EM Reviewer Guidance Document

NOAA Northeast Fisheries Science Center and Fisheries Greater Atlantic Regional Fisheries Office

Video Review Protocols for Multispecies Sector Trips

Table of Contents: **Page Number**

List of Tables: Page Number

List of Appendices: Page Number

Introduction:

NOAA Fisheries approved two exempted fishing permits (hereafter EFP) submitted by the Nature Conservancy (TNC) that will be active for the 2020 Fishing Year which focuses on using EM for catch estimation. These EFP extend a program initiated by similar EFPs in 2016. Additionally, the Gulf of Maine Research Institute (GMRI) received approval for the Maximized Retention (MREM) EFP in the same fishery. The National Marine Fisheries Service (NMFS), Greater Atlantic Regional Fisheries Office (GARFO), and Fisheries Sampling Branch (NEFSC) collects, maintains, and distributes data for scientific and management purposes. Collectively, GARFO and NEFSC (hereafter referred to as NMFS) regulate and monitor fisheries in the Northeast. This includes monitoring of groundfish sectors currently subject to an At-Sea Monitoring program. There are parallel efforts to shift a portion of the cost of monitoring to the industry and to reduce program costs as well. Part of the ongoing efforts to reduce the cost of monitoring aim at developing electronic monitoring (EM) as a viable monitoring option.

Project goals for 2020-2021 include refining catch review protocols for fish where species, disposition, or measurements of individuals cannot be derived from the video (i.e. system failure, improper catch handling, obstructed view, poor video quality); refining catch handling protocols to ensure accurate identification and measurements of all discarded regulated groundfish; developing alternative methods for discard reporting for large volumes of species (i.e. subsampling, visual estimates, volume based estimates); further developing a feedback loop between the EM provider, NMFS and vessel participants; evaluating third-party video reviews for discard monitoring; further developing of an audit methodology to compare discard estimates from EM datasets to fishermen's reports. Collaborators include Teem Fish, Gulf of Maine Research Institute, New England Marine Monitoring and several Northeast Groundfish Sectors.

Operational EM programs have core standards that must be consistent among providers, and between providers and NMFS reviewers, including: reviewer training, data elements, species identification protocols, length measurement and weight estimation techniques, documenting events, documenting video quality, and reviewing procedures. Secondary reviews, when the video is reviewed and annotated by NMFS staff, are conducted as a quality control of the service provider. Completed trip file records submitted by each reviewer are then compared. Based on criteria such as species counts, discard weights, image quality, and vessel performance suggestions are made to improve the data collection process and provide feedback to providers.

In order to provide data that can be meaningfully compared both among EM service providers and between NMFS and service providers, data must be collected using a standardized methodology. The purpose of this document is to provide guidance to video reviewers on items related to species identification, methods for obtaining lengths and weights, assigning an end disposition to the discards, and event documentation. This document also provides an overview of the general catch handling protocols for participating vessels and description of events. See appendix A for definitions of exempted fishing permit (EFP), Vessel Monitoring Plans (VMP), and multispecies Annual Catch Entitlement (ACE).

This reviewer document is not vendor specific, it provides guidance that applies to the two EFPs currently estimating catch weights in the multispecies groundfish fishery. Also, a subsection highlights the protocol for the compliance method of EM used in GMRI's MREM EFP. Where the text does not indicate a difference between the two methods the protocols for review are assumed to be the same. Key differences are highlighted with a bold font. Essentially, the goal of this document is to provide EM reviewers working for NMFS as well as outside companies cohesive instructions on how to review an EM trip. The goal in establishing these guidelines is to both provide data sets that can be compared for research and as a means for evaluating the performance of EM review companies. This document should be actively referenced by new reviewers, and where needed annotated with more specific details. Should discrepancies between review methods become apparent it is the responsibility of the reviewer to alert NMFS staff so that a preferred method for handling discrepancies can be determined and documented here.

Electronic Monitoring Annotation

Program Codes and Observer IDs:

Starting for FY2020, program codes will be used to identify the different EM trips that are submitted to NMFS. These program codes will allow end users to identify these trips as being EM and not a human observed trip. Also starting FY2020, reviewers will be given a NMFS observer program identification number. These observer IDs will be used to identify which reviewer performed the primary review. For each EM EFP trip the reviewer will apply one of the program codes found in table 1.

Table 1: EM Program Codes and Names - Groundfish

PROGRAM	PROGNAME	PROGNAMEABB	EFP_PROGRAM_ID
251	ELECTRONIC MONITORING AUDIT MODEL GROUNDFISH	EM AUDIT GROUNDFISH	18
252	ELECTRONIC MONITORING MAXIMIZED RETENTION GROUNDFISH	EM MREM GROUNDFISH	15

Review Start and Stop Definitions:

Review Start: The reviewer should make sure the vessel is at a dock or mooring prior to departing with the intent of going fishing. If the reviewer cannot determine or track the departure location and the system is activated while underway, an EMS-SYSTEM NOT ACTIVATED AT DOCK event should be annotated. The camera system must be activated by the captain prior to departure and a system check should be conducted to ensure the system and cameras are functioning properly.

Review Stop: Determining the end of a review is dependent on the program. For the two catch accounting programs, review should continue until all discards are measured and all catch is fully processed or when the vessel lands with the intent to off-load their catch, whichever occurs last. If discards are collected during a haul but are not measured and the vessel lands and begins off-loading, the reviewer should continue watching the video to confirm all discards are processed. If video ends prior to being able to fully account for discards, the appropriate annotations should be made. **In the MREM program, the reviewer will watch the offload and the hold inspection. The video needs to encompass the entire offload and fish hold inspection by the DSM.**

Currently, there are no annotation requirements for review start or stop. However, if the system is not activated prior to departure or is deactivated early, the appropriate EMS Event should be documented (see Event Documentation for more guidance). In these cases the OBSERVED element of the trip object in the EM JSON ("was the entire trip observable dock to dock") should be recorded as N. Note that all hauls can still be marked OBS=Y in these cases.

Gear Types:

There are currently four primary gear types operating in the EM EFPs. Each trip will have a primary gear type used and possibly secondary gear used. EM gear codes will align with codes established by the Atlantic Coastal Cooperative Statistics Program. The ACCSP is the data warehouse for the Atlantic states and works to standardize data sets among federal and state fishery programs. Gear type definitions and ACCSP codes can be found in table 2.

Some vessels use multiple types of gear on the same trip. The most common multi-gear scenario is a combination of a handline/auto-jig and either gillnet or longline gear. A common scenario we observe is that vessels may test the waters with the handline before setting out gillnet or longline gear. Some vessels also may use a handline to fish for tuna prior to or after fishing with another gear. It is important to keep these fishing activities separate and annotated correctly on the haul level.

Table 2: Gear Type definitions and ACCSP Codes

Gear Type	Definition	ACCSP Category	ACCSP Code
Trawl	Gear consisting of a net that is towed	Otter Trawls	090

Gillnet	One net or a series of nets tied together between a weighted leadline and floatline creating a vertical barrier of netting in the water column.	Gill Nets	200
Longline	Fishing gear that is or is designed to be set horizontally, either anchored, floating, or attached to a vessel, and that consists of a main or ground line with three or more gangion lines and hooks.	Long Lines	400
Handline/AutoJig	Long section of line that is spooled on a reel. Generally will have a weight attached to a swivel towards the end of the line, with a shorter piece of line attached to a hook or a jig. The hook may be baited or fish shaped lures may be used.	Hand Lines	700
Other	Any other gear that is hauls that is not listed.	Other Gears	800

Haul Definitions by Gear Type:

Currently vessels participating in the MREM and two catch estimation EFPs fish with a variety of gears. Depending on the gear being used by fishermen on a given trip that is reviewed there is a slightly different definition of what is considered a 'haul' for EM data collection. The haul definitions below loosely follow VTR reporting instructions and the observer program's gear specific definitions. As the ultimate goal is to match the EM data to the self-reported eVTR data, the HAULBACK_START is the most important haul time element, and every effort should be made to collect an accurate date/time.

The other time elements will allow the data to be used by other scientists at the Center. Depending on gear type, not all time elements will be entered. Below is how to document the different haul time elements for each gear type. For all approved gear types, a date, timestamp, and GPS coordinates should be created for each of the given elements within the haul. The reviewer should do his/her best in determining when each element occurs.

There may be instances where a haul element or series of elements cannot be annotated. Reasons may include missing video or the image is too corrupt to verify activity. If one or more haul elements cannot be collected, for whatever reason, leave it blank or null and add a comment to the haul stating what occurred and why. Do not create a false annotation just to have a date/time entered.

Trawl

- *SET_START:* Codend is deployed and hits water with intent of setting out for fishing
- *SET_END:* Winches stop and lock; wire no longer being set out

Note: If either of the above times are not annotated, the haul may still be OBSERVED=Y if it is confirmed no catch is being processed prior to set (see Criteria for a Review section). A haul level comment is required when a haul element is not annotated.

- *HAULBACK_START:* Winches engaged for haul back and doors being retrieved
- *HAULBACK_END:* Codend is brought onboard and crew prepares to release the contents
- *CATCH_SORTING_END:* At completion of catch handling, when all kept catch has been cleaned and stowed and discarded catch has been processed.
- If the trawl net is deployed but not fished (i.e. doors not set out, net partially on reel), this would *NOT* count as a haul. This is called a Water Tow or Cleaning Tow and is typically not counted by the captain as a haul. Water Tows should be documented as a Fishing Operations Event - Water Tows and the time should encompass the entire time the net is set to when it comes back on board.

Gillnet and Longline:

- *SET_START:* First surface system (highflyer or buoy) tossed overboard
  - This field will not be recorded by the reviewer. Due to the gear type this time element will not be captured by EM. Leave the date/time/GPS null.
- *SET_END:* All net panels or hooks are deployed and the end surface system (highflyer or buoy) is tossed overboard
  - This field will not be recorded by the reviewer. Due to the gear type this time element will not be captured by EM. Leave the date/time/GPS null.
- *HAULBACK_START:* First surface system (highflyer or buoy) onboard
- *HAULBACK_END:* Last piece of surface system (highflyer or buoy) is onboard
- *CATCH_SORTING_END:* When all fish are processed and stowed and all discards are measured.
- If a gillnet string is broken at any point and the vessel immediately retrieves the other end of the string and continues the haul, this would be considered one (1) haul. The second half of the string will only have one surface system (highflyer/buoy) and is a good indicator of a broken string. If another string is hauled in between the broken string, a new haul is created and the broken string would be counted as two (2) hauls.

Handline or Auto-Jig:

- *SET_START:* When the first rod or line is deployed.
- *SET_END:* No information in VTR or observer instructions for gear type
  - This field will not be recorded by the reviewer. Due to the gear type this time element will not be captured by EM. Leave this date/time/GPS null.
- *HAULBACK_START:* When all gear is completely retrieved and aboard the vessel
- *HAULBACK_END:* No information in VTR or observer instructions for gear type
  - This field will not be recorded by the reviewer. Due to the gear type this time element will not be captured by EM. Leave this date/time/GPS null.
- CATCH_SORTING_END: When all fish are processed/gutted and stowed and all discards are measured.
- If the captain hauls another gear type, the jig haul would end and a new haul would begin with that new gear. A new haul is *NOT* created if gear is being set (i.e. longline or gillnet) and the jig(s) is still on deck with the intent of continuing being fished. If another rod/reel/jig is added to the current set being fished, this *DOES NOT* constitute another haul, but a continuation of the current haul.

In the event another type of gear is hauled besides what is listed above (trawl, gillnet, longline, handline/autojig), the following haul definition should be used:

Other:

- *SET_START:* No information in VTR or observer instructions for gear type
  - This field will not be recorded by the reviewer. Due to the gear type this time element will not be captured by EM. Leave this date/time/GPS null.
- *SET_END:* No information in VTR or observer instructions for gear type
  - This field will not be recorded by the reviewer. Due to the gear type this time element will not be captured by EM. Leave this date/time/GPS null.
- *HAULBACK_START:* When all gear is completely retrieved and aboard the vessel
- *HAULBACK_END:* No information in VTR or observer instructions for gear type
  - This field will not be recorded by the reviewer. Due to the gear type this time element will not be captured by EM. Leave this date/time/GPS null.
- CATCH_SORTING_END: When all fish are processed/gutted and stowed and all discards are measured.

All continuous activity with "other" gear will be considered one (1) haul for review purposes. However if another gear type is hauled in between "other" gear, this would trigger a sub-trip. Example: Vessel starts with hauling 2 sets of longline gear, hauls all his pots, then hauls another 2 longline sets. This would be 5 hauls, 2LL – 1PT – 2 LL.

HMS EFP Guidance:

Some vessels are permitted to fish for Bluefin Tuna while on a groundfish trip. A tuna is only allowed to be caught and landed using handline/jig gear. Vessels whose primary gear type is gillnet, longline or trawl are permitted to use a handline/jig to target tuna *only* if they are in the Highly Migratory Species (HMS) EFP. Vessels whose primary gear is handline/jig, DO NOT need to be on the HMS EFP. Vessel participants may use legal sized groundfish as bait but they are not permitted to use sublegal groundfish when targeting tuna. Below are the video review requirements set by the HMS scientists for the provider. For data processing and submission requirements, see the vessel's Tuna VMP Addendum.

1. A new haul with gear type HMS should be selected for periods when tuna fishing occurs.
2. Create a species entry for: Tuna, NK, Swordfish, Shark, NK
   a. Caught on tuna or groundfish gear. This will facilitate future video review, if necessary.
3. Clip video for Bluefin tuna interactions: 2 minutes before fish is hooked until 2 minutes after fish is on deck or released. Includes all catch (landed and discarded).
   full fight times on rod and reel and harpooned fish will be provided
4. Fishermen will need to measure fish for catch reporting purposes. HMS Management Division staff will make length estimates in-house. Primary reviewers DO NOT need to make length estimates.

Catch Sorting and Processing:

While hauling gear or immediately preceding a haul there is generally a period of catch processing. It is important to also review the catch processing period because the vessel may decide to discard fish originally marked as kept. For trawl vessels, this period occurs after haul back, when the net has been pulled from the water and the catch is dumped on deck. For gillnet/longline and handline/jig vessels, the catch processing can occur during gear retrieval but will likely continue after the haul has ended and the entire string is onboard. At this time fish are typically being gutted and stowed and discarding can occur as the quality of the fish is examined. Catch sorting is completed when all catch is stowed (i.e all fish are in hold or covered on deck), processed (i.e. gutting and cutting of fish has finished) or when the last fish is measured, whichever occurs last. **In the MREM program, the Catch Sort End will be after fish are loaded into the fishhold.** When catch sorting is completed, a timestamp should be created and entered under the catch_sort_end datetime field of the EM Detail.

There are instances when the deck is never cleared between hauls and the kept catch is continuously being processed (no separation between processing periods). This is typically seen in longline fishery when the captain is hauling the line and picking fish while the crewman is responsible for gutting and cleaning kept catch. The captain does not wait for all the fish to be processed and stowed before he hauls in the next line. This can also be seen in the trawl fishery when kept catch processing has not concluded, but deckloading is not occurring. When this occurs, enter the CATCH_SORT_END when the catch is fully processed. The catch_sort_end may span multiple hauls in this case.

Catch Handling Protocols:

Fish caught in the Multispecies Groundfish fishery can fall into several categories: allocated species and regulated species that do not have sector allocations. Depending on the designation of these species, captains will be responsible for handling individuals in different ways. There are also subtle differences in the way the discarding of fish should be recorded between the two EM models (Catch Estimation and Maximized Retention). See Table 3 for a list of the groundfish species and which categories these species belong to.

As specified in the Vessel Monitoring Plan (VMP), vessels participating in the EM catch estimation EFPs will have a designated area for processing and measuring allocated groundfish species discards and non-allocated groundfish species on deck (See Appendix B for vessel reference). **Groundfish vessels participating in the MREM EFP will be retaining/landing all allocated groundfish, regardless of size. Non-allocated groundfish (Atl. Wolffish, Ocean Pout, Windowpane Flounder), will be discarded at designated discard control point(s). See VMP for vessel specific discard control point(s). Non-allocated groundfish are not accounted for during MREM trip reviews.** Vessel participants of either groundfish EFP are allowed to land one (1) Atlantic Halibut per trip. Any upgrading (discarding a smaller, previously caught Halibut in favor of a larger one caught on a subsequent haul) will be clearly visible to the reviewer and occur within camera view. A catch entry of the discarded Halibut should be made at the time of discarding with a comment stating 'UPGRADED'. If the haul of when the fish was caught is known, include it in the comments as well. Catch handling procedures will be documented in the VMP of each vessel and will vary slightly depending on the gear used by the vessel, the catch composition and the processing workflow (e.g., if the vessel has a conveyor). Reviewers should keep current VMPs handy while reviewing trips and

large deviations from the approved catch handling behavior should be noted in the review data.

Animals that are placed with kept catch or taken out of camera view for extended periods of time during hauling, sorting, or measuring phases of fishing effort should be considered as retained catch.

Fishermen are instructed to place individual catch items along the measuring strip and smooth out the fish if it is curled or aligned with the grid if off center. Once the fish is placed accurately the fisherman will momentarily ensure an unobstructed view of the fish by removing his or her hands from the vicinity of the catch item and measuring grid. The reviewer should use his/her best judgment if a length can be obtained or not when a fish is not perfectly placed on the strip or hands are partially on the fish. Finding the exact frame where a fish is unobstructed may require rewinding or forwarding the video. If a length cannot be obtained an entry should be made with LENGTH = unknown, WEIGHT DETERMINED BY = VISUALLY ESTIMATED and enter in the visually estimated weight.

If an allocated groundfish is discarded, either intentionally or accidentally, a catch entry should be made. This will create a timestamp of the event and can be queried to determine if the vessel is not following the EFP and VMP. Due to the nature of the MREM EFP, no weight will be estimated for any discard, only provide a count. No entries are required for the non-allocated and non-regulated fish species. The vessel is allowed to discard these species, as long as it is in camera view at one of the discard control points. See Table 3 for a list of the groundfish species.

Species Identification Standards:

While sorting catch on a catch estimation EFP trip, any of the 13 federally regulated groundfish species that the captain does not intend to land for market must be retained on board for catch accounting and length measurement processing before returning discards to the water. Vessels are allowed to discard non-regulated catch without passing them across the measuring strip, however all discarding must occur at designated control points as illustrated in the vessel's VMP.

During review of an EFP trip, trip level species identification will be required for all encountered regulated groundfish (Table 3). Annotating catch items at the species level is preferred, but may not always be possible due to, but not limited to, instances of poor image quality or the individuals being partially blocked. The primary reviewer will include 2 identification characteristics on the first annotation of a species per trip only. The ID characteristics that are commented on should reflect the characteristics that led that reviewer to his/her species designation.

For FY2020, the Center will be moving to a more unified catch accounting system and reporting method. Between the NEFSC and GARFO, different species and gear codes were being used for reporting, management, and scientific purposes. In an effort to simplify things, a single Catch Accounting Monitoring System (CAMS) is being developed. With this change, species and other codes used by the EM programs need to be updated. The move to the Integrated Taxonomic Information System (ITIS) for species names and codes is part of this unified effort and part of the Fishery Dependent Data Initiative. Some of the species used by EM reviewers were unique to the EFP programs and an equivalent in ITIS could not be found.

For instances when a fish cannot be identified to one of the species in Table 3, follow the

following guidance:

When a species level identification cannot be determined, the reviewer will make an annotation of FISH NK, WEIGHT DETERMINED BY = UNKNOWN and the appropriate disposition code. When applicable Event entry or entries should be made for fish that could not be identified. Entries of FISH NK should be limited to any unidentifiable discards. Examples include groundfish that cannot be identified to the species or fish that cannot be identified at all (i.e. a blur being tossed over, water drop over fish). Entries of non-groundfish should NOT be included in any FISH NK catch entry, unless otherwise stated in this document (see page: 14). The reviewer should be able to eliminate and exclude species based on what is visible. If a reviewer is unsure of any fish, annotate as FISH NK and comment 'Marked for FSB ID' and the FSB staff will confirm if that entry is needed.

> Example: If an elongated, left eyed flounder is discarded down the conveyor, the reviewer would NOT make an entry. The shape is not correct for a Windowpane flounder, which is the only groundfish founder that is left eye orientated. However, if the reviewer cannot see the eye orientation or is not confident in the identification, a FISH NK entry should be made.

The reviewer should take the time to make sure the fish cannot be identified and that any non-groundfish species have been ruled out.

There are a handful of hake species encountered by fishermen participating in the EFP's. Many of these hakes are difficult to distinguish morphologically in person and from video footage. Because White Hake is a regulated groundfish species that are difficult to differentiate from other dorsally-filamented hake (red and spotted hakes), clearly documenting all of the individuals from these hake species is important for generating accurate estimates of the catch of White Hake. During the haul, the reviewer should tally ALL dorsal-filamented hake (i.e. white, red, and spotted hakes), regardless if a review can identify the individual to species using additional morphological characters (e.g., dashed lateral line of the spotted hake is visible). At the end of the haul, one (1) annotation of HAKE, RED/WHITE, MIX will be made with the COUNT filled out with the total number of dorsal-filament hake species for the haul, this entry does not include hake that are measured. Individuals that can be positively identified as Silver Hake or Offshore Hake should NOT be included as part of this tally because they are non-groundfish species (i.e., species that can be discarded without catch entries). See the tally count subsampling section below for more details.

The only time White Hake should be noted is when they are discarded as 031 - POOR QUALITY. In these cases individuals are typically larger and easy to identify as White Hake, but are often damaged. An entry will be made for White Hake, with a visual estimated weight and categorized as 031 - POOR QUALITY. See the Documentation of Fish Disposition section for more details.

In addition to correctly identifying the species, a video analyst should be able to exclude similar species. A quick reference guide to species characteristics for regulated groundfish can be found in Appendix C.

Table 3: Federally managed groundfish species of the northeast multispecies complex.

Groundfish Species of the Northeast			
Common name	*'Allocated'*	*'Regulated'*	*Allowable MREM discard*
Atlantic cod	Yes	Yes	No
Haddock	Yes	Yes	No
Pollock	Yes	Yes	No
White hake	Yes	Yes	No
Atlantic halibut†	Yes	Yes	Yes†
Winter flounder	Yes	Yes	No
American plaice flounder	Yes	Yes	No
Yellowtail flounder	Yes	Yes	No
Redfish	Yes	Yes	No
Witch Flounder	Yes	Yes	No
Ocean pout*	No	Yes	Yes
Windowpane flounder*	No	Yes	Yes
Atlantic wolffish*	No	Yes	Yes

* Regulations prohibit retention, † Regulations allow the retention of a single individual, upgrading possible

Protocols for Obtaining Lengths for Catch Est. EFP's:

To turn image data into weight estimates fishermen place specimens on measuring boards (to produce lateral images of each fish directly on the board). Measuring boards with two centimeter increments are installed on deck and the view from at least one camera is focused on this 'measuring station'. Red lines on the boards are used to indicate ten centimeters. Estimates of a catch item's length should be recorded in whole centimeters, with reviewers rounding to the nearest whole centimeter (i.e., round down when the estimate is less than 0.5 centimeters and up when the estimate is equal to or greater than 0.5 centimeters). Measuring standards follow NEFOP measuring protocols.

Reviewers will estimate a length in whole centimeters for *each* allocated groundfish species that is processed and discarded on EFP multi-species trips. If a regulated groundfish species is placed on the measuring strip, but is seen being retained, no entry is required. In cases where the reviewer is uncertain if an individual fish is kept or discarded, the reviewer will make an annotation to species with the DISPOSITION = 900 UNKNOWN KEPT OR DISCARDED. Atl. Wolffish are exempted from length measurements and can be discarded without being placed on the strip. Make an annotation of WOLFFISH, ATLANTIC, LENGTH = null, WEIGHT DETERMINED BY = VISUALLY ESTIMATED and enter in the visual weight. A length measurement should be collected for Atlantic wolffish that are placed on the measuring board and if the animal is not handled properly on the board, the reviewer will create a Crew Event - Improper Fish Handling.

Generally, species length estimates represent a total length, however, for species with forked caudal tails, a fork length estimate should be recorded instead. Appropriate length estimates for each regulated species are illustrated in Table 3. The parameters used in length to weight conversion for each species can be found in Wigley et. al (2003). Some species exhibit seasonal variation in the parameters that best describe this length to weight relationship (related to spawning and other seasonal changes in body condition), and for these species subtly different parameters should be applied depending on the season they are caught (see Appendix F). While annotating catch data, reviewers should inspect each animal to ensure that it is whole and intact. Lengths should not be collected from groundfish that are missing body parts, reveal signs of significant predation, gear damage, or decomposition.

In the MREM program, the LENGTH will be left null or unknown. This program does not require the captain to measure discards. The reviewer is only required to provide a count.

Table 4: Length types for groundfish species

SPECIES	LENGTH TYPE	SPECIES	LENGTH TYPE
COD, ATLANTIC	*FL*	*HADDOCK*	*FL*
FLOUNDER, AM. PLAICE	TL	HAKE, WHITE	TL
FLOUNDER, WINDOWPANE	TL	HALIBUT, ATLANTIC	TL
FLOUNDER, WINTER	TL	OCEAN POUT	TL
FLOUNDER, WITCH	TL	*POLLOCK*	*FL*
FLOUNDER, YELLOWTAIL	TL	*REDFISH, ACADIAN*	*FL*
WOLFFISH, ATLANTIC *	TL		

FL= FORK LENGTH; TL= TOTAL LENGTH * Atl. Wolffish *doesn't* require a length

If a measurement cannot be obtained for a catch item, the reviewer will include a comment that describes the reason. These data are only useful if the text used by reviewers is consistent. Below are common examples that result in degrees of difficulty for measuring a fish. If multiple issues exist please separate them with commas:

- Not placed on measuring strip/grid
- Missing frame
- Poor image quality
- Fish extending out of camera view
- Crew interference
- Inanimate object obstructing view
- Catch item curled
- Damaged or poor quality

Determining Species Weights and Subsampling Methods for High Volumes of Groundfish Discards for Catch Est. EFP's:

During the 2020 fishing year, discarded species weights will be determined by length-weight conversion (LENGTH), tally count sub-sampling (TALLY), or visual estimates (VISUALLY ESTIMATED). Electronic scales will not be deployed into the field at this time, but vessels may opt for scales in the future. Any other sub-sampling method, such as volumetric (BASKET/TOTE COUNT) will need prior approval from NMFS project leads. There is current work being done on verifying a volumetric sampling method, but it is still experimental and should not be used to generate data for official catch accounting purposes. If a vessel is seen using another estimation method besides what is described in this document, a note should be made. If a weight cannot be collected by using one of these methods, the reviewer will report a count and use the UNKNOWN code and specify characteristics that led to this conclusion.

In the MREM program, the WEIGHT DETERMINED BY will be UNKNOWN for all catch entries. This program does not require weights, only a count.

Length

Fish that have a length measurement collected, the weight will be auto-generated based on Wigley et. al (2003).

Visual Estimate

Fish that are not placed on the measuring strip, drop-offs, and any damaged fish will get a visually estimated weight. The weight recorded should represent what is seen, not what the fish would be whole. If fish are not placed properly on the measuring strip, but an estimated length can be seen, use that estimated length to inform the visual estimate.

Tally

When there is an overabundance of a regulated groundfish species that will not be kept from a given haul, the captain can elect to use one of the sub-sampling methods outlined below. While approved options offer a level of catch processing expediency to vessel crews, sub-sampling is not a preferred method and should be applied infrequently. In situations where a large quantity of a specific species is discarded by a captain, sub-sampling allows captains to estimate the total weight for that species using several approved methods. Reviewers need to understand these protocols so they can interpret what captains are doing and tailor their data to match the captain's protocols. Reviewers should follow the captain's lead and estimate lengths following the protocol selected by the captain. Each gear type is unique and there are gear specific sub-sampling methods, which are outlined below.

A reviewer should not assume sub-sampling will occur based on what has previously occurred on the vessel. If there is an initial review and a flag can be added to the hauls that indicate sub-sampling will occur, the primary reviewer can mark fish discarded outside the measuring period as WEIGHT DETERMINED BY = TALLY. Fish discarded down the conveyor or fish that are unhooked at the rail can be marked this way. If an initial review is not completed, fish discarded

outside the measuring period should be marked as WEIGHT DETERMINED BY = VISUALLY ESTIMATED and a visual weight entered.

Sub-sampling should be applied only when 20 or more length measurements are obtained per high volume species. Regardless of the cause, such as glare or camera blocking for example, if there are less than 20 length measurements collected by the reviewer, the portion of lengths that could not be determined from the sub-sample will be added to the tallied fish and the reviewer will submit a visual estimate for the combined total. However, if the reviewer collected 20 lengths from a sub-sample but the captain measured more than 20 fish and lengths from a subset of measured fish could not be determined, that portion should be added to the total tally count for the sub-sampled species.

> Example 1: The captain measures and lengths are obtained from 26 fish and then 78 fish are passed under the camera to be tallied. The tallied fish should be entered as COUNT=78, WEIGHT DETERMINED BY = TALLY, wt left null. The total estimated weight will be calculated from the average individual weight of the 26 fish lengths multiplied by the total count of 104 fish.
>
> Example 2: The captain measures 20 fish and lengths are obtained from 18 fish because the reviewer could not confirm the length of **2** fish. After processing lengths, the captain passes **57** fish under the camera to be tallied. The total tally count should be entered as COUNT=**59**, WEIGHT DETERMINED BY = VISUALLY ESTIMATE. The reviewer devises a visual estimate of 0.4 lbs per fish (59*0.4 lbs = 23.6 lbs) and enters a total weight of 24 lbs. The reviewer will use the appropriate event descriptor for the 2 fish that were measured but a length was undetermined.

If the reviewer feels not all individuals can be seen or made visible to the camera (ex: not moving skates or other fish around on conveyor), a Crew Event- Improper Sub-Sampling should be logged at the end of the haul along with a catch entry. If there is NO attempt to retain any individuals of the sub-sampled species for measurement a Crew Specific Event- Improper Fish Handling should be created.

Below are the gear-specific and species-specific sub-sampling protocols:

Trawl and Gillnet:

The captain/crew will collect all of the individuals of the species to be sub-sampled and keep them in camera view. From that species, the captain will randomly select at least 20 individuals and place these individuals on the measuring board following the standard measurement protocol. The remaining individuals will be passed under the camera at the measuring station in a manner that allows the reviewer to obtain an accurate count. At the end of the tally period, a catch entry should be made with the COUNT filled out with the number tallied and WEIGHT DETERMINED BY = TALLY.

Longline:

During the haul, the captain/crew are allowed to ‘ping-off’ or unhook the species to be sub-sampled at the rail (sub-sampled fish are not retained and processed as required onboard gillnet and trawl vessels). The captain is choosing not to bring these fish onboard. Fish the captain attempts to gaff are not part of the sub-sample and should have an individual catch entry with a

visually estimated weight. During the haul the captain will randomly select at least 20 individuals and place these individuals on the measuring board following the standard measurement protocol. Sub-sampled groundfish that are unhooked at the rail can be entered as a single catch entry at the end of the haul with the quantity discarded, LENGTH = null, DISPOSITION = 099 - DISCARDED, OTHER, and WEIGHT DETERMINED BY = VISUALLY ESTIMATED or TALLY.

The sub-sampled species are NOT considered to have a DISPOSITION = 043, as the captain is making the decision not to measure them because of their abundance. In regard to high volume sub-sampling, species that are not brought onboard (DISPOSITION = 043), the reviewer will visually estimate the weight as they are not considered to be part of the sub-sample group.

In addition, if the reviewer is not able to obtain a length for 20 individuals of the sub-sampled species placed on the measuring board, the portion of the sub-sampled individuals without lengths will be recorded as WEIGHT DETERMINED BY = VISUALLY ESTIMATED.

Hake:

During the haul, the captain/crew will randomly collect 20 individuals from the combined spotted/red/white hake species group (dorsal-filament hakes) and retain them for measurement. The reviewer will create a catch entry and record the lengths under the species code of HAKE, RED/WHITE, MIX. The captain and crew are allowed to discard dorsal-filamented hake as long as all hake can be seen by the camera(s). The reviewer will collect a count of all dorsal-filament hake discarded (not including silver or offshore hake) and will create one catch entry of HAKE, RED/WHITE, MIX with the COUNT filled out with the numbered tallied and WEIGHT DETERMINED BY = TALLY or VISUALLY ESTIMATED.

Protocol for Grouping Discards into a Single Catch Entry:

Typically, reviewers will annotate discards as individual catch entries to account for the exact time the animal was identified and discarded during fishing operations. In addition to sub-sampling, there are five circumstances when a reviewer can group multiple discards of one species classification into a single catch entry (COUNT >1). The following scenarios are common examples of when a reviewer will quantify multiple discards as a single species catch entry:

1. Any time a container of fish is discarded in one action, a single catch entry that represents identified species will be submitted with a total count entered in the COUNT field. Discarded catch dumped from the container that cannot be classified to a regulated species will be counted and recorded as FISH, NK. Groundfish species that are identified should have a total count and a visually estimated weight assigned to each species catch entry.
2. During confirmed sub-sampling on longline trips, the species selected for sub-sampling that are discarded outside the measuring period (i.e. unhooked at the rail) can be entered as a single catch entry at the end of the haul.

3. Hake that are discarded without measuring during catch sorting (i.e. discarded down the conveyor or tossed out of the checker-pen) can be entered as a single catch entry. There may be Crew Specific Event(s) applied if VMP protocols are not followed (ex: if <20 hake are discarded on a haul, or if no attempt to retain and measure hake is made on a haul, a Crew Specific Event- Improper Fish Handling would be applied, if >20 hake are discarded but <20 were measured a Crew Specific Event- Improper Sub-Sample would be applied).

4. UNKNOWN KEPT OR DISCARDED: Fish that land on deck or fall off sorting tables/conveyors and are not recovered or picked up by crew cannot be confidently tracked. If multiples of the same species are observed landing on deck and cannot be tracked a reviewer can assign disposition code 900 to catch entries with a quantity > 1.

5. For trawl gear if multiple fish are washed overboard immediately following the end of the haul a single entry can be made. If multiple species are observed, a separate entry for each should be created with a tally count and estimated weight when applicable at the approximate end of the event.

Documentation of Fish Disposition:

This section gives guidance on how to assign a catch item a specific disposition or fate. These fish disposition codes mimic what NEFOP observers use to describe why fish are discarded. The disposition code will be entered in for each catch item under the DISPOSITION field of the EM Detail. A unique disposition code must be applied to each catch entry. The reviewer should make his/her best judgement as to which disposition code is best suited for the situation. The disposition codes can be found in Table 4.

Any catch item that is not kept by the vessel and is discarded will have a DISPOSITION recorded as 099- DISCARDED, OTHER. A length, a visual weight or tally count should be applied to the catch item. This disposition code will be the most commonly used code.

Fish sometimes come aboard in less than preferred market conditions or have been damaged in some way (predation, sand flea, gear, etc.). This categorization includes any legal sized groundfish that the vessel owner/captain elects not to retain because of poor quality as a result of damage (i.e. LUMF) *and* any damaged sub-legal fish. These 'poor quality' fish should be processed by captains in the same manner as regulated groundfish that cannot be kept due to size restrictions. If a poor quality catch item is identified, a visual weight will be obtained by the reviewer. The visually estimated weight should be representative of what the reviewer sees of the fish, not what the fish would weigh if it were whole. The DISPOSITION will be recorded as 031- POOR QUALITY for that catch entry. No length measurements should be recorded for any poor quality or damaged fish. Furthermore, damaged sub-legal groundfish should be separated from a tally count sub-sample; a visual estimate will always be assigned to poor quality groundfish regardless of size.

A common observation of EM reviewers are fish that interact with the gear but do not land on the deck of a vessel or are not handled by the captain/crew. These individuals are seen interacting with the fishing gear in a way that could affect their survival and thus warrant documentation by a reviewer. These fish should be given a DISPOSITION of 043- NOT BROUGHT ONBOARD, FELL OUT/OFF OF GEAR. Not Brought Onboard is defined as any fish that is entangled or caught in the gear with the intent of being landed or retained, but does not come in contact with the vessel and is assumed to be unaccounted for by the captain and therefore not included in the eVTR (i.e., drop offs). In most occurrences the catch entry will have a quantity equal to one, unless the discard event includes more than one fish that the reviewer can confidently group multiples of the same species into single catch entries. A visually estimated weight will always accompany fish that are identified as regulated groundfish. Fish with DISPOSITION = 043 do not require a Crew Event - Improper Fish Handling.

The disposition code (043) does NOT include fish that are momentarily handled at the rail and are dropped or escape/slip from hand; fish that make contact with the deck and are then washed overboard or out a scupper; fish that are unhooked at the rail by the captain; or fish that the captain attempts to gaff. Catch items such as these should have individual catch entries with DISPOSITION = 099- DISCARDED, OTHER. These fish have been seen by the captain and therefore be included in the eVTR.

For catch items that the reviewer cannot determine the end status (kept or discarded) the DISPOSITION should be recorded as 900- UNKNOWN KEPT OR DISCARDED. Examples of this would be, but not limited to, fish that are left on deck and not physically discarded by the crew and not deemed as kept; fish seen on deck and then washed out of camera view; fish

physically taken out of camera view and never seen by the reviewer being kept or discarded. A piece count and visual weight should be applied to the catch item(s). Identification to the lowest taxonomic classification is also required. If a catch item comes back into view and is observed discarded (discarded by crew, washes out of scupper, etc) the disposition will be updated to 099-DISCARDED, OTHER.

When a reviewer observes an Incidental Take (i.e. mammal, sea turtle, or sea bird) interact with any portion of the gear, regardless of its fate or condition (dead or alive, whole or in pieces) a catch entry should be made with the DISPOSITION of 052- INCIDENTAL TAKE (MAMMAL, SEA TURTLE, SEA BIRD).

These disposition codes should also be applied by reviewers in the MREM program, where applicable. The most common disposition codes used in the MREM program will be 099, 043, and 052, but 031 and 900 may also be used in some instances.

Table 5: List of Fish Disposition Codes and Description

Code	Description
031	POOR QUALITY, REASON NOT SPECIFIED
043	NOT BROUGHT ON BOARD, FELL OUT/OFF OF GEAR
099	DISCARDED, OTHER
900	UNKNOWN KEPT OR DISCARDED
052	INCIDENTAL TAKE (MAMMAL, SEA TURTLE, SEA BIRD)

Event Documentation Standards:

Occasionally, certain events will diminish the ability to obtain information and decrease the value of collected data. There are specific event types that respond to haul level observations and other events that apply to trip level concerns. Currently, there are four event types that require documentation. An event can either be a point or duration. A point event is annotated at the "first sight" of the event. A duration event begins at the "first sight" of the event and ends once the event has been resolved or when the haul has ended, depending on event type. For duration events documented on the haul level, overlap may occur. Some events can be changed from single point to duration events depending on the situation. Location information and detailed comments will be included with the event entry. The four events listed are used regardless of EFP.

- Fishing Operations Specific (Table 6)
- Crew Specific (Table 7)
- EM System Specific (Table 8)
- Video Quality (Table 9)

Events are processed to document and further determine if data quality was jeopardized within a haul or at any time of the trip. It is important to distinguish event types and provide notation because events can impact fishing effort and/or disrupt catch processing on deck; these unique scenarios in turn can affect the amount of time reviewers spend analyzing trip data. See Tables 6-9 for examples of specific event types. The frequency and duration of the stated examples can disrupt workflow and in extreme cases render haul or trip level data unusable.

Fishing Operations Events:

Fishing Operations Specific events require detailed notes to understand the nature of the situation, including documentation of start and end time. When possible, reviewers will provide as much information as the reviewing software allows. Generally, Fishing Operations Specific events increase review time and they can be related to gear issues, slipped or tripped bags of catch, deckloading, water or cleaning tows, and US Coast Guard boarding procedures. With the exception of Lost or Damaged Hooks and Deckloading, all events in this category are duration events and will be documented with a start and end time.

Table 6: Fishing Operations Event Descriptors

TORN TRAWL NET	GILLNETS TANGLED OR TORN	LOST OR DAMAGED HOOKS
MECHANICAL FAILURE	SLIPPED OR TRIPPED BAG	DECKLOADING
USCG OR LAW BOARDING	WATER TOWS	GEAR CONFLICT
OTHER		

Torn Trawl Net; Gillnets Tangled/Torn; Lost/Damaged Hooks: These three descriptors represent gear-specific damage that detract from normal operations while the vessel is processing catch or retrieving gear. If any part of the trawl net is torn and is mended before setting out again the reviewer will enter a duration event that marks when the damage was discovered until the gear is mended. In the gillnet fishery, if the hauler is stopped in order to attend to tangled or torn gillnets, the reviewer will create a duration event that includes the beginning and end of the time spent fixing nets. Point events will be used in the handline/longline fisheries to mark occurrences when jigs/hooks are lost or damaged.

Gear Conflicts: Gear conflicts refer to any interaction with other gear (i.e. lobster trap, pieces of gillnet gear, pieces of trawl gear, hagfish barrels, etc.) that detract from normal operations. An event should be created at the first sight of the interaction. First sight of the interaction is based on when a reviewer identifies the object interfering with deck operations. The duration event will conclude once the ghost gear has been removed and set aside. If the gear conflict resulted in damage to the vessel's gear, repairs or adjustments will be accounted for in the duration of the event and the timestamp marking the end point will include all association actions. Comments should include what type of gear was caught and what happened to it (i.e. was it kept on deck or tossed overboard).

Example:

> Reviewer detects a lobster pot inside the trawl net. They stop playback to create the start of the duration event. The pot is removed after a hole was cut in the net and tossed overboard. The reviewer ends the event when the net is mended and hauling resumes.

Mechanical Failure: An event entry will be created if failures in hydraulics, wenches, or other gear retrieval equipment are observed and repairs and adjustments detract from normal fishing operations. Include in the comment what type of failure occurred.

Slipped or Tripped Bag: In the trawl fishery, sometimes the contents of a tow are released in the water or the catch is not fully brought onboard. A **tripped bag** indicates that the captain/crew made an intentional effort to release catch from the codend by either cutting through a large section of meshes, by setting the net out with the codend open with catch still inside after coming onboard, or by forcing the codend open off the stern or sides of the vessel. This action can be due to safety reasons, mechanical issues, because the catch is not the intended target species or to clean the net of the unwanted catch. **Slipped catch** (or bag) is the unintentional loss of catch. The volume or amount of catch that is lost cannot be quantified in most cases and/or occurred out of camera view. An entry at the first sight of an issue should be made and the comments should include any observations regarding gear damage, mechanical failure, or potential safety concerns. The reviewer will include a comment regarding the species composition for the catch that was released or not brought on deck and include the time the event ended. Since a full account of the catch cannot be made (i.e. discards cannot be tracked confidently), the haul will be marked OBSERVED=N and no catch entries need to be made for fish seen in the water or falling from the gear. This is similar to Discarding Events documented in the NEFOP.

Deckloading: The NEFOP definition for deckloading will be used for EM review. Deckloading is defined as "when catch from multiple hauls are dumped on top of each other in rapid succession, before the deck is completely cleared". Gear issues while the net is deployed, high catch volumes and weather are examples of when reviewers may encounter deckloading during a

trip. This event description most commonly applies to trawl and dredge fisheries when catch from multiple hauls are dumped on top of each other and it is not possible to assign catch items to specific hauls. Because it is impossible to distinguish catch from deckloaded tows, the deckloaded hauls will have no discards associated with them and all discards will be annotated on the last haul of the period. An entry should be made on each haul of the deckloading period. All catch entries will be annotated on the last haul of the deckloading period. The hauls within the deckloading period will be annotated as usual (begin/end date/time, etc.).

Water Tows: This occurs in the trawl fishery only. The vessel will set the net partially out, typically to clean only the codend section of the net. The doors are never deployed and the net does not fully come off the reel. This is NOT a haul and therefore should not have a haul number associated with the event. The entry should be made when the net is first set out for the water tow and end when the net is back on deck.

USCG or Law Enforcement Boarding: The United States Coast Guard and other law enforcement personnel will board fishing vessels from time to time to inspect the vessel's safety equipment, fish hold, and gear. If, at any time, the Coast Guard or other law enforcement agencies board a vessel, the reviewer will make an entry when the first member of the boarding party boards the vessel. General activity of the USCG (i.e. number in boarding party, measured codend, checked fish hold, etc.) should be included in the comments.

Other: This descriptor should only be used if the event does not fit one of the above scenarios. Detailed comments should be provided to help explain the situation.

> Note: Instances in which longlines become tangled and hauling ceases to untangle or cut lines will be documented as a FOE-Other during Fishing Year 2020 trips.

Crew Specific Events:

In order to have a functional EM program captains must follow their VMP and the EFP. This includes being vigilant in keeping camera covers clean and clear of fish slime, water droplets, and/or encrusted salt spray and following the catch handling protocols developed by NMFS. They are required to keep objects from obstructing camera views and must refrain from catch handling practices that disrupt the video analyst's ability to accurately collect data. Ensuring that these entries are made is critical as timely feedback is the only way to communicate to the captain's effectively (before a series of trips are recorded with undesirable conditions). Crew Events can be reported as either a duration event throughout a haul or as a singular-point event.

Table 7: Crew Specific Event Descriptors

CAMERA SYSTEM NOT MAINTAINED	CAMERA BLOCKING	IMPROPER FISH HANDLING
BULK DISCARDING	NOT RETAINING ANY DISCARDS	IMPROPER SUB-SAMPLE
OTHER		

Camera System Not Maintained: If any camera has water spots, fish slime, or anything on the lens and data collection or review of the video is directly impacted, an entry should be made. This duration event entry is documented at the haul level, at first appearance of the liquid or debris on the dome cover and continues until the affected camera view is no longer being used or is cleaned during the haul. This event may lead to a haul being reported as OBS=N if discards cannot be adequately tracked due to water spots, slime, debris, etc.

> Note: If camera(s) are impacted by weather, a Crew Specific Event- Camera System Not Maintained is not necessary.

Camera Blocking: During catch sorting or when fish are on deck, if any object or person obstructs or blocks the camera, an event entry should be made. This entry should be made for each time a camera is blocked (i.e. one entry for fish bins blocking the checkerpen and one for a person standing in front of a camera on the same haul). This is a duration event and will be noted at the first sight of camera blocking and end when the person or object moves and the view is no longer obstructed, or at CATCH_SORTING_END.

> Note: Instances in which an object, hand, etc. is blocking any part of the fish and impacts the ability to record a length, it is documented as Improper Fish Handling.

Improper Fish Handling: Catch items (allocated and non-allocated species) that are not handled properly or any catch processing that is out of the purview of the vessel's VMP should be documented. This applies to any fish not properly handled, regardless of species classification (i.e. FISH NK entry made because cannot ID fish due to handling should also have an event made). If Improper Fish Handling is observed more than five times during a haul, the reviewer will erase the point events and create one duration event that marks the beginning of the event and extends to either the Catch_Sorting_End or when a corrective action was made. An entry should be made each time a fish is not handled properly, unless otherwise stated in the Reviewer Document. If the vessel makes an attempt to properly place the fish on the strip (i.e. lays it flat multiple times, pulls hands away but fish curls up), no event is needed. The vessel is making a good faith effort but the fish is alive and hard to lay flat. Fish that are curved due to stiffness or rigor and are not straightened, an event should be created. The weight of the catch entry should be a visual estimate or via a sub-sample.

Examples of when to apply a CSE - Improper Fish Handling

1. If catch handling protocols are not followed when an observer is on board. Captain supposed to hand observer the laminated Information Sheet located on the vessel.
2. Discarding poor quality or damaged fish without placing on measuring strip
3. Allocated or regulated fish discarded down the conveyor without measuring, or picked out of checker-pen
4. Fish that are assigned as Fish NK because they are discarded either out of camera view or not at a designated control point described in their VMP
5. If a length cannot be collected due to part of the fish (nose and/or tail) being blocked by a hand or object.
6. The measuring strip is taken out of camera view during the measuring period
7. Fish not placed straight or flat on the strip due to stiffness or rigor.
8. If no attempt to retain a high volume species for measurement is made (i.e. all are discarded during sorting), regardless of quantity.

Examples of when NOT to apply a CSE - Improper Fish Handling

1. For longline vessels when poor quality fish are unhooked or during sub-sampling and intact fish are unhooked.
2. Crew attempts to lay the fish flat and removes hands, but the tail keeps curling or the fish keeps moving and no length is obtained.
3. Fish annotated with DISPOSITION = 043 NOT BROUGHT ONBOARD
4. If less than 20 of a high volume species are measured. This would result in a CSE- Improper Sub-Sample.

Bulk Discarding: Refers to any action where a container of fish is dumped overboard or when catch that is piled or layered on deck is swept or shoveled overboard during video review and the contents cannot be confirmed as a groundfish or non-groundfish species. The distinction between a pile and single layer should be made. Fish discarded in a single layer can be tracked and accurately counted, and would not constitute an event. When fish are in containers or in piles, the fish mixed in or at the bottom cannot be observed, counted, or properly accounted. If fish cannot be verified for whatever reason a bulk discarding event should be documented.

A catch entry associated with the event will provide an actual or estimated count of the unidentifiable discarded contents:

FISH, NK, COUNT > 1
DISPOSITION = DISCARDED, OTHER (099)
WEIGHT_DETERMINE_BY = UNKNOWN

The count should include all items that cannot be identified as either groundfish or non-groundfish. Obvious non-groundfish species (skate, dogfish, monkfish, crustaceans, etc.) do not need to be included, unless their ID is inhibited in some way. However if image quality impacts the clarity of the image and only general shapes and colors can be seen, all items should be counted. Comments for the catch entry will indicate the species composition of the discarded pile. Bulk discarding is a point event annotated at the first sight of the discarding. Detailed comments within the event should fully describe the situation.

Other events may impact a reviewer's ability to verify piles of catch resulting in a Bulk Discarding event. It is important to include all events so the entire picture can be captured. Examples of event descriptors that could prompt Bulk Discarding include Cameras Not Maintained, Camera Blocking, Glare, Weather, etc.

When Bulk Discarding is annotated and located in the database, this will act as a flag for FSB. In-house staff may verify the event and change the outcome of a haul, if it is deemed necessary. If there are no other events or activities preventing the tracking of discards, the haul can be marked OBSERVED=Y. The examples below are not all-inclusive, but have been developed based on recent discussions and should be referenced when discarding events are encountered. Other instances of Bulk Discarding may still be seen.

Examples of Bulk Discarding:

1. Contents of the codend are dumped in a pile on deck then swept overboard by gear or crew and the contents cannot be identified or verified as only non-groundfish.
2. Contents within a checker-pen that has been moved to one corner or remains scattered in small piles on deck are then shoveled overboard and the contents cannot be identified or verified as exclusively non-groundfish.

3. Tote/container of unknown fish is dumped over.

Examples of NOT Bulk Discarding:

1. Throughout the haul, verified non-groundfish are pushed to a corner or side of a checkerpen by a crewmember and then discarded in one action.
2. Fish discarded in a single layer that can be tracked and counted.
3. A mound or pile of catch that is separated into a single layer before discarding.
4. Tote/container of confirmed non-groundfish is discarded.
5. Tote/container of confirmed guts and no whole fish is discarded.

Not Retaining Any Discards: This event should ONLY be applied if the crew are not making any attempt to retain any sub-legal discards. This event signifies egregious improper fish handling that has an impact on the overall data quality of the trip/haul. This is a single point event and should be made at the end of the haul or measuring period. See the Catch Handling Metrics section for details.

Improper Sub-Sample: A reviewer will indicate a deficient sub-sample during catch processing when the crew makes an effort to retain a high volume species for tally counting but measures less than the 20 required to calculate a mean weight per individual, not all individuals can be seen or made visible to the camera (ex: not moving skates or other fish around on conveyor), or when a captain fails to measure any of the high volume species and only processes for the purpose of obtaining a count. If the crew attempts to retain all high volume species and then processes them individually across the measuring station camera view without measuring, a Crew Event will be added at the time the crew begins passing the high volume species across the camera view. During hauls when fish are measured the Crew Event - Improper Sub-Sample - will be added once the reviewer confirms that crew has stopped measuring the high volume species and that fewer than 20 fish were measured. This is a single point event and should be made at the end of a haul or measuring period.

An Improper Sub-Sample event signifies that the captain and crew made an attempt to process a high volume species but failed to properly carry out the protocols. A reviewer would not use this descriptor to document hauls when the captain measured any portion of a high volume species but avoided retaining the majority brought onboard or dumped containers of the retained high volume species overboard because deckloading or a sudden gear issue prevented the crew from processing all discards.

> Note: If no attempt to retain discards of a high volume species is made a Crew Specific Event- Improper Fish Handling will be created.

Other: This descriptor should only be used if the event does not fit one of the above scenarios. Detailed comments should be provided to help explain the situation. This event can be either point or duration, the determination is to be made by the reviewer.

EM System Specific Events:

EM System Specific events reflect failures in the EM camera system and can result in loss of video and data. These events can be documented at any point in a trip, regardless of fishing activity or potential impacts to review. EM System Events include when there are video or sensor gaps, camera(s) or system failure, when the EM system is not activated prior to departure or if it is shut off prior to landing, out of synced camera. The event is created at the first sight of an issue, with the appropriate descriptor attached and ends when the event concludes or is resolved. Include any comments that may help to explain the situation. EM System Events can be reported as either a duration event spanning multiple hauls or as a singular-point event.

Table 8: EM Specific Event Descriptors

CAMERA FAILURE	SENSOR GAPS	VIDEO GAPS
SYSTEM FAILURE	CAMERAS OUT OF SYNC	MEASURING SURFACE VISIBILITY
CAMERAS OUT OF POSITION	SYSTEM NOT ACTIVATED AT DOCK	SYSTEM TURNED OFF PRIOR TO LANDING
REMOTE CAMERA ACCESS	OTHER	

Camera Failure: If video from one (1) or more camera(s) but not all drop out and recording ceases, an entry will be made. This event signifies that the camera was lost for the duration of the trip. The comments should include which camera(s) failed and the level of impact the failure had on reviewing the haul due to the limited number of cameras available. If the reviewer could not successfully observe the haul, the haul will be recorded as OBSERVED = N.

Sensor Gaps: If at any point during a trip, the GPS or other sensors are not functioning, an event should be created. The event should encompass the entire time the sensors are not functioning. Comments should be made describing what type of sensor and the impact to the review, if any.

Video Gaps: If any video is missing at any point in a trip, regardless of duration or number of cameras affected, an event entry should be made. The event should encompass the entire time there are gaps. Comments should be made describing any impact to the review. Hauls that could not be successfully reviewed will be recorded as OBSERVED = N.

System Failure: If at any point during a trip, the complete EM system (all cameras and all sensors) fails and stops operating, an event should be made with comments stating the situation. The event should encompass the entire time the system is not functioning. Detailed comments should be included in the event entry.

Cameras out of sync: If at any point during a trip the cameras are no longer in sync with each other, an event should be created. Cameras are out of sync when images are more than 5 seconds apart. The event should encompass the whole time the cameras are not synced to each other.

Measuring Surface Visibility: If the camera view of the measuring strip is degraded or not in full view while the captain is processing discards (i.e. measuring discards or processing a sub-

sample) and there are direct impacts to a reviewer's ability to identify species, obtain lengths, or collect accurate counts during sub-sampling, an event is required for each discard that could not be properly documented per measuring period.

Single event entries will be made for fish that are intermittently impacted during the measuring period. If 25 or more fish in a row are impacted, a duration event can be extended through that period of time to document the issue. This event is necessary only when the data being collected is compromised.

> Example: The captain is measuring fish throughout the haul. Fish 1-3 are ok and data is collected for each. Fish 4-6 are impacted and a MSV event created for each fish. Fish 7-15 are ok so no event made. Fish 16-42 are impacted and a MSV event is created for the duration period. For this example there would be 3 single-point and 1 duration MSV Event.

Cameras out of position: If at any point during the trip, one or more cameras are knocked out of position (i.e. view is not identical to VMP or the reviewer observes the camera being hit and knocked out of place), an event should be created. The event should encompass the whole time the cameras are not positioned correctly. The event may span several hauls if no corrective action is taken. If vessel personnel or an outside technician corrects the camera position the event would end. Detailed comments on which cameras were affected should be added to the event entry.

> Note: Cameras mounted on booms must be positioned correctly once the vessel arrives on the fishing grounds.

System not activated at dock: The EM system is required to be operational for the duration of the trip (departure from dock to landing at a dock). If the video for a trip starts while the vessel is already underway an event entry should be made when the system begins recording video. Event comments will include what the reviewer sees when the video began and if any fishing activity occurred. This is a single point event and should be made when the video is first seen.

> The EM Provider must determine the reasons for delayed activation of the system. Comments related to the causes will be included with the event in addition to other reporting sources such as work logs or portal entries.

System turned off prior to landing: The EM system is required to be operational for the duration of the trip (departure from dock to landing at a dock). If the system is turned off prior to landing, an event entry should be made that includes comments on the approximate location of the vessel and if there was unsorted catch or crew present on deck at the time of the cameras being lost. This is a single point event and should be made when the video cuts out. If unprocessed kept catch from multiple hauls is present on deck or if catch processing is still occurring when the system is turned off the trip could result in a failure. Multiple hauls could potentially be recorded as OBSERVED = NO. Under these circumstances the provider must provide access to the video prior to submitting the trip. Reviewers must comment on what was taking place when the system was turned off.

> **Note: In the MREM program, if video ends prior to the hold inspection by a DSM an event entry should be created.** For the purposes of the Audit-Model Program, cameras must be operational until the vessel lands at a dock where the captain intends to

offload all, or a portion of the kept catch.

Remote Camera Access: In certain instances the EM system can be adjusted remotely by a technician while the vessel is at sea to attempt to correct an issue, such as, cameras shifting or adjusting focal points of cameras. EM technicians will alert reviewers of these occurrences and remote access to the system will be logged during the video review. This is a single point event and should be made at the first sign of remote access.

Other: This descriptor should only be used if the event does not fit one of the above scenarios. Detailed comments should be provided to help explain the situation. This event can be either point or duration, the determination is to be made by the reviewer.

Video Quality Events

Video Quality Events are used to document instances in which video quality affects the reviewer's ability to track operations on deck, as well as identifying, measuring, and verifying discards. Events in this category are used to mark deficiencies in video that have direct impacts on review, but are not in the control of the crew. Video Quality events are documented at the haul level. In the trawl fishery, the reviewer will document Video Quality events from the beginning of the haul: Set Start through Catch Sorting End. While reviewing gillnet, longline or handline gear, the reviewer will note issues from the Haulback Start through Catch Sorting End. These events will have a start and end time as well as comments detailing the camera(s) affected.

Table 9: Video Quality Events

OUT OF FOCUS	GLARE	POOR LIGHTING
WEATHER OR POOR VISIBILITY	PIXELIZATION	MELTING OR RUNNING
OTHER		

Out of Focus: Camera views or viewer screens should provide clear and unblemished images. Reviewers will assess camera views at the haul level and views that are blurry due to being out of focus and do not meet the manufacturer's quality standards must be documented, regardless of impact. Causes can include lens damage such as pitting or scratches, condensation in the lens or dome, as well as a general loss of clarity.

Example of when to apply a VQE - Out of Focus

1. If after examining the VMP still images the camera does not match the supplied view and it is not due to water, salt, or slime.

Example of when not to apply a VQE - Out of Focus

1. If a camera is not maintained and water spots, dried salt spray, or fish slime are observed on the camera(s). This would result in a CSE - Camera System not Maintained

Glare: Reviewers will document glare whenever video of fishing operations is impeded by the presence of sharp-bright light or sun glare. This Video Quality Event should be included when the primary camera(s) used by the reviewer are affected by glare for time duration greater than 1 minute or if glare directly impacts species identification or catch handling.

Note: In the trawl fishery the primary camera changes throughout the haul. Examples of when a Video Quality Event would be documented include, but are not limited to: if glare is impacting the view of the net reels or stern during haulback and fish cannot be tracked; during catch sorting when discards cannot be tracked or identified.

Poor Lighting: Reviewers will document poor light conditions whenever video of fishing operations is affected by shadows or otherwise a lack of light that produces darker images of activity or fish. This includes instances in which deck lights are either nonexistent or insufficient for tracking fish.

Weather/Poor Visibility: During fishing operations, reviewers will note when the weather such as fog, high winds or precipitation reduce image quality and impact video review at the haul level. Typically, more than one camera is impacted. If the weather resolves during the trip and the cameras still have water on them a Crew Specific Event- Cameras Not Maintained would be annotated. This event does not include when the lens or dome cover is foggy or hazy due to damage. Those would fall under VQE-Out of Focus.

Pixelization: The reviewer will document video that has lost clarity as a result of pixelated images, defined as: The appearance of individual pixels and/or pixel blocks causing the individual pixels making up the image to become more prominent, thus causing a grainy appearance in the image.

Melting/Running: When the image colors blend and run together. The image appears to be melting down the screen.

Other: This descriptor should only be used if the event does not fit one of the above scenarios. Detailed comments should be provided to help explain the situation.

Protected Species Interactions:

If at any time during an observed EFP trip a marine mammal, sea turtle, or sea bird, regardless of condition, directly contacts the vessel, or the vessel's fishing gear and any part of the animal is entangled, snagged, ensnared, caught, hooked, collided with, hit, injured or killed by the vessel or its gear, regardless of the final condition and release of the animal, it should be reported as an incidental take. The animal could be alive or dead, whole or a skeleton/pieces of bone. All interactions should be annotated. The primary reviewer is not required to identify the animal to species; only to mark the interaction (presence/absence). At the first sight of the animal, an entry of WHALE, DOLPHIN, SEAL, TURTLE, or BIRD NK, DISPOSITION = 052 INCIDENTAL TAKE, WEIGHT DETERMINED BY = UNKNOWN should be made. This will create a timestamp that will allow NMFS staff to view the clip at a later date and collect more detailed information on the take for the Protected Species Branch at the Center.

Individual Animal Documentation:

EM vessels are not required to follow specific catch handling protocols for species which typically are recorded on individual animal logs (e.g., sharks, tuna, other non-groundfish species). This protocol is consistent with ASM procedure. If an individual animal is caught and/or brought on board during any observed EFP trip, reviewers may opportunistically document the event and will create a catch entry, therefore generating a timestamp of the interaction. Length and weight estimates do not need to be recorded for these interactions, and identification to the species level is also not required. A catch entry of either SHARK, RAY, STURGEON, SWORDFISH, or TUNA, NK DISPOSITION = 099 DISCARD OTHER, WEIGHT DETERMINED BY = UNKNOWN should be made at the first sign of interaction.

Criteria for Documenting a Review

Reviewed

Definition: A reviewer indicates how much of the ***available*** video of a haul was reviewed (AMOUNT_REVIEWED = FULL, PARTIAL, or NONE).

Purpose: To facilitate haul level audit (if the agency so chooses).

- FULL (OBSERVED/UNOBSERVED)
  - All available video is watched by the reviewer, regardless of video gaps or missing video segments within the haul as long as all available video is reviewed.
- PARTIAL (UNOBSERVED)
  - Reviewer begins watching a haul, but does not complete a review of the haul (reasons; poor catch handling, image quality issues, etc.).
- NONE (UNOBSERVED)
  - Reviewer does not review *ANY* video for a haul, regardless if it is available (reasons; provider knows trip will fail).

Observed

Definition: Were all discard events in the haul viewable such that they could be adequately annotated by a video reviewer. "Adequately annotated," is defined as identification to lowest taxonomic level possible and appropriate weight estimation (length measurement, tally, subsampling, visual estimate). If video cuts out, is missing, or obstructed and the catch cannot be tracked confidently to determine end disposition, then that haul would be unobserved.

Purpose: Indicates all discards were accounted for on the haul.

A haul is OBSERVED = N when discards cannot be accounted for or tracked. The appropriate EM, Crew Specific, or Video Quality Event(s) should be created. This indicates the reason(s) the haul was unobserved and corrections can be made and feedback provided to the vessel. For the types of Crew or EM Specific Events, see Tables 4 and 5 in the Documenting Event Standards section.

Catch Handling Metrics:

Catch handling is pivotal to the success of the EM programs. The captain and crew are responsible for accurately and properly measuring fish in camera view so that a length can be collected and converted into a weight in the catch verification EM EFP's. Being able to identify the fish being placed on the measuring strip or being discarded another way is important so the correct weight and species is used for quota monitoring. The following metrics were developed to aid the reviewer and to make sure the data quality is high. There are two pre-submission metrics that the primary reviewer may use to flag hauls with questionable catch handling for FSB staff to confirm and one post-submission metric that is applied during the Audit Model Procedure (AMP). These metrics are to aid in the data quality and limit the percentage of FISH UNKNOWN entries.

Pre-Submission Metrics - catch handling that can be detected during a provider's initial review

Metric 1:

When watching the first measuring period of the first haul, if the first 15 fish are not placed on the strip properly (i.e. hand(s) covering head and/or tail, fish not straight and/or flat) the reviewer will stop watching the haul. The reviewer will check the remaining haul's measuring periods for similar behavior. If there are no verifiable improvements with catch handling, the trip will be sent to FSB to confirm the haul's status. If the percent of unobserved hauls exceeds the NMFS defined fail rate, the trip is deemed a failure. The primary reviewer will annotate the AMOUNT_REVIEWED and OBSERVED fields appropriately. If a portion of the video per haul is watched, mark the haul(s) as OBSERVED=N and AMOUNT_REVIEWED=PARTIAL. One CREW EVENT - IMPROPER FISH HANDLING should be created at the time the reviewer stops watching the video or at the end of the haul. This event will indicate why the haul was unobserved. If there are less than 15 fish measured (i.e. <15 discards/haul) the haul would be recorded as AMOUNT_REVIEWED=FULL and OBSERVED=Y, since the discards could be tracked, but not necessarily identified.

Metric 2:

If a crewmember is discarding fish (i.e from the checkerpen, over the rails, or down a conveyor) and making NO attempt to retain any sub-legal fish (i.e. no measuring period observed, only measuring legal fish for confirmation) *and* the reviewer cannot classify (i.e. groundfish round nk, groundfish flounder nk, non-groundfish) or identify to species, the reviewer will flag the haul(s) and the trip will be sent to FSB to confirm the haul's status. If the percent of unobserved hauls exceeds the NMFS defined fail rate, the trip is deemed a failure. The primary reviewer will annotate the AMOUNT_REVIEWED and OBSERVED fields appropriately; AMOUNT_REVIEW=PARTIAL and OBSERVED=N. One CREW EVENT - NOT RETAINING ANY DISCARDS should be created at the time the reviewer stops watching the video or at the end of the haul. This event will indicate why the haul was unobserved.

If any trip fails due to one or more of the above metrics, the provider will work with the vessel to improve catch handling. The form of feedback is up to the provider (i.e. letter mailed to captain, vessel visit, sector manager involvement). If vessels continuously have failing trips due to catch handling, a more severe feedback or OLE involvement may be warranted.

Criteria for Trip Pass/Fail:

A successfully reviewed trip must have data representing a majority of the hauls fished by the vessel. GARFO data analysts will use EM files that have "passed" for calculating discards and which data will be used for those discards. All EM trips are required to be submitted to the Center's database, regardless if there is usable video/data. If gaps in video occur during any of the hauls, those hauls with missing video cannot be considered as observed. Only fully reviewed hauls recorded as observed are considered. Any questions on if a trip should be reviewed due to unusable video should be directed to the team leads' listed above.

The threshold for hauls set by the Center and GARFO will be 75% of the hauls (rounded up) from the trip must pass (be marked OBSERVED=Y) to consider the trip observed:

- 2 Hauls *(both must pass, 100%)*
- 3 Hauls *(all must pass, 100%)*
- 4 Hauls *(3 must pass, 75%)*
- 5 Hauls *(4 must pass, 80%)*
- 6 Hauls *(5 must pass, 83%)*
- 7 Hauls *(5 must pass, 71%)*

Trips that fail these criteria will be considered unobserved for the purposes of catch accounting. A list of database items submitted to the API can be found in Appendix E.

Appendix A: General Definitions:

Exempted Fishing Permit (EFP):

An EFP is a research proposal submitted by a principal investigator to the NMFS. The proposal is reviewed by NMFS and must be authorized by the Regional Administrator. If the proposal is approved it becomes a contractual agreement between stakeholders. The legally binding document lists vessel participants and outlines the boundaries of the experimental fishing activities permitted in accordance with the Magnuson-Stevens Fisheries and Conservation Management Act. The exemptions, conditions, and requirements that are documented in the EFP are depicted in the Vessel Monitoring Plan. A copy of the EFP must be carried onboard the vessel at all times.

Vessel Monitoring Plan (VMP):

EM service providers are tasked with completing Vessel Monitoring Plans uniquely designed for individual vessel's participating under an Exempted Fisheries Permit in the Northeast Groundfish fishery. The VMP is an essential document that serves as an operations manual for a given vessel that the captain and crew must adhere to whenever they are assigned EFP coverage. The VMP describes how fishing operations on the vessel will be conducted and how the EM system and associated equipment will be configured to successfully monitor fishing activity. The VMP will contain detailed information pertaining to the vessel lay out, catch handling processes, vessel information and operations outline, EM equipment set-up, contact information, and EM system malfunction.

With guidance from federal agencies, the EM vendor will collaborate with individual vessel participants to ensure that the VMP is structured to minimize error and data loss. Prior to operating in the groundfish fishery with EM activated in lieu of an at-sea monitor, VMPs must go through an approval process by GARFO and FSB.

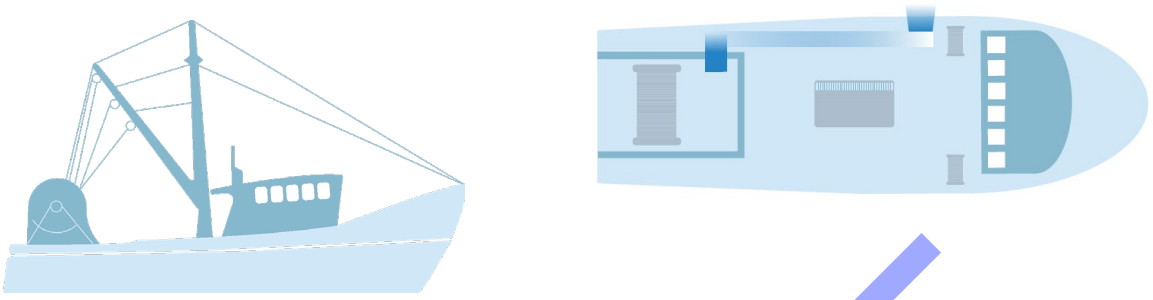
During the study, an individual's VMP can undergo revisions based on suggestions from captains or recommendations from stakeholders.

Annual Catch Entitlement (ACE):

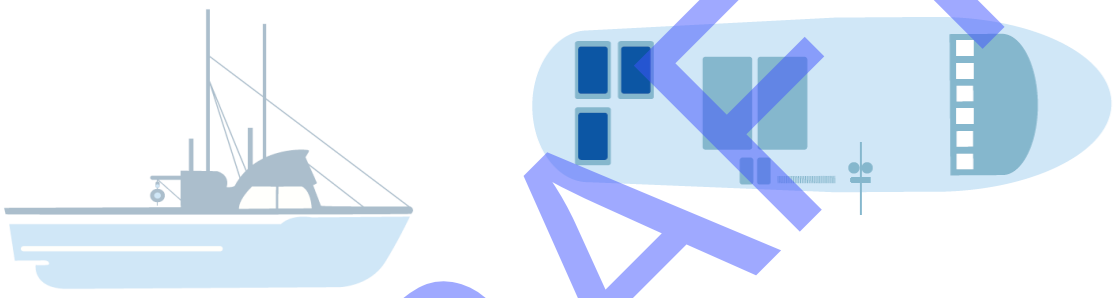
Annual Catch Entitlement with respect to the NE multispecies fishery, means the share of the annual catch limit (ACL) for each NE multispecies stock that is allocated to an individual sector operator or state permit bank based upon the cumulative fishing history attached to each permit participating in that sector or held by state-operated permit bank in a given year. This share may be adjusted due to penalties for exceeding the sector's ACE for a particular stock in earlier years, or due to other violations of the Fishery Management Plan (FMP), including the yearly sector operations plan. When a sector's or state operated permit bank's share of a NE multispecies stock, as determined by the fishing histories of the vessels participating in that sector or permits held by the state-operated permit bank, is multiplied by the available catch, the result is the amount of ACE (live weight pounds) that can be harvested (landings and discards) by participants in that sector or transferred by a state-operated permit bank during a particular permit year.

Appendix B: Generic schematics of vessel layout

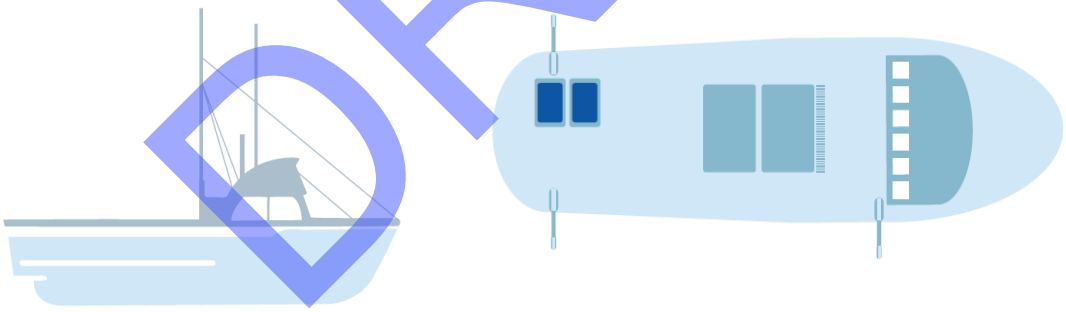
Trawl



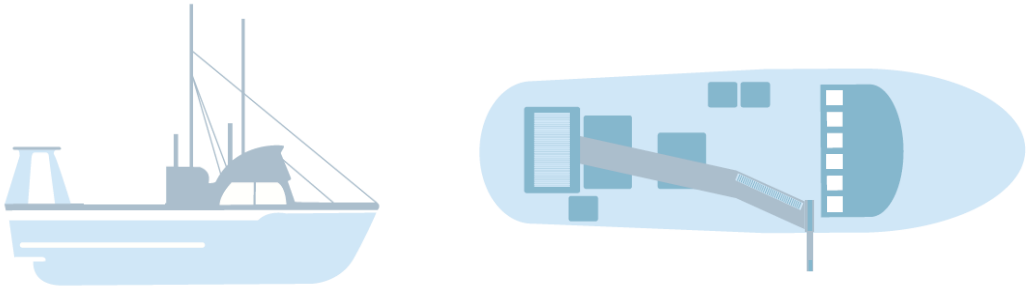
Longline



Handline/Jig



Gillnet



Appendix C: Primary Species Characteristics

Atlantic cod

- Speckled greenish-brown or reddish coloration
- Three dorsal fins
- White lateral line
- Prominent chin barbel

Pollock

- Solid blue gray dorsal color that fades to white along ventral surface
- White lateral line
- Three dorsal fins

Haddock

- Black lateral line
- Dusky black patch located above and behind pectoral fin
- Three dorsal fins

White hake

- Body rounded in front of vent
- Second dorsal and anal fin extend to tail stock
- Pelvic and dorsal fin rays present
- Pelvic fin rays do not reach vent

Acadian Redfish

- Body flame red
- Stout spines
- Bass or perch-like appearance

Windowpane flounder

- Left eyed
- Black and white spots on dorsal, anal, and caudal fins
- Ventral view body appears translucent
- Round overall body shape with pointed snout

American plaice flounder

- Right eyed, with large mouth
- Plain coloration
- Narrow caudal peduncle
- Rounded tail

Witch flounder

- Right eyed
- Upper side brown color often with black hue and dark margins along anal and dorsal fins
- Dark/black tipped pectoral fins
- Thin bodied

Winter flounder

- Thick bodied with light ventral side
- Small mouth
- Convex tail, thick caudal peduncle
- Right eyed

Yellowtail flounder

- Yellow mottled coloration on dorsal surface
- Protruding, upturned snout (dorsal side)
- Small mouth
- Convex tail

Atlantic halibut

- Right eyed
- Diamond shaped body
- Concave tail
- Underside white

Ocean pout

- Long slender body
- Broad, heavy head and large fleshy lips
- Long dorsal fin
- Rounded pectoral fin

Atlantic wolffish

- Bluish, gray color with broad dark bars covering length of body
- Large head with blunt snout
- Long dorsal and anal fins
- White underside

The following section illustrates identification characteristics of non-regulated finfish that are common bycatch in the Northeast groundfish fishery and also hold market value. Occasionally, a captain or crew member will present and process these fish on the measuring board. The video reviewer should account for every catch item that is passed across the measuring strip within camera view.

Fourspot flounder

- Left eye
- Four distinct ocelli present on dorsal surface
- Large mouth
- Ventral view appears translucent

Red hake

- Dorsal surface brownish to bronze
- Pelvic and dorsal fin rays present
- Body rounded in front of vent
- Pelvic fin rays do reach or slightly pass vent

Silver/Offshore hake

- Lower jaw projects beyond upper
- Wide mouth (sharp teeth may be visible)
- Dark gray dorsal surface but most of the body is silver in color

Summer flounder

- Left eye
- Many ocelli present on dorsal surface
- Large mouth
- Robust tail

Appendix D: Minimum Sizes for Commercial Groundfish Species

Groundfish Minimum Fish Sizes

Species	Size (cm)
Witch flounder	33 (13 in)
Yellowtail flounder	30.5 (12 in)
American plaice flounder	30.5 (12 in)
Winter flounder	30.5 (12 in)
Redfish	17.8 (7 in)
Haddock	40.6 (16 in)
Pollock	48.3 (19 in)
Atlantic cod	48.3 (19 in)
Atlantic halibut	104 (41 in)
White hake	No minimum size

Appendix E: Electronic Monitoring EM Detail JSON Technical Requirements

Description:	**Trip review object**	
report_id	integer; Used only when re-submitting an EM review.	
vessel_permit_number*	integer; The fishing vessel permit number.	
	example: 222222	
vessel_name*	string; The name of the fishing vessel	
date_sail*	string; Date the trip left the dock in ISO1806 standard datetime format	
	example: 2019-05-31	
date_land*	string; Date trip returned to dock in ISO1806 standard datetime format	
	example: 2020-06-01	
evtr_num*	integer; Electronic Vessel Trip Report serial number (formerly trip_id)	
	example: 12345619010102	
total_hauls*	integer; The total number of hauls that occurred during the trip.	
	example: 9	
reviewed_hauls*	integer; The number of hauls reviewed.	
	example: 9	
observed*	string; Was the entire trip observable dock to dock?	
	example: Y	
comments	string; Notes pertaining to this trip or EM review.	
hauls	**description:**	**Haul object for each haul of this trip**
	haul_id*	integer; Ordinal number of the haul within the trip.
		minimum: 1
		example: 1
	set_start_datetime	string($date-time); Date and Time in ISO1806 standard format that this haul started.
		example: 2019-08-02T16:24:45.000Z
	set_start_lat	number($double); Latitude in decimal degrees
		minimum: 0

		example: 42.123456
	set_start_lon	number($double); Longitude in decimal degrees
		maximum: 0
		example: -67.123456
	set_end_datetime	String ($date-time); Date and Time in ISO1806 standard format that this haul ended.
		example: 2019-08-02T17:00:15.000Z
	set_end_lat	number($double); Latitude in decimal degrees
		minimum: 0
		example: 42.123456
	set_end_lon	number($double); Longitude in decimal degrees
		maximum: 0
		example: -67.123456
	haulback_start_ datetime*	string($date-time); In ISO1806 standard datetime format
		example: 2019-08-02T16:24:45.000Z
	haulback_start_lat*	number($double); Latitude in decimal degrees
		minimum: 0
		example: 42.123456
	haulback_start_lon*	number($double); Longitude in decimal degrees
		maximum: 0
		example: -67.123456
	haulback_end_ datetime	string($date-time); in ISO1806 standard datetime format
		example: 2019-08-02T16:24:45.000Z
	haulback_end_lat	number($double); Latitude in decimal degrees
		minimum: 0
		example: 42.123456
	haulback_end_lon	number($double); Longitude in decimal degrees
		maximum: 0
		example: -67.123456

	amount_reviewed*	string; How much of this hauls video was reviewed? Must be FULL if observed is Y.
		Array [FULL, PARTIAL, NONE]
	observed*	string; Was the haul fully observed? amount_reviewed must be FULL if observed is Y.
		Array [Y, N]
	gear_category*	string; See Reference Table 1
	catch_sorting_end_ datetime	string($date-time); in ISO1806 standard datetime format
		example: 2019-08-02T16:24:45.000Z
	comments	string; Notes specific to this haul.
	haul_id*	integer; Indicates the haul from which this discard resulted, if known.
	species_common_ itis*	string; See Reference Table 2
		example: COD, ATLANTIC
	species_code_itis*	integer; See Reference Table 2
		example: 164712
	weight	number; Weight of the discard.
		example: 1.5
	catch_weight_uom	string; Unit of measure used when estimating the weight of the discard.
	length	integer; Length of discard.
		example: 12
	catch_length_uom*	string; Unit of Measure used to measure discard.
	count	integer; Number of discards this record represents.
	weight_determined_ by*	string; How was weight of discard estimated? See Reference Table 3
		example: LENGTH
	discard_datetime*	string($date-time); The date and time the discard occurred in ISO1806 standard format.
		example: 2019-08-02T16:24:45.000Z
	discard_lat*	number($double); Latitude in decimal degrees
		minimum: 0
		example: 42.123456

	discard_lon*	number($double); Longitude in decimal degrees
		maximum: 0
		example: -67.123456
	disposition*	string; See Reference Table 4.
	reviewer_id*	string; Official Observer ID assigned by FSB to the reviewer.
		example: X99
	comments	string; Notes that are specific to understanding this discard record.
	event_category*	string
		Array [VIDEO QUALITY, FISHING OPERATIONS, CREW, EM SPECIFIC, UNKNOWN]
	event_code*	string; See Reference Table 5.
	haul_id	integer; The haul within this event occurred, if known.
	event_datetime*	string($date-time); Timestamp in ISO1806 standard format.
		example: 2019-08-02T16:24:45.000Z
	event_lat*	number($double); Latitude in decimal degrees
		minimum: 0
		example: 42.123456
	event_lon*	number($double); Longitude in decimal degrees
		maximum: 0
		example: -67.123456
	reviewer_id*	string; Official Observer ID assigned by FSB to the reviewer.
		example: X99
	comments	string; Notes that are specific to understanding this event.

Reference Table 1 – Gear Types - Groundfish

ACCSP_ GEARCATCD	ACCSP_CATEGORY_NAME	ACCSP_ TYPECD	ACCSP_TYPE_NAME
000	NOT CODED	000	NOT CODED
090	OTTER TRAWLS	004	TRAWLS
200	GILL NETS	006	GILL NETS
400	LONG LINES	008	LONG LINES
650	HARPOONS	012	SPEARS AND GIGS
700	HAND LINES	013	HAND LINES
800	OTHER GEARS	015	OTHER GEARS

Reference Table 2: Species List - Groundfish

NESPP4	COMMON_NAME	SCIENTIFIC_NAME	SPECIES_ITIS
0818	COD, ATLANTIC	GADUS MORHUA	164712
1200	FLOUNDER, WINTER	PLEURONECTES AMERICANUS	172905
1219	FLOUNDER, SUMMER	PARALICHTHYS DENTATUS	172735
1220	FLOUNDER, WITCH	GLYPTOCEPHALUS CYNOGLOSSUS	172873
1230	FLOUNDER, YELLOWTAIL	PLEURONECTES FERRUGINEUS	172909
1240	FLOUNDER, AMERICAN PLAICE	HIPPOGLOSSOIDES PLATESSOIDES	172877
1250	FLOUNDER, WINDOWPANE	SCOPHTALMUS AQUOSUS	172746
1477	HADDOCK	MELANOGRAMMUS AEGLEFINUS	164744
1520	HAKE, RED	UROPHYCIS CHUSS	164730
1539	HAKE, WHITE	UROPHYCIS TENUIS	164732
1551	HAKE, RED/WHITE MIX[1]	UROPHYCIS SP	164729
1580	HALIBUT, GREENLAND	REINHARDTIUS HIPPOGLOSSOIDES	172930
1590	HALIBUT, ATLANTIC	HIPPOGLOSSUS HIPPOGLOSSUS	172933
2400	REDFISH, ACADIAN	SEBASTES FASCIATUS	166774
2500	OCEAN POUT	MACROZOARCES AMERICANUS	630979
2695	POLLOCK	POLLACHIUS VIRENS	164727

3591	SHARK, NK	SQUALIFORMES	159785
4212	STURGEON, NK	ACIPENSERIDAE	161064
4328	SWORDFISH	XIPHIAS GLADIUS	172482
4657	TUNA, NK	EUTHYNNUS THUNNUS SP	172418
5121	WOLFFISH, ATLANTIC	ANARHICHAS LUPUS	171341
5260	FISH, NK	OSTEICHTHYES	161030
6100	BIRD, NK	AVES	174371
6753	RAY, NK	RAJIFORMES	160806
6994	SEAL, NK	PHOCIDAE	180640
6997	DOLPHIN, NK (MAMMAL)	DELPHINIDAE	180415
6999	WHALE, NK	CETACEA, WHALE	180403
8160	TURTLE, NK	CHELONIOIDEA	173749

[1] HAKE, RED/WHITE MIX: the reviewer should aggregate all unidentifiable hake (i.e., red, white, and spotted) discards and report them under “HAKE, RED/WHITE MIX”.

Reference Table 3 – Discarded Fish Weight Determined By [2]

Code	Weight Determined By
15	LENGTH
06	VISUALLY ESTIMATED
11	ACTUAL, ELECTRONIC SCALE
05	TALLY
03	BASKET/TOTE COUNT
00	UNKNOWN

[2] Discarded Fish Weight Determined By: when selecting UNKNOWN, the reviewer will report a count, but no weight (value will be null); when selecting VISUALLY ESTIMATED or ACTUAL, ELECTRONIC SCALE, the reviewer will report both a count and a weight.

Reference Table 4 – Fish Disposition Codes and Descriptors

Code	Description
031	POOR QUALITY, REASON NOT SPECIFIED
043	NOT BROUGHT ON BOARD, FELL OUT/OFF OF GEAR[3]
099	DISCARDED, OTHER

052	INCIDENTAL TAKE (MAMMAL, SEA TURTLE, SEA BIRD)
900	UNKNOWN KEPT OR DISCARDED

[3] Not Brought Onboard: defined as any fish that comes in contact with the gear with the intent of being landed or retained, but does not come in contact with the vessel and is assumed to be unaccounted for by the captain and therefore not included in the eVTR (i.e., drop offs).

Reference Table 5: Event Categories, Descriptions and Codes

EVENTID	EVENT_CAT	EVENT_DESC	EVENTCD
8	CREW	CAMERA SYSTEM NOT MAINTAINED	CAMMAINT
9	CREW	CAMERA BLOCKING	CAMBLOCK
10	CREW	BULK DISCARDING	BULKDISC
11	CREW	OTHER	OTHER
12	CREW	NOT RETAINING ANY DISCARDS	NOTRETDISCS
30	CREW	IMPROPER FISH HANDLING	IFH
47	CREW	IMPROPER SUBSAMPLING	SUBSAMP
13	EM SPECIFIC	SYSTEM FAILURE	SYSTEM
14	EM SPECIFIC	CAMERA FAILURE	CAMFAIL
15	EM SPECIFIC	SENSORS GAPS	SENSGAP
16	EM SPECIFIC	VIDEO GAPS	VIDGAP
17	EM SPECIFIC	MEASURING SURFACE VISIBILITY	MEASVIS
18	EM SPECIFIC	OTHER	OSI
34	EM SPECIFIC	CAMERAS OUT OF SYNC	COS
35	EM SPECIFIC	SYSTEM NOT ACTIVATED AT DOCK	NAATDOCK
36	EM SPECIFIC	SYSTEM TURNED OFF PRIOR TO LANDING	SYSOFFPRIOR
40	EM SPECIFIC	CAMERAS OUT OF POSITION	CAMKNOCK
51	EM SPECIFIC	REMOTE CAMERA ACCESS	RCA
1	FISHING OPERATIONS	TORN TRAWL NET	TORNTRAWL
2	FISHING OPERATIONS	GEAR CONFLICT	GEARCON

4	FISHING OPERATIONS	OTHER	OTHER
5	FISHING OPERATIONS	MECHANICAL FAILURE	MECHFAIL
6	FISHING OPERATIONS	SLIPPED OR TRIPPED BAG	BAG
29	FISHING OPERATIONS	USCG OR LAW BOARDING	BOARDING
31	FISHING OPERATIONS	WATER TOWS	WATERTOWS
32	FISHING OPERATIONS	DECKLOADING	DEAKLD
37	FISHING OPERATIONS	GILLNETS TANGLED OR TORN	GILLTORN
41	FISHING OPERATIONS	LOST OR DAMAGED HOOKS	HOOKS
38	VIDEO QUALITY	POOR LIGHTING	LIGHT
39	VIDEO QUALITY	GLARE	GLARE
42	VIDEO QUALITY	OUT OF FOCUS	FOCUS
43	VIDEO QUALITY	PIXELATION	PIXEL
44	VIDEO QUALITY	MELTING OR RUNNING	MELT
45	VIDEO QUALITY	WEATHER OR POOR VISIBILITY	WEATHER
46	VIDEO QUALITY	OTHER	OTHER

Appendix F: Month determination for Length/Weight Conversions formula for each Species

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Atl. Cod	W	W	W	S	S	S	S	S	S	A	A	A
Haddock	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	A	A	A
Pollock	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	A	A	A
Acadian Redfish	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A
White Hake	W	W	W	S	S	S	S	S	S	A	A	A
Am. Plaice Fld.	W/A	W/A	W/A	S	S	S	S	S	S	W/A	W/A	W/A
Winter Fld.	W	W	W	S	S	S	S	S	S	A	A	A
Witch Fld.	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	W/S	A	A	A
Yellowtail Fld.	W	W	W	S	S	S	S	S	S	A	A	A
Atl. Halibut	A	A	A	S	S	S	S	S	S	A	A	A
Atl. Wolffish	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A
Ocean Pout	W/A	W/A	W/A	S	S	S	S	S	S	W/A	W/A	W/A
Windowpane Fld.	W	W	W	S	S	S	S	S	S	A	A	A
Summer Fld.	AN AVERAGE OF ALL SEASONS WILL BE USED											

W=Winter, S=Spring, A=Autumn

References:

Wigley, S.E., McBride, H.M. and McHugh, N.J., 2003. Length-weight relationships for 74 fish species collected during NEFSC research vessel bottom trawl surveys, 1992-99.

Version History:

Release Date	Description of Edits	Version	Prepared By
6/10/17	DRAFT 1	1	J.Potter
10/17/17	DRAFT 2	2	C.Endres
11/28/2017	FINAL DRAFT	3	C.Endres
10/25/18	DRAFT 3: Haul definitions, longline subsampling protocols	4	C.Endres
7/17/19	DRAFT 4: Hake subsampling protocols, EM specs updates, adding in MREM protocols	5	C.Endres
9/17/19	Addition of "Other Gear" haul definition	6	C.Endres
10/9/19	Addition of Water Tows definition and guidance	7	C.Endres
11/4/19	Reviewed and Observed field guidance	8	C.Endres
2/5/20	Correction to discard_condition for pinged-off fish on Longline vessels	9	C.Endres
4/16/20	Defining split gillnet haul, additional jig hauling guidance, FY2020 changes: event/image quality clarifications and examples, catch handling metrics, EM Detail JSON: adding fish disposition codes, changing codes to ACCSP/ITIS, longline protocols finalized	10	C.Endres
6/9/2020	Change to sub-sample number from 30 to 20 fish per haul	11	C.Endres
7/17/20	Addition of Jig SET_START def; Made haul elements optional for submission when a comment is present; EM-MSV descriptor better defined; VQE-Weather descriptor better defined.	12	C.Endres
8/28/20	Addition of Gear Type definitions; Addition of general vessel schematics	13	FSB
10/27/20	Addition of Review Start/Stop definitions; removal of discard annotation for FOE-Slipped/Trip Bag; revisions to several event descriptors	14	FSB