \$899 for one year of average fishing effort (Table 1).

Table 1. Cloud storage costs for 36 months of storage for the bottom trawl fishery and the shoreside whiting fishery with cost multipliers.

Trip month	Months of storage		Bottom trawl storage costs			Shoreside whiting storage costs		
	S3	Glacier	S3	Glacier	Total	S3	Glacier	Total
Jan	15	21	\$23.40	\$6.30	\$29.70	\$15.60	\$4.20	\$19.80
Feb	14	22	\$21.84	\$6.60	\$28.44	\$14.56	\$4.40	\$18.96
Mar	13	23	\$20.28	\$6.90	\$27.18	\$13.52	\$4.60	\$18.12
Apr	12	24	\$18.72	\$7.20	\$25.92	\$12.48	\$4.80	\$17.28
May	11	25	\$17.16	\$7.50	\$24.66	\$11.44	\$5.00	\$16.44
Jun	10	26	\$15.60	\$7.80	\$23.40	\$10.40	\$5.20	\$15.60
Jul	9	27	\$14.04	\$8.10	\$22.14	\$9.36	\$5.40	\$14.76
Aug	8	28	\$12.48	\$8.40	\$20.88	\$8.32	\$5.60	\$13.92
Sep	7	29	\$10.92	\$8.70	\$19.62	\$7.28	\$5.80	\$13.08
Oct	6	30	\$9.36	\$9.00	\$18.36	\$6.24	\$6.00	\$12.24
Nov	5	31	\$7.80	\$9.30	\$17.10	\$5.20	\$6.20	\$11.40
Dec	4	32	\$6.24	\$9.60	\$15.84	\$4.16	\$6.40	\$10.56
Average per trip					\$22.77			\$15.18
Average cost for a year of trips					\$763.93			\$899.11
<i>From AWS website</i>								
S3 storage		0.026	GB/month					
Glacier		0.005	GB/month					
<i>From NMFS Report November 2019 I.5.a, attachment 9</i>								
Bottom trawl		0.06	TB/trip		Whiting		0.04	TB/trip
Bottom trawl		33.55	trips/year		Whiting		59.23	trips/year

If the West Coast EM Program instead required only the minimum retention period afforded under the National Policy Directive (15 to 27 months), rather than the 36 months recommended by the EC and Council, the cost of storing one year of video data for the bottom trawl fishery would be

\$617.99, and for the shoreside whiting fishery would be \$727.34. In other words, **the additional cost of retaining a year’s worth of video data for the 36-month period versus the national minimum is \$145.94 for the bottom trawl fishery and \$171.80 for the shoreside whiting fishery.**

Deep Storage Retrieval Costs

While the likelihood of needing to retrieve data from deep storage is low, there is an added cost if retrieval is necessary. There is no cost to retrieve the readily accessible data stored in AWS S3, however there would be a retrieval cost for data in AWS Glacier. The retrieval costs vary depending on how quickly the data is retrieved from deep storage, but in general costs are minimal, ranging from \$0.17 to \$1.99 per trip, and from \$5.78 to \$69.95 to retrieve an entire year of data from deep storage (Table 2).

Table 2. Deep-storage cloud retrieval costs per trip and per year for the bottom trawl and shoreside whiting fishery with cost multipliers.

<i>From AWS website</i>				Bottom trawl		Shoreside whiting	
	Retrieval time	Retrieval fee	Retrieval cost per GB	Cost for one trip	Cost for a year of trips	Cost for one trip	Cost for a year of trips
S3 storage		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Glacier (deep storage)							
Expedited	1-5 min	0.01	0.033	\$1.99	\$66.76	\$1.33	\$78.78
Standard	3-5 hr	0.00005	0.011	\$0.66	\$22.14	\$0.44	\$26.06
Bulk	12-48 hr	0.0000025	0.00275	\$0.17	\$5.54	\$0.11	\$6.52
<i>From NMFS Report November 2019 I.5.a, attachment 9</i>							
Bottom trawl		0.06	TB/trip		Whiting	0.04	TB/trip
		33.55	trips/year			59.23	trips/year

Feedback from the Bottom Trawl Fleet on the EM Program

CDFW staff have been hearing that the bottom trawl fleet has concerns about the efficacy of the EM program given the sorting requirements for the bottom trawl fleet as well as other concerns about the cost of operating under EM when the federal regulations take effect. Recently, CDFW contacted nine captains from the 28 vessels with federal bottom trawl permits that recently landed fish in California in an effort to better understand their concerns. The captains’ main concerns are:

- The sorting requirements and number of species to be retained for bottom trawl
 - Time on deck to sort the fish and present discards to the camera
 - Space on deck to sort the fish
- The additional costs of complying with the sorting requirements
- Costs of the program as it switches from an EFP program to third-party review

Three of the captains reported that they do not use EM but instead take observers. These three captains based their decision to use an observer due to EM sorting requirements, including Pacific Halibut, and having to sort and bring in a lot of the bycatch. The time it takes to sort the fish results in fish spending more time on deck, which can cause them to lose color, making marketable species

less valuable. Some also noted it is easier to have the observer take care of the bycatch rather than a deckhand, and stated they prefer to fill the hold with marketable species, rather than retained species they cannot sell. Two captains mentioned that they do not have the space on deck to sort the fish according to the requirements. When queried about what would make them consider EM, they all mentioned changing the sorting requirements and that the EM costs would need to be less than taking an observer.

Of the six captains contacted that operate using EM, most of them fish in deeper water targeting slope species where there is less bycatch. One captain said that he will fish using EM on the slope, but switch to an observer when fishing on the shelf due to the increased bycatch that must be retained. The captains that use EM are primarily concerned with the increased costs associated with changing from the EM EFPs to the EM program under regulations with third party review, although sorting catch can also be an issue. They are all aware of the impending change and most said that if EM ends up costing more than an observer they will go back to having an observer on board.

In addition to the sorting and program costs, some captains mentioned issues due to the current COVID pandemic. Two captains mentioned that they are currently being paid less for their catch due to lower demand as restaurants have been closed, making it difficult to break even. One captain that is also a first receiver mentioned difficulty in getting a catch monitor, while another captain mentioned difficulty in obtaining observer coverage during the COVID pandemic.