

NMFS Report Groundfish Electronic Monitoring Program Guidelines

NMFS is providing this report to consult with the Council on the Program Guidelines for the groundfish electronic monitoring (EM) program, as required by the regulations at 50 CFR 660.600(b). NMFS has prepared draft Vessel Monitoring Plan Guidelines (Appendix A) and EM Service Plan Guidelines (Appendix B) for review and input by the Council and its advisory bodies. The guidelines are intended to be used by EM service providers and vessel owners in preparing their applications to participate in the EM program. The approach that the Council and NMFS took to the EM regulations was to include only general standards and requirements, but to delegate specifics that may vary by individual provider and vessel operations to EM service plans and vessel monitoring plans, to allow the flexibility to consider different business models. The guidelines document best practices and other information that NMFS has identified in the EM literature and from our experience with the EM EFPs that we believe are necessary to implement a successful EM program. NMFS will use these guidelines to evaluate proposed service and vessel monitoring plans. It is important to note that the guidelines are not requirements, but EM service providers and vessel owners should be prepared to address the best practices and, if they do not employ them, explain why, what alternative method would be used, and why it is equivalent. In this way, the guidelines allow NMFS to consider alternative, but equivalent methods of meeting the various requirements proposed through the plans. These documents are intended to be living documents that NMFS would update annually based on lessons learned from the EM program.

Appendices A and B are the first drafts of the guidelines that NMFS is providing for input by the Council and its advisory bodies. NMFS will bring updated guidelines for a final discussion at the November 2019 meeting. Once the guidelines have been finalized, NMFS will post them to our website and publish notice of their availability in the Federal Register.

EM Program Guidelines Guidelines

There are two sets of guidelines – Vessel Monitoring Plan Guidelines and EM Service Plan Guidelines.

Vessel Monitoring Plan Guidelines

These guidelines are intended to be used by vessel owners and their EM service providers in the preparation of the individual VMP. This draft document contains the latest language on catch handling and handling EM system malfunctions used in the current EM EFP. NMFS would also post templates using the same language on its website. Current VMPs also contain checklists for captain's tasks on EM trips, reporting instructions, and reminders. These are not required elements of the VMP, and so are not included in the guidelines, but can be included by vessel owners in their VMPs if desired.

EM Service Plan Guidelines

These guidelines are intended to be used by EM service providers in preparation of their EM service plans. The EM service plans are intended to describe how an EM service provider plans to carry out the responsibilities of an EM service provider, using their own business model.

These draft guidelines reflect best practices and other information that NMFS identified from a review of the literature on EM programs and from experience with the EM EFPs. NMFS is seeking feedback from the Council and its advisory bodies, and participating vessel owners and providers. We would appreciate feedback on any aspect of the guidelines, including:

1. Is there any additional information needed by EM service providers in the guidelines to complete their EM service plans and plan their service delivery models?
2. Are any of the guidelines not relevant or appropriate for the groundfish EM program?
3. Are there other best practices that EM vessels or providers know of that would be helpful to include in the guidelines?

Draft Electronic Monitoring Program Vessel Monitoring Plan Guidelines

As part of an application for an EM Authorization, a vessel owner must develop and submit an individual Vessel Monitoring Plan (VMP). A vessel owner's EM service provider may prepare and submit a VMP on behalf of the vessel owner. The VMP describes how fishing operations on the vessel will be conducted and how the EM system and associated equipment will be configured to effectively monitor fishing activities and document any discards. The VMP should be developed during and after EM system installation working with your service provider. NMFS will review the VMP to ensure that the equipment installed and the proposed operations of the vessel would effectively monitor vessel operations. This document provides additional information on what NMFS is looking for in a VMP and describes best practices and suggested language to satisfy the required components. Vessel owners may propose and NMFS may consider alternative, but equipment, methods to meet the requirements of the EM program in the VMP. Templates are also available on NMFS's website for each fishery sector and gear type: [INSERT WEB ADDRESS].

Contact the Permits Branch with questions and assistance in completing your VMP: (206)526-4353.

Vessel Monitoring Plan Contents

The vessel monitoring plan should include the following sections:

- A. Contact information – This section includes contact information for the vessel owner, vessel operator, and EM service provider for NMFS to use during the year.
- B. General vessel information – This section lists the basic information about the vessel and operations, like the vessel name, registration number, and target fishery.
- C. Vessel layout – This section describes the layout of the vessel, equipment, and activities to help NMFS and your EM service provider understand where discards will take place.
- D. EM equipment set-up – This section documents the settings of the EM system, such as the time period that cameras will be recording.
- E. Catch handling procedures – In this section, you should describe the way crew will handle catch, sort it, and discard it, to enable video reviewers to identify the species and estimate weight.
- F. EM system malfunctions – This section should describe the way the vessel operator will handle different malfunctions of the EM system and associated equipment.

Some other information you may want to include in the VMP is a checklist of EM tasks for each day or trip that the captain can use as a reference; instructions and tips for completing the logbook; and trouble-shooting instructions from the EM service provider.

A. Contact Information

1. Provide the name, address, phone number, and signature of the vessel owner, and the date of the application.
2. Provide the name, address, phone number, email address, and preferred method of contact, of a primary point of contact for vessel operations. This should be the person, such as the vessel captain, that NMFS and the EM service provider would call to provide feedback on catch handling, logbook reporting, etc. and that can make changes accordingly.
3. Provide the name, address, and phone number of your EM service provider(s), and contact information for a primary point of contact at the EM service provider(s) that NMFS and the vessel operator can contact for technical support and program operations.

B. General Vessel Information

1. Provide the vessel name and documentation number/state registration number.
2. Indicate what type of gear the vessel will be using and for what target fishery (i.e., pots, longline, bottom trawl, whiting midwater trawl, and/or non-whiting midwater trawl).
3. Indicate what sector(s) the vessel will be participating in (i.e., shorebased IFQ or mothership sector).
4. Provide the vessel's homeport.

C. Vessel Layout

1. Include a diagram of the vessel layout including deck measurements and locations of sorting, a measuring board, and discard control points.
2. Include the measurements of all bins, baskets, compartments, and other tools, that will be used to calculate estimates of weight. Provide photos of bins, baskets, and other measuring tools, to assist video reviewers in identifying them on camera.

D. EM Equipment Set-up

1. Describe the number and location of cameras and provide images of the locations and corresponding views.
2. Describe and provide images of the location of lighting, control center, global positioning system (GPS), sensor(s), monitor(s), external UPS, and other EM equipment.
3. List the frame rates, image resolution, frequency of data logging, sensor trigger threshold values, and other EM system specifications.
 - a. Sensor data should be recorded by the system every 10 seconds for the duration of the fishing trip when powered on.

- b. Cameras should be recording the entire time that catch is being sorted or stored or transferred to the mothership, and while catch is onboard until the offload begins.
 - i. For MS/CV vessels, cameras must be recording while the gear is being retrieved and until the codend is transferred to the mothership. The cameras may shut off after the codend has been transferred.
 - ii. For shorebased whiting vessels, cameras must be recording while the gear is being retrieved and until all catch is sorted and stored. One camera that provides an overview of the deck and holds must remain on in between hauls and on the return to port until offload begins.
 - iii. For fixed gear vessels, cameras must be recording while the gear is being retrieved and until all catch is sorted and stored. One camera that provides an overview of the deck and holds must remain on in between hauls and on the return to port until offload begins.

Below is an example of the type of language that should be included for D.3:

- *“The EM system records sensor every 10 seconds for the duration of the fishing trip when powered on.*
- *The EM system is configured to record video whenever there is fishing activity taking place. To achieve this, video recording is triggered whenever the hydraulic sensor detects pressure equal to or greater than 125 psi or the drum sensor registers 1 or more turns. The system continues to record video for 2 hours after fishing activity, as indicated by the sensor readings dropping below the specified thresholds. The deck view will record continuously after the first trigger until the EM system is powered down.”*

E. Catch Handling Procedures

1. Describe the location and procedures for any catch handling, including sorting and measuring of discards, the number of crew sorting catch.
 - a. If catch handling or weight estimation will be done differently for different species, the VMP should describe the different procedures.
 - b. NMFS has provided language below that needs to be included in all plans of certain gear types.
2. Describe what steps will be taken to ensure that all catch remains in camera view. Video reviewers need to see the fate of catch in order to properly count it. Fish that were not seen retained will assume to have been discarded.

All VMPs

All VMPs should include the following instructions:

“General Catch Handling

- Any and all sorting must occur in clear view of the camera.*
- Crewmembers must not block camera views while sorting.*
- All discards must occur at a discard control point designated on the vessel diagram.*

- ☑ *All catch handling must be complete before the next haul is brought onboard.*
- ☑ *Vessel operator must provide adequate lighting for cameras.*
 - *Lighting must not shine directly at cameras and impede video reviewers' ability to view fishing activity."*

Whiting VMPs

Vessels targeting whiting should include the following additional instructions:

“Species-Specific Catch Handling - Trips Targeting Whiting:

- ☑ ***Mutilated fish*** - *Mutilated fish that are squashed, maimed, or fish with carcass torn up by other events can be discarded.*
 - *Discarded mutilated fish must be sorted to species into a tote of known size within camera view before discarding to assist video reviewers in estimating weight.*
 - *Discarded mutilated fish must be noted in logbook.*
- ☑ *Debris (trash, mud, rocks, and other inorganic debris), Large marine organisms (marine mammals, sea turtles, and seabirds, and fish longer than 6-ft) may be discarded in camera view.*
- ☑ ***Unavoidable discard*** *that is the result of an event that is beyond the control of the vessel operator or crew, such as a safety issue or mechanical failure, is allowed.*
 - *Record weight by species, reason for the discard, and the location of tow in the logbook.”*

Bottom Trawl and Non-whiting Midwater Trawl VMPs

Vessels using bottom trawl and/or non-whiting midwater trawl gear to target non-whiting species should include the following additional instructions:

“Species-Specific Catch Handling – Maximized Retention Bottom Trawl and Non-whiting Midwater Trawl Trips:

- ☑ ***Mutilated fish*** - *Mutilated fish that are squashed, maimed, or fish with carcass torn up by other events can be discarded.*
 - *Discarded mutilated fish must be sorted to species into a tote of known size within camera view before being discarded to assist video reviewers in estimating weight.*
 - *Discarded mutilated fish must be noted in logbook.*
- ☑ *Debris (trash, mud, rocks, and other inorganic debris), Large marine organisms (marine mammals, sea turtles, and seabirds, and fish longer than 6-ft) may be discarded in camera view.*
- ☑ ***Unavoidable discard*** *that is the result of an event that is beyond the control of the vessel operator or crew, such as a safety issue or mechanical failure, is allowed.*

- Record weight by species, reason for the discard, and the location of tow in the logbook.

Species-Specific Catch Handling – Optimized Retention Bottom Trawl and Non-whiting Midwater Trawl Trips:

- ☑ Allowable discards must be sorted to species before being placed in designated discard tote, and discarded in camera view at the location designated in diagram only.
 - Allowable non-IFQ fish and invertebrates/trash must be sorted in separate totes (fish tote and invertebrate/trash tote) in camera view
- ☑ **Halibut** - All halibut must be placed in view of the camera and on or near a measuring tool for measurement prior to discarding.
- ☑ **Mutilated fish** - Mutilated fish that are squashed, maimed, or fish with carcass torn up by other events, not predation, can be discarded.
 - Discarded mutilated fish must be sorted to species into a tote of known size within camera view before being discarded to assist video reviewers in estimating weight.
 - Discarded mutilated fish must be noted in logbook.
- ☑ Debris (trash, mud, rocks, and other inorganic debris), Large marine organisms (marine mammals, sea turtles, and seabirds, and fish longer than 6-ft) may be discarded in camera view.
- ☑ **Unavoidable discard** that is the result of an event that is beyond the control of the vessel operator or crew, such as a safety issue or mechanical failure, is allowed.
 - Record weight by species, reason for the discard, and the location of tow in the logbook.
- ☑ **Prohibited and protected species**
 - Vessels must discard the following species, in view of the camera:
 - i. Pacific halibut (see discard requirements above)
 - ii. Dungeness crab caught seaward of Washington or Oregon or Point Reyes, California
 - iii. Green sturgeon
 - iv. California halibut (except as allowed by state regulations)
 - v. And nearshore groundfish species below state commercial minimum size limits
 - vi. Seabirds
 - vii. Sea turtles
 - viii. Marine mammals

****ALL SALMON AND EULACHON MUST BE RETAINED****

except that on trips with scientific observers, eulachon may be discarded after observer sampling is complete

- ☑ **Heads and Guts from Processing at Sea:** (For Sablefish J-Cut at sea)

- *Cut the fish in clear camera view*
- *Tote the heads and guts in camera view*
- *Discard tote contents at control point*
- *Only heads and guts may be discarded*

Additional allowable discards (with proper catch handling, display, measuring, and logbook recording):

- *IFQ species on the **IFQ Allowable Discard List***
- *Non-IFQ species not on the **Non-IFQ Prohibited Discard List***
- *Allowable discards must be sorted to species before being placed in designated discard tote, and discarded at the location designated in diagram only.*
 - *Allowable non-IFQ fish and invertebrates/trash must be sorted in separate totes (fish tote and invertebrate/trash tote)*

IFQ ALLOWABLE DISCARD LIST

Flatfish

Arrowtooth Flounder
English Sole
Dover Sole (discarded deep sea sole may be counted as dover sole)
Pacific Sanddab (other sanddabs discarded may be counted as Pacific sanddab)

Roundfish

Pacific Whiting
Lingcod

NON-IFQ PROHIBITED DISCARD LIST

Flatfish

Greenland Turbot
Slender Sole
Hybrid Sole
C-O (C-O Turbot) Sole
Bigmouth Sole
Fantail Sole
Hornyhead Turbot
Spotted Turbot

Rockfish

Northern Rockfish
Black Rockfish
Blue Rockfish
Shortbelly Rockfish
Olive Rockfish
Puget Sound Rockfish
Semaphore Rockfish

Roundfish

Walleye Pollock
Slender Codling
Pacific Tom Cod
Salmon
Eulachon

Fixed Gear VMPs

Vessels using fixed gear should include the following additional instructions:

"Prohibited Discards (must be retained)"

- All salmon must be retained.*

Allowable Discards

- ☑ *Allowed to discard (with proper catch handling, display, measuring, and logbook recording):*
 - *All IFQ and non-IFQ fish, except salmon.*
 - ☑ *All IFQ and non-IFQ species must be measured and displayed to camera before discarding.*
 - *Show all sides of fish, spread dorsal spines of thornyheads, and show any unique characteristics for accurate species ID.*
 - ☑ ***Pacific Halibut***- *All halibut must be placed in view of the camera and on or near a measuring tool for measurement prior to discarding.*
 - ☑ ***Mutilated and predated fish*** – *Predated and mutilated fish, including sablefish, which are intended to be discarded must be placed in a tote together before discarding at the end of the haul. This will help when counting fish.*
 - *Place carcasses that have a head and tale on measuring area before discarding.*
 - ☑ *Invertebrates, debris (trash, mud, rocks, and other inorganic debris), Prohibited and Protected Species, and non-IFQ fish must be discarded in camera view at a designated discard location (see vessel diagram).*
 - *Prohibited and Protected Species:*
 - *Dungeness crab caught seaward of Washington or Oregon*
 - *Green Sturgeon*
 - *Eulachon*
 - *Seabirds*
 - *Sea turtles*
 - *Marine mammals*
- **ALL SALMON MUST BE RETAINED****
- ☑ ***Unavoidable discard*** *that is the result of an event that is beyond the control of the vessel operator or crew, such as a safety issue or mechanical failure, is allowed.*
 - *Record weight by species, reason for the discard, and the location of haul in the logbook.*
 - ☑ ***Heads and Guts from Processing at Sea: (For Sablefish J-Cut at sea)***
 - *cut the fish in clear camera view*
 - *tote the heads and guts in camera view*
 - *discard tote contents at control point*
 - *only heads and guts may be discarded"*

F. EM System Malfunctions

1. Describe the detailed steps that will be taken to minimize the potential for EM system malfunctions. Some examples:

- a. Completing a functionality test before each trip as required can identify malfunctions before starting the trip.
- b. Checking camera lenses between and during hauls to make sure they are clean and clear of water spots, dirt, etc., and cleaning them if not.
- c. Establishing redundant or back-up systems, such as a back-up power supply or two hydraulic sensors can ensure that small power interruptions or sensor malfunctions do not interrupt data collection.

Your EM service provide may have some other suggested approaches.

2. Describe the steps that will be taken when malfunctions occur to ensure the adequate monitoring of catch. Work with your EM service provider and NMFS to determine what types of malfunctions are critical (require returning to port), what types of malfunctions are not critical, and how a critical malfunction can be fixed at sea. Regardless of the type of malfunction, the vessel operator must stop fishing and attempt to fix the issue before proceeding (if gear is in the water, the vessel operator may finish retrieving gear before stopping). Below are some examples of different malfunctions, whether NMFS considers them critical or not, and how it could be addressed in the VMP.
 - a. NMFS considers the following malfunctions critical (would require the vessel operator to delay the trip or return to port, unless an observer is onboard):
 - i. Both drum and hydraulic sensor
 - ii. Keyboard, if manual recording is required
 - iii. Monitor
 - iv. Control box
 - v. Green screen
 - vi. Lighting, if the vessel will fish at night
 - vii. Most camera malfunctions (talk with your EM service provider and NMFS to determine if certain cameras can be designated as not critical)
 - b. NMFS considers the following malfunctions not critical (a vessel operator may continue fishing):
 - i. Either drum or hydraulic sensor
 - ii. GPS
 - iii. Keyboard, if manual recording is not required
 - iv. Lighting, if the vessel will not fish at night

Example language for handling EM system malfunctions is below.

“Malfunction Prior to Departure:

1. *If the system malfunctions prior to departure, call EM Service Provider **24 Hour Support Line [PHONE NUMBER]** to report and troubleshoot the problem. Some possible solutions are listed in **Table 1**.*
2. *If the malfunction cannot be resolved, take the Action described in **Table 1** corresponding to the type of malfunction.*

3. *Report the date/time, nature of malfunction, and outcome in the logbook.*

Malfunction While Fishing:

1. *If the system malfunctions while gear is in the water, vessel may complete hauling gear out of the water, but **GEAR CANNOT BE RESET until the problem is resolved.***
2. *Call EM Service Provider **24 Hour Support Line- [PHONE NUMBER]** to report and troubleshoot the problem. Schedule a service event for your return to port to have the issue resolved as quickly as possible. Some possible solutions are provided in **Table 2.***
3. *If the malfunction cannot be resolved, take the Action described in **Table 2** corresponding to the type of malfunction.*
4. *Report the date/time, nature of the malfunction and the outcome in the logbook.*

Power Loss

In the event of a temporary loss of power, return power to the system immediately, and record the time, date, and duration of the power interruption in the logbook.”

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Table 1. Summary of types of dockside malfunctions of EM system and associated equipment, and actions to be taken.

Malfunction Type	Critical/Not Critical	Report to AMR?	Report in Log?	Possible Solution Downgrades to Not Critical (non-exclusive list)	Action if Malfunction Not Resolved or Not Downgraded
Drum sensor	Not critical	Y	Y	Carry spare reflectors.	Vessel operator may depart on trip, but must trigger video recording manually. Malfunction must be repaired before next trip.
Hydraulic sensor	Not critical	Y	Y	Restart system. Follow troubleshooting guidance.	Vessel operator may depart on trip but must trigger video recording manually. Malfunction must be repaired before next trip.
Drum and hydraulic sensors	Critical	Y	Y	Restart system. Follow troubleshooting guidance. Carry spare reflectors.	Vessel operator may not depart on trip until malfunction is repaired or vessel operator voluntarily obtains observer.
GPS	Critical	Y	Y	Restart system.	Vessel operator may not depart on trip until malfunction is repaired or vessel operator voluntarily obtains observer.
Keyboard	Not critical	Y	Y	Carry spare USB keyboard. Connect spare keyboard	Vessel operator may depart on trip provided cameras are recording without keyboard. Malfunction must be repaired before next trip.
	Critical if manual record is required.	Y	Y	Carry spare USB keyboard. Connect spare keyboard.	Vessel operator may not depart on trip until malfunction is repaired or vessel operator voluntarily obtains observer.

Appendix A – Draft Vessel Monitoring Plan Guidelines

Malfunction Type	Critical/Not Critical	Report to AMR?	Report in Log?	Possible Solution Downgrades to Not Critical (non-exclusive list)	Action if Malfunction Not Resolved or Not Downgraded
Monitor	Critical	Y	Y	Connect to a different VGA monitor.	Vessel operator may not depart on trip until malfunction is repaired or vessel operator voluntarily obtains observer.
Control box	Critical	Y	Y	Restart system, follow troubleshooting guidance.	Vessel operator may not depart on trip until malfunction is repaired or vessel operator voluntarily obtains observer.
Green Screen	Critical	No, unless unresolved.	Y	Restart system, follow troubleshooting guidance.	Vessel operator may not depart on trip until malfunction is repaired or vessel operator voluntarily obtains observer.
Lighting	Critical	No	Y	Vessel operator will not retrieve gear at night	Vessel operator may depart on trip provided he does not retrieve gear at night (i.e., 30 minutes before official sunset to 30 minutes after official dawn). Malfunction must be repaired before next trip.
Camera(s)	Critical	Y	Y	Restart system, follow troubleshooting guidance. Carry and connect spare camera.	If the vessel has an observer onboard, may depart on trip. If the vessel does not have an observer onboard, may not depart on trip until malfunction is repaired or vessel operator voluntarily obtains observer.

Table 2. Summary of types of at-sea malfunctions of EM system and associated equipment, and actions to be taken.

Malfunction Type	Critical/Not Critical	Report to AMR?	Report in Log?	Possible Solution Downgrades to Not Critical (non-exclusive list)	Action if Malfunction Not Resolved or Downgraded
Drum sensor	Not critical	Y	Y	Carry spare reflectors.	Vessel operator may resume fishing but must trigger video recording manually.
Hydraulic sensor	Not critical	Y	Y	Restart system. Follow troubleshooting guidance.	Vessel operator may resume fishing but must trigger video recording manually.
Drum and hydraulic sensors	Critical	Y	Y	Restart system. Follow troubleshooting guidance. Carry spare reflectors.	Vessel operator may resume fishing but must trigger video recording manually.
GPS	Critical	Y	Y	Restart system.	If not resolved, vessel operator must return to port.
Keyboard	Not critical	Y	Y	Carry spare USB keyboard. Connect spare keyboard.	Vessel operator may resume fishing provided cameras are recording without keyboard. Otherwise return to port.
	Critical if manual record is required.	Y	Y	Carry spare USB keyboard. Connect spare keyboard.	If not resolved, vessel operator must return to port.

Appendix A – Draft Vessel Monitoring Plan Guidelines

Malfunction Type	Critical/Not Critical	Report to AMR?	Report in Log?	Possible Solution Downgrades to Not Critical (non-exclusive list)	Action if Malfunction Not Resolved or Downgraded
Monitor	Critical	Y	Y	Connect to a different VGA monitor.	If not resolved, vessel operator must return to port.
Control box	Critical	Y	Y	Restart system, follow troubleshooting guidance.	If not resolved, vessel operator must return to port.
Green Screen	Critical	No, unless unresolved.	Y	Restart system, follow troubleshooting guidance.	If not resolved, vessel operator must return to port.
Lighting	Critical	No	Y	Vessel operator will not retrieve gear at night	Vessel operator may resume fishing provided the vessel operator does not retrieve gear at night (i.e., 30 minutes before official sunset to 30 minutes after official dawn).
Camera(s)	Critical	Y	Y	Restart system, follow troubleshooting guidance. Carry and connect spare camera.	If vessel has an observer onboard, vessel operator may resume fishing. Otherwise return to port.

Draft Electronic Monitoring Program Service Plan Guidelines

As part of an application for an EM (EM) service provider permit and endorsement, a service provider must develop and submit an EM Service Plan (EMSP) that describes how the EM service provider will provide EM services to the fleet. NMFS will review the EM Service Plan as part of the application package to ensure that it meets all the required elements and would effectively fulfill the EM service provider responsibilities. This document provides additional information on what NMFS is looking for in an EMSP and describes best practices and suggested language that could be used to satisfy the required components. EM service providers may propose and NMFS may consider alternative, but equipment, methods to meet the requirements of the EM program in the EMSP. Excerpts of regulations cited are provided in appendices for convenience.

Contact the Permits Branch with questions and assistance in completing the EM Service Plan and provider permit application: (206)526-4353.

EM Service Plan Contents

The EM service plan should include the following sections:

- A. EM service provider information – This section should include contact information for the EM service provider(s) for NMFS to use during the year.
- B. Program management – This section should describe the service provider’s plans for hiring and training program staff, communicating with NMFS and vessel representatives, and delivering and managing field and data services.
- C. EM system and software – This section contains detailed information about the EM system and software that the provider is proposing to deploy to allow NMFS to evaluate them.
- D. Field and technical support services – This section should describe the service provider’s procedures for installing and servicing EM systems and for providing technical support to contracted vessels.
- E. Data services – This section should describe the service provider’s procedures for data processing, including review and storage of EM data, and reporting of summary data to NMFS.

A. EM Service Provider Information

1. Provide the name, address, phone number, and email address of the EM service provider.

2. Provide contact information for a primary point of contact for program operations inseason. This should be the person, such as the project manager, that NMFS would call with questions regarding installations, vessel monitoring plans, service events, technical issues, data analysis, reports, and other program logistics during the year.

B. Program Management

1. Describe procedures for hiring and training of competent program staff to carryout EM field services.
 - a. Describe minimum qualifications for EM technicians, EM data analysts, and other staff that may handle hard drives/EM data, process EM data, or generate reports.
 - b. Describe or provide terms and conditions of employment.
 - c. Detail EM technician and EM data analyst recruitment/hiring procedures including provider's interview process, review of educational background, background checks, physical/medical condition, CPR and first aid certification, citizenship.
 - d. Describe training program for staff in providing EM field and data services, including any certification of program staff to work on EM equipment and procedures to maintain the skills of EM data processing staff in:
 - i. Use of data processing software;
 - ii. Species identification;
 - iii. Fate determination and metadata reporting requirements;
 - iv. Data processing procedures;
 - v. Data tracking; and,
 - vi. Reporting and data upload procedures.
2. Describe provider's procedures for tracking performance and responding to identified poor performance by an EM technician, EM data analyst, or other staff that handle hard drives/EM data and reports.
3. Describe provider's procedures for tracking, reporting to NMFS, and responding to identified harassment of EM provider staff.
4. Describe provider's procedures for tracking, reporting to NMFS, and responding to identified EM provider staff conflicts of interest.
5. Describe what support services are provided to the EM technicians deployed to a fishing community (i.e.; list of rentals, motels, laundry facilities).
6. Describe provider's interactions with vessel owners and NMFS to solicit feedback on EM staff performance (e.g., post service visit check-in) and actions taken by a provider when performance issues involving the EM staff are identified.
7. Describe provider's process for tracking EM technician and EM data analyst pay data and the system to record overtime, benefits, etc.
8. Describe the company's procedures and policies related to data storage, access, handling, and release, to maintain the integrity and confidentiality of the EM Program data as required (*see* 50 CFR 660.603(n)).

- a. The EM service provider must not release a vessel owner’s EM data and other records except to NMFS and authorized officers, unless otherwise authorized by the owner or operator of the vessel.

C. EM System and Software

1. Describe the identifying characteristics of the EM system to be deployed and the video review software to be used in the fishery, including but not limited to: manufacturer, brand name, model name, model number, software version and date, firmware version number and date, hardware version number and date, monitor/terminal number and date, pressure sensor model number and date, drum rotation sensor model number and date, and GPS model number and date.
2. Describe the EM system and software specifications, including a narrative statement describing how the EM system and associated equipment meets the performance standards at § 660.604(j). The specifications (e.g., image resolution, frame rate, user interface) and configuration of an EM system and associated equipment (e.g., number and placement of cameras, lighting) used to meet the requirements of this section must be sufficient to:
 - a. Allow easy and complete viewing, identification, and quantification, of catch items discarded at sea, including during low light conditions;
 - b. Continuously record vessel location (latitude/longitude coordinates), velocity, course, and sensor data (i.e., hydraulic and winch activity);
 - c. Allow the identification of the time, date, and location of a haul/set or discard event;
 - d. Record and store image data from all hauls/sets and the duration that fish are onboard the vessel until offloading begins;
 - e. Continuously record and store raw sensor data (i.e., GPS and gear sensors) for the entire fishing trip;
 - f. Prevent radio frequency interference (RFI) with vessel monitoring systems (VMS) and other equipment;
 - g. Allow the vessel operator to test and monitor the functionality of the EM system prior to and during the fishing trip to ensure it is fully functional;
 - h. Prevent tampering or, if tampering does occur, show evidence of tampering; and,
 - i. Provide image and sensor data in a format that enables their integration for analysis.
3. NMFS recommends that the EM system have the following features to meet the performance standards:
 - a. Simple to use and require minimal maintenance.
 - b. Durable in harsh marine environments.
 - c. Be secure, using end-to-end encryption of data files and restricting access to system settings (i.e., prohibiting administrative access to vessel crew).
 - d. Modular, small size, for ease in installation and component replacement.

- e. Have an internal UPS that carries the system through short power interruptions and provides for a controlled shutdown.
 - a. Have a single means of distributing power to all system components with the ability to log the time and reason for any interruption to system power.
 - b. Logs occurrences and reasons for system shutoff.
 - c. Automatic re-starting of system based upon restoration of sufficient power.
 - d. Data storage hardware should be resistant to damage and data loss and provide safeguards to retain data in the event of electrical failure or power spikes.
 - e. Cameras should record continuously at a frame rate of 5 unique frames per second, and provide the option to produce still images for enhanced species identification and measurement.
 - f. Cameras should produce images compatible with zoom function for enhanced identification during video review.
 - g. Cameras should be capable of recording data at a resolution of 2MP (1080P).
 - h. Cameras should produce color imagery with the ability to revert to black and white video output when light levels become too low for color recognition.
 - i. The control box should log GPS positions every 10 seconds. The GPS should use a minimum of 3 satellites to triangulate vessel position. If 3 satellites are not available at any time, the system should not log a location rather than imputing a calculated location.
 - j. Video imagery should be capable of being viewed on the vessel by the vessel crew or authorized officers without interfering with data collection.
 - k. The video imagery should have embedded time stamps with time synced between GPS, imagery, and other sensors and data sets.
4. If the technologies have previously been subject to scrutiny in a court of law, provide a brief summary of the litigation and any court findings on the reliability of the technology.

D. Field and Technical Support Services

1. Describe procedures for communicating with individual vessel operators and NMFS to coordinate field services, provide technical support and other assistance, and to communicate feedback on vessel operations.
2. Describe the plan for provision of services including service locations, response timelines, equipment inventories, and procedures for installations, service visits, repairs, technical support, and other program services required of an EM service provider (*see* § 660.603(k)).
 - a. The EM service provider must provide maintenance and support services, including maintaining sufficient equipment inventory, such that all deployed EM systems continuously perform according to the performance standards at § 660.604(j) and that field service events are scheduled and carried out with minimal delays or disruptions to fishing activities.
 - i. The EM provider should maintain appropriate inventory levels to service vessels as problems occur (e.g., 10% pool), conduct periodic stock

inventories, maintain a list of component suppliers and stock availabilities, order stock as necessary, and monitor shipping/receiving and movements of inventory.

- b. Technical support must be available 24-hours per day, seven days per week, and year-round.
- c. The EM service provider must submit to NMFS reports of requests for technical assistance from vessels, including when the call or visit was made, the nature of the issue, and how it was resolved.

E. Data Services

1. Describe EM video review software specifications, including a narrative statement describing how the software is sufficient to process EM data to provide NMFS with EM summary reports, including discard estimates, fishing activity information, and meta data (e.g., image quality, reviewer name) and incident reports of compliance issues, as described in the EM Program Manual (*see* § 660.603(m)(5)).
3. Describe procedures for tracking hard drives and data files throughout their use cycle. This would apply to all providers that may come into possession of hard drives or data files containing EM data, either through providing data services or technical support to vessel owners and NMFS (e.g., recovering corrupted data).
 - a. An inventory management system should be used to track individual hard drives/data files using a unique ID number or other identification system. The provider should be able to determine whether a hard drive/data file is deployed, in transit, or at the provider and at what stage in the use cycle.
 - b. The inventory management system should log the names of any employees that come into possession of or accessed the hard drive/data files.
 - c. The system should also log tracking numbers from shipping companies that were used, and dates of mailing and receipt.
 - d. EM staff must not handle or transport hard drives or other medium containing EM data except to carry out EM services as described in the NMFS-accepted EM Service Plan.
4. Describe procedures to ensure the integrity and security of hard drives/data files in transit (e.g., use of sealed tamper evident envelopes for hard drives, end-to-end encryption of data files).
5. Describe procedures to remove confidential data from hard drives before returning them to the field.
2. Describe procedures for tracking EM datasets throughout the processing cycle, including documenting any access and modifications.
3. Describe procedures for communicating with individual vessel operators and NMFS to coordinate data services, resolve specific program issues, and provide feedback on program operations.
4. Describe procedures for providing feedback to vessel representatives, field services staff, and NMFS, regarding:

Appendix B – Draft EM Service Plan Guidelines

- a. Adjustments to system settings;
 - b. Changes to camera positions;
 - c. Advice to vessel personnel on duty of care responsibilities;
 - d. Advice to vessel personnel on catch handling practices; and,
 - e. Any other information that would improve the quality and effectiveness of data collection on the vessel.
5. Describe procedures for processing EM data from contracted vessels and submitting to NMFS EM summary reports, including discard estimates, fishing activity information, and meta data (e.g., image quality, reviewer name), and incident reports of compliance issues, according to the EM Program Manual (*see* § 660.603(m)(5)).
 6. Describe procedures for correcting and resubmitting datasets and reports identified by NMFS as not meeting the program standards.
 7. Describe how EM data and other records will be stored as required (*see* § 660.603(m)(6) and (n)). The provider must maintain all of a vessel's EM data and other records for a period of not less than 3 years after the date of landing of a trip. EM data and other records must be stored such that the integrity and security of the records is maintained for the duration of the retention period. The provider must produce EM data and other records immediately upon request by NMFS or an authorized officer.
 - a. The original EM data files should be copied, catalogued, and stored unmodified, immediately upon receipt from the vessel. EM staff must not write to or modify any EM hard drive or other medium that contains EM data before it has been copied and catalogued.
 - b. The original data files or an exact copy should be stored, unmodified. Data processing, annotations, and any other modifications should be done on copies.
 - c. All EM data and other records should be stored using redundancies and back-ups to guard against failure or physical destruction.
 - d. EM data may be stored locally on hard drives, local servers, or using cloud storage services.
 - e. NMFS expects most requests for access or submission of EM data and other records associated with a specific EM trip will be made during the year in which that trip was taken (January 1 – December 31) and until data is finalized for that year (on or about March 1 of the following year). EM data files may be transmitted to NMFS via a secure website where NMFS and authorized officers can access and download the data files, or by mailing a hard drive, CD, or other medium containing the data files. The provider may wish to take this information into account when planning for and comparing the costs and accessibility of different storage options.

Excerpts of the Regulations

Excerpt from 660.603(k)-(n)

(k) *Field and technical support services.* The EM service provider must provide and manage EM systems, installation, maintenance and technical support, as described below and according to a NMFS-accepted EM Service Plan, which is required under § 660.603(b)(1)(vii), and as described in the EM Program Manual or other written and oral instructions provided by the EM Program, such that the EM program achieves its purpose as defined at § 660.600(b).

(1) At the time of installation, the EM service provider must:

(i) Install an EM system that meets the performance standards under § 660.604(j);

(ii) Ensure that the EM system is set up, wires run, system powered, and tested with the vessel in operation;

(iii) Brief the vessel operator on system operation, maintenance, and procedures to follow for technical support or field service;

(iv) Provide necessary information for the vessel operator to complete the VMP, such as images and diagrams of camera views and vessel layout, specific information about system settings, and designated discard control points; and,

(v) Complete an EM System Certification Form for the vessel owner.

(2) The EM service provider must communicate with vessel operators and NMFS to coordinate service needs, resolve specific program issues, and provide feedback on program operations.

(3) The EM service provider must provide maintenance and support services, including maintaining an EM equipment inventory, such that all deployed EM systems perform according to the performance standards at § 660.604(j) and that field service events are scheduled and carried out with minimal delays or disruptions to fishing activities.

(4) The EM service provider must provide technical assistance to vessels, upon request, in EM system operation, the diagnosis of the cause of malfunctions, and assistance in resolving any malfunctions. Technical support must be available 24-hours per day, seven days per week, and year-round.

(5) The EM service provider must submit to NMFS reports of requests for technical assistance from vessels, including when the call or visit was made, the nature of the issue, and how it was resolved.

(1) *Technical assistance and litigation information.* As a requirement of its permit, the EM service provider must provide the following to NMFS or authorized officers, upon request.

(1) Assistance in EM system operation, diagnosing and resolving technical issues, and recovering corrupted or lost data.

(2) Responses to inquiries related to data summaries, analyses, reports, and operational issues with vessel representatives.

(3) Technical and expert information, if the EM system/data are being admitted as evidence in a court of law. All technical aspects of a NMFS-approved EM system may be analyzed in court for, inter alia, testing procedures, error rates, peer review, technical processes and general industry acceptance. To substantiate the EM system data and address issues raised in litigation, an EM service provider must provide information, including but not limited to:

(i) If the technologies have previously been subject to such scrutiny in a court of law, a brief summary of the litigation and any court findings on the reliability of the technology.

(ii) Reserved.

(4) All software necessary for accessing, viewing, and interpreting the data generated by the EM system, including maintenance releases to correct errors in the software or enhance the functionality of the software.

(5) Notification NMFS within 24 hours after the EM service provider becomes aware of the following:

(i) Any information, allegations, or reports regarding possible harassment of EM provider staff;

(ii) Any information, allegations, or reports regarding possible EM system tampering;

(iii) Any information, allegations, or reports regarding any action prohibited under §§ 660.12(f) or 660.602(a)(13); or,

(iv) Any information, allegations or reports regarding EM service provider staff conflicts of interest.

(6) Notification to NMFS of any change of management or contact information or a change to insurance coverage.

(7) A copy of any contract between the service provider and entities requiring EM services;

(8) Proof of sufficient insurance as defined in paragraph (i);

(9) Copies of any information developed and used by the EM service provider and distributed to vessels, including, but not limited to, informational pamphlets, payment notifications, and description of EM service provider duties; and,

(10) EM data and associated meta data, and other records specified in this section.

(m) *Data services*. For vessels with which it has a contract (see § 660.604(k)), the EM service provider must provide and manage EM data processing, reporting, and record retention services, as described below and according to a NMFS-approved EM Service Plan, which is required under § 660.603(b)(1)(vii), and as described in the EM Program Manual or other written and oral instructions provided by the EM Program, and such that the EM Program achieves its purpose as defined at § 660.600(b).

(1) The EM service provider must process vessels' EM data according to a prescribed coverage level or sampling scheme, as specified by NMFS, and determine an estimate of discards for each trip using standardized estimation methods specified by NMFS. NMFS will maintain manuals for EM data processing protocols on its website.

(2) The EM service provider must ensure that its data processing staff are fully trained in:

(i) Use of data processing software;

(ii) Species identification;

(iii) Fate determination and metadata reporting requirements;

(iv) Data processing procedures;

(v) Data tracking; and,

(vi) Reporting and data upload procedures.

(3) The EM service provider must track hard drives and EM datasets throughout their cycles, including documenting any access and modifications. EM data must be removed from hard drives or other medium before returning them to the field.

(4) The EM service provider must communicate with vessel operators and NMFS to coordinate data service needs, resolve specific program issues, and provide feedback on program operations. The EM service provider must provide feedback to vessel representatives, field services staff, and NMFS regarding:

Appendix B – Draft EM Service Plan Guidelines

(i) Adjustments to system settings;
(ii) Changes to camera positions;
(iii) Advice to vessel personnel on duty of care responsibilities;
(iv) Advice to vessel personnel on catch handling practices; and,
(v) Any other information that would improve the quality and effectiveness of data collection on the vessel.

(5) On behalf of vessels with which it has a contract (see § 660.604(k)), the EM service provider must submit to NMFS EM summary reports, including discard estimates, fishing activity information, and meta data (*e.g.*, image quality, reviewer name), and incident reports of compliance issues according to a NMFS-accepted EM Service Plan, which is required under § 660.603(b)(1)(vii), and as described in the EM Program Manual or other written and oral instructions provided by the EM Program, such that the EM program achieves its purpose as defined at § 660.600(b). If NMFS determines that the information does not meet these standards, NMFS may require the EM service provider to correct and resubmit the datasets and reports.

(6) *Retention of records.* Following an EM trip, the EM service provider must maintain all of a vessel's EM data and other records specified in this section, or used in the preparation of records or reports specified in this section or corrections to these reports, for a period of not less than three years after the date of landing for that trip. EM data and other records must be stored such that the integrity and security of the records is maintained for the duration of the retention period. The EM service provider must produce EM data and other records immediately upon request by NMFS or an authorized officer.

(n) *Data integrity and security.* The EM service provider must ensure the integrity and security of vessels' EM data and other records specified in this section. The EM service provider and its employees:

(1) Must not handle or transport hard drives or other medium containing EM data except to carry out EM services required by this section in accordance with a NMFS-accepted EM Service Plan.

(2) Must not write to or modify any EM hard drive or other medium that contains EM data before it has been copied and catalogued.

(3) Must not release a vessel's EM data and other records specified in this section (including documents containing such data and observations or summaries thereof) except to NMFS and authorized officers as provided in section § 660.603(m)(6), or as authorized by the owner or operator of the vessel.