



# **Electronic Monitoring Audit Model Program Reviewer Guidance Manual**

**Video Review Protocols for Multispecies Sector Trips  
5/1/2023 to 4/30/2024**

In Accordance with NOAA Fisheries:  
Northeast Fisheries Science Center and  
Greater Atlantic Regional Fisheries Office

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## Introduction:

Electronic Monitoring (EM) refers to the use of technologies, such as video cameras, gear sensors, and reporting systems, to monitor fishing operations, effort, and/or catch. In 2010, NMFS implemented Amendment 16 to the groundfish FMP and established annual catch limits and accountability measures for the fishery. Amendment 16 also included a requirement for groundfish sectors to implement and fund an at-sea monitoring (ASM) program, and regulations allow sectors to use EM to satisfy their catch monitoring requirements. The Greater Atlantic Region has assisted with the development of two EM models: the Audit Model and the Maximized Retention model. This Guidance Document focuses on the Audit Model review requirements. The protocols and guidance provided in this manual are subject to change. NMFS will provide notice if/when new protocols are added or current protocols are amended.

The New England Fishery Management Council developed Amendment 23 to the groundfish FMP. Amendment 23 is intended to adjust the groundfish monitoring program to improve the reliability and accountability of catch reporting in the commercial groundfish fishery, and to ensure the monitoring program is providing accurate catch information.

The New England Fishery Management Council adopted Amendment 23 to the Northeast Multispecies Fishery Management Plan at its September 2020 meeting. The measures approved in the amendment include higher levels of monitoring (i.e., 100 percent, contingent on available funding) and approval of both the Audit and Maximized Retention models as optional tools to meet monitoring requirements. Amendment 23 was submitted to NOAA Fisheries for review, and following final action, NMFS determined that the action is consistent with all applicable law, as required by the Magnuson-Stevens Fishery Conservation and Management Act. Amendment 23 was fully implemented on January 9, 2023.

The Audit Model EM program began in 2016 and includes vessels using a variety of gear types and from all sectors. Under the Audit Model EM program, participants must record the estimated weight and count of all discards on an eVTR and adhere to catch handling protocols at sea to ensure collection of discard data from the video footage. In particular, participants must hold all groundfish below the minimum fish size under a camera prior to discarding them to facilitate video review by a third-party EM service provider. NMFS audits a subset of trips taken by each participating vessel and compares the discard data submitted by the third-party EM service provider to the eVTR submitted by the vessel. The agency will apply the Delta Model to each EM trip's eVTR for catch accounting. The Delta Model makes minor adjustments to discards for eVTR over- or under-estimations made by the captain and is regularly updated for all trips within the fishing year. On audited trips, the EM data is compared to eVTR for accuracy and used to update the Delta Model. The goal of the Delta Model is to use eVTR self-reported discards estimates to improve catch accounting.

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. All primary reviewed EM trips are subject to editing by the agency. This is a quality control measure for both the reviewer and service provider. Feedback is given to the reviewer and provider on reviewer protocol adherence

and overall performance.

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 page 3 for definitions of Vessel Monitoring Plans (VMP) and multispecies Annual Catch Entitlement (ACE).

This reviewer document is not vendor specific, it provides guidance that applies to the Audit Model Program. The goal of this document is to provide EM reviewers working for NMFS as well as outside company's 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 veteran reviewers alike. 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.

## Common Acronyms:

<b>EM:</b> Electronic Monitoring	<b>GARFO:</b> Greater Atlantic Regional Fisheries Office
<b>eVTR:</b> Electronic Vessel Trip Report	<b>NEFSC:</b> Northeast Fisheries Science Center
<b>ITIS:</b> Integrated Taxonomic Information System	<b>TDQ:</b> Training and Data Quality Branch
<b>JSON:</b> JavaScript Object Notation	<b>FMO:</b> Fisheries Monitoring and Operations Branch
<b>VMP:</b> Vessel Monitoring Plan	<b>FMRD:</b> Fisheries Monitoring and Research Division
<b>VMAN:</b> VMP Management Application	<b>ACCSP:</b> Atlantic Coastal Cooperative Statistics Program
<b>NEFOP:</b> Northeast Fishery Observer Program	<b>ACE:</b> Annual Catch Entitlement
<b>ASM:</b> At-Sea Monitor	<b>FOE:</b> Fishing Operations Event
<b>NMFS:</b> National Marine Fisheries Service	<b>CSE:</b> Crew Specific Event
<b>NEMIS:</b> Northeast Electronic Monitoring Info. System	<b>EME:</b> Electronic Monitoring Event
	<b>DCP:</b> Delayed Catch Processing

## Terminology Used in This Manual:

*Reviewer:* Any person trained and certified by NEFSC to view and analyze EM trips, hauls, or footage.

*Trip:* Defined as Port-to-Port deployments. The captain is required to submit an eVTR when the vessel returns to port for any reason (weather, mechanical failure, partial off-load, etc.). In the situation where a vessel returns to port, does not offload, and returns to sea to fish, the captain would be required to submit eVTRs for the two distinct fishing trips.

*Haul:* The deployment and subsequent retrieval of fishing gear.

*Fixed Gear:* Gears that are set to soak in a particular area, typically unattached from the vessel, and retrieved after a period of time that can range from less than an hour to more than a week.

*Mobile Gear:* Gears that are deployed from the vessel(s) and pulled through the water, before being retrieved and the contents emptied.

*Vessel Monitoring Plan:* EM service providers are tasked with submitting VMP's uniquely designed for individual vessel's participating in an EM program 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 when sailing on a declared groundfish trip. 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 contains detailed information pertaining to vessel layout, catch handling processes, vessel information and operations outline, EM equipment set-up, contact information, and EM system malfunctions.

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 participating in an operational EM program, VMPs must go through an approval process by GARFO and NEFSC. VMP's may be revised based on suggestions from captains or recommendations from stakeholders.

*Annual Catch Entitlement:* ACE 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.

*Catch:* Any living or non-living items captured by gear, that is witnessed by vessel personnel, observed by a video analyst, or sea-sampler, regardless of whether it is brought on board.

*Discard:* Any catch item that has been in contact with the fishing gear and is disposed of or returned to the sea.

*Impact to Review:* Items that may impact the review include the inability to identify discards to species, collect length measurements, track fish, or collect haul level elements.

## Reviewer IDs:

Reviewers will be given a NMFS observer program identification number. These reviewer IDs will be used to identify which reviewer(s) performed the primary review.

## Trip Level Elements:

A trip is defined as a Port-to-Port deployment. The captain is required to submit an eVTR when the vessel returns to port for any reason (weather, mechanical failure, partial off-load, etc.). The vessel does not need to land in the primary port listed in the VMP in order for a trip to be considered complete. In the situation where a vessel returns to port, does not offload, and returns to sea to fish, the captain would be required to submit eVTRs for the two distinct fishing trips.

Vessels are required to have a functional EM system for the duration of the trip. A functional EM system is defined as a system that continuously records activity on deck onto a hard drive or other suitable video storage device. The EM system consists of the control box, GPS, or other sensors, and the cameras. The captains are required to turn the EM system on before departing a dock or mooring, keep the system running for the entirety of the trip and wait to turn it off until after they land at a dock/mooring.

Audit Model EM vessels will need to process all discards prior to ending a trip. Typically discards are processed at sea, however discard processing may occur after the vessel has landed. A reviewer will enter a sail and land timestamp based on the video.

**Sail Date:** The reviewer will annotate a timestamp when they see the vessel leaving the dock with the intent of going fishing. This timestamp should be noted when the vessel begins moving away from a dock or mooring. If the vessel leaves a dock and lands at another dock without fishing, and departs again, the second departure time would be the sail date. If the reviewer cannot determine or track the departure location and the system is activated while underway, DO NOT annotate a SAIL\_DATETIME. The EME-SYSTEM NOT ACTIVATED AT DOCK event should be annotated when the video begins. This field should **only** be NULL if the EME-SYSTEM NOT ACTIVATED AT DOCK is annotated.

**Land Date:** The reviewer will annotate a timestamp when they see the vessel land at a dock, regardless if the vessel is intending to offload catch. EM review should continue until all discards are measured and all catch is fully processed or when the vessel lands, 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 annotate the land time and continue watching the video to confirm all discards are processed.

If video ends prior to being able to verify the vessel landing (i.e. vessel is still underway, or cannot verify landing with available views), DO NOT annotate a LAND\_DATETIME. The EME-SYSTEM FAILURE event should be annotated when the video cuts out. This field should **only** be NULL if the EME-SYSTEM FAILURE is annotated.

```
{
  "vessel_permit_number": 222222,
  "vessel_name": "Vessel B",
  "sail_datetime": "2020-16-02T16:24:45.000Z",
  "land_datetime": "2020-16-10T06:57:15.000Z",
  "evtr_num": 2222220062901,
  "all_effort_confirmed": "Y",
  "comments": "string"
}
```

Figure 1: Example of a trip object in JSON format.



**All Effort Confirmed Y/N:**

This trip level field is used to indicate if the EM system was functioning in a way that allowed the reviewer to confidently confirm all fishing effort (all hauls, all gear types) was reviewed. **This field is looking for effort confirmation, not if catch can be tracked.** Currently effort is verified via video and camera functionality. See below for examples of when this field would be marked Y or N.

**Examples of when All Effort Confirmed= Y:**

1. The EM system recorded full footage from dock to dock with no EM system issues (Video Gap, Camera Failure, System Failure).
2. Video gaps or a Camera Failure occurred on the trip but occurred either outside of fishing activity, or was brief enough so that fishing activity could still be reviewed confidently.
3. If footage begins when the vessel is still in the harbor or early in the steam, it can be confirmed that no fishing activity has been lost (i.e. land still in view).
4. If footage ends prior to the vessel landing, it can be confirmed that all effort has concluded (i.e. land is in view, near harbor, etc.)

**Examples of when All Effort Confirmed= N:**

1. If a prolonged video gap occurs during the trip, it cannot be verified that fishing activity did not occur during the gap.
2. If a video gap occurs and one or more haul elements cannot be recorded.
3. If a System Failure occurs during the trip, and footage of potential fishing activity is lost.

Table 1: Trip Level fields in the EM JSON Submission

Name	Details/Instructions	Units/Format	Unknown Values
vessel_permit_number	federal permit number	6- digit code	Cannot be unknown
vessel_name	name of vessel	text	Cannot be unknown
sail_datetime	Date and time vessel departs the docks/trip starts	YYYY-MM-DD hh:mm:ss	Can be null if departure is unknown
land_datetime	Date and time vessel lands at to dock/trip ends	YYYY-MM-DD hh:mm:ss	Can be null if landing is unknown
eVTR_num	trip report number, report filed by captain, used as trip identifier	14-digit code	Cannot be unknown
all_effort_confirmed	Could all fishing activity be verified in review	Y/N	cannot be unknown
comments	any trip comments, general trip summary	text	can be left blank

## General Gear Categories:

There are currently four gear categories operating in the multispecies EM program. Each trip will have a primary gear 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 category definitions and ACCSP codes can be found in Table 2.

Some vessels use multiple gear categories 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 the gillnet or longline gear.

If a gear not found in Table 2 is used, there is no requirement to document the haul activity or discards. The reviewer is still required to watch the video to confirm the system is functioning properly. The only events required would be EM events like video or sensor gaps and camera or system failures.

If a gear found in Table 2 is observed in video, the reviewer will document the fishing effort and associated catch consistent with normal video annotation described in this manual. **The target species does not need to be groundfish in order to collect fishing effort or catch information.** If groundfish catch is observed, the captain is required to process those discards accordingly. If the reviewer sees a gear type from Table 2 being used but it is not approved in the vessel's VMP, the reviewer should *still* annotate that gear's haul elements accordingly and annotate any discards seen, and inform their program manager. For example, if a gillnet vessel drops a handline and that gear is not listed on their VMP, the handline haul should still be annotated and discards marked. However, if a vessel hauls lobster traps, that gear and/or associated groundfish catch does not need to be marked as a haul since it is not listed in Table 2. See Appendix's A and B for gear and vessel diagrams.

Table 2: Gear Category definitions and ACCSP Codes - Groundfish

Gear Type	Definition	ACCSP Category	ACCSP GEARCATCD
Otter Trawl, Bottom	A funnel shaped net that is towed along the ocean bottom, behind one boat. Large doors deployed to aid in keeping the net on the bottom	Trawls	091
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 gangions and hooks.	Long Lines	400

Handline/ AutoJig	Handlines and jigs are generally configured with a weight, leader, and at least one hook attached to a line. These gears may use baited hooks or fish-shaped lures made of plastic or metal with a barb at the end, which vary according to target species.	Hand Lines	700
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## Haul Definitions by Gear Category:

Currently vessels participating in an EM program fish with a variety of gears. Depending on the gear being used by fishermen on a trip that is selected for review, there are slightly different definitions of what is considered a ‘haul’ for EM data collection. The haul definitions used by EM will mimic the ASM program’s gear specific definitions.

Below is how to document the different haul time elements for each gear. A date, timestamp, and GPS coordinates should be created for each of the given elements within the haul based on the gear type. The reviewer should do their 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 imagery is too corrupt to verify activity during that period of time. 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.

While hauling gear or immediately proceeding 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. No annotations are required indicating when processing has ended, but it is expected the reviewer watches all catch processing for possible discarding events.

```
{
  "haul_id": 1,
  "gear_category": "091",
  "start_haul_datetime":
  "2019-08-02T16:24:45.000Z",
  "start_haul_lat": 42.123456,
  "start_haul_lon": -67.123456,
  "end_haul_datetime":
  "2019-08-02T16:24:45.000Z",
  "end_haul_lat": 42.123456,
  "end_haul_lon": -67.123456,
  "reviewer_id": "X99",
  "delayed_catch_process": "Y",
  "observed": "Y",
  "comments": "string"
}
```

Figure 2: Example of a haul object in JSON format

## Bottom Trawl:

*HAUL BEGIN:* First component of net deployed, i.e. net hits the water with the intent to fish.

*HAUL END:* Hauling equipment put into gear with the intention of hauling back.

- Note: If the hauling equipment (i.e. winches) are not in view, the reviewer will use the wire from the winches to the trawl doors as the indicator of Haul End. When using the wire, look for rope or colored markings, as those will be most visible when the wire is in motion. Captains typically put depth markings on the wire that are visible on video. If the wire is not visible, the reviewer can mark the Haul End as when the trawl doors are fully up alongside the vessel. Please provide comments if another haul end determination is used for this timestamp.
- If the trawl net is deployed but not fished (i.e. doors not set out, net partially on reel, codend cleated to the side of the vessel), this is *NOT* a haul. The captain is cleaning the net with no intention to deploy it fully. No annotations are required for this type of event. If the reviewer cannot determine the intent to fish, the haul should be annotated and comments added.
- Note: Vessels may adjust the wire during a haul. This could be due to the vessel making a turn avoiding something on the ocean bottom. These instances would not be annotated as a Haul End timestamp since the intent is not to haul back the gear to end fishing.

## Gillnet or Longline:

*HAUL BEGIN:* Hauling equipment put into gear or retrieval of gear commences.

*HAUL END:* When the last piece of the surface system (highflyer or buoy) is brought on board.

- Note: If the highflyer/buoy is left in the water floating beside the vessel, the haul will end when the line is cleated. The vessel will likely set the same gear immediately and therefore not bring the gear completely onboard. Please add a haul level comment if this scenario is used to determine the Haul End timestamp.
- Note: If the highflyer goes out of view and you do not see it come onboard, the haul will end when the last piece of rope comes over the hauler. Please add a haul level comment if this scenario is used to determine the Haul End timestamp.
- If a gillnet string or a longline's mainline is broken/severed 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:

*HAUL BEGIN:* Do not record haul begin information for handline gears.

*HAUL END:* When all rods are stowed and fishing has ceased. Vessel has started to steam home and the deck is being cleaned.

- During the haul, the vessel can pick up gear and steam around in search of fish. All jigging activity should be accounted for as one (1) haul.
- 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.

## Haul Level Elements:

### Observed Y/N:

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 the lowest taxonomic level possible and appropriate weight estimation. 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=Y when the reviewer can adequately annotate discards within that haul. A haul is OBSERVED=N when discards cannot be accounted for or tracked. Issues that may lead to discards not being trackable include, but are not limited to, video gaps, camera or system failure, bulk discarding, released bag, and system image impairment issues. The appropriate EM, Fishing Operations, or Crew Specific event 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 events, see the Documenting Event Standards section.

If catch from multiple hauls is on deck (i.e. deckloading or Delayed Catch Processing occurs) and an event such as a Video Gap, System Failure, Bulk Discarding, etc. results in the inability to track catch, all hauls with catch on deck should be marked as OBSERVED=N. For example if catch from H2, H3, and H4 are all on deck and there is a 2 hour video gap, those 3 hauls would be OBSERVED=N.

The reviewer will review and annotate all video, hauls, and discards regardless of whether the haul will be OBS Y or N. The ability to track discards may be impacted but the video should still be reviewed. The reviewer should do their best at documenting discards when issues arise (improper catch handling, system image impairment issues, etc.).

## Delayed Catch Processing Y/N:

Vessels may elect to process their groundfish discards immediately as each animal is encountered; or process discards at the end of the haul after sorting is completed; or process discards together after several hauls. This last example is referred to as Delayed Catch Processing (DCP). Vessels are required to process discards upon changing statistical area, gear, or mesh within the trip, and prior to landing at a dock with the purpose of off-loading. A reviewer is still required to annotate each haul accordingly, if discard processing occurs or not.

If multiple hauls occur with no catch processing performed after each haul the reviewer will annotate all discards on the haul where they are processed. For example, if discards from haul's 1, 2, and 3 are kept and then processed at the end of haul 3, all the discards will be assigned to haul 3, DCP=Y for hauls 1 and 2 and DCP=N for haul 3. Reviewers will check DCP = Y for each haul when discards are not processed, irregardless if otherwise initiated by the captain (holds up a card with haul number) or kept separated. If discards are processed or none are seen being collected or stowed, the reviewer will check DCP=N for that haul.

A reviewer may see instances where vessels opt to deckload catch. Deckloading occurs when catch from multiple hauls is combined and sorted together. This is most commonly seen when the crew does not have time to finish sorting prior to catch from the next haul comes on board. If deckloading is observed reviewers will mark DCP = Y for the prior haul that is deckloaded and any discards will be attributed to the later haul. For example, if there is catch from hauls 4 and 5 combined in a checkerpen, the DCP field for H4 = Y and any discard annotations would be attributed to H5. DCP instructions will be included in VMPs for vessels that are electing to utilize this operational plan. If DCP is applied during a haul, the reviewer must confirm that groundfish discards were stored at the designated area on deck and retained within camera view.

Vessels may use a combination of DCP and non-DCP sampling on hauls within a trip. If the vessel is seen not retaining discards within a designated area or are stored out of view or the vessel is not retaining all groundfish discards throughout hauls documented as DCP, the reviewer should annotate a CSE-IMPROPER CATCH HANDLING event.

The processing of discards refers to the placing of fish on the measuring board appropriately as described in their VMP. Fish may still be discarded during the haul (Fish NK, drop-offs, etc.) and would not impact the DCP field being Y or N

This field will be used to indicate which haul discards were caught and if they were processed on that haul. When discards are post-processed by the Center for quota management, they will be parsed out to each haul where DCP=Y is annotated, similar to the cumulative sum estimation method at-sea observers use. A haul with DCP=N, will signify that discards were processed or that no discards were seen for that particular haul.

Table 3: Haul Level Fields in the EM JSON Submission:

<b>Name</b>	<b>Details/Instructions</b>	<b>Units/Format</b>	<b>Unknown Values</b>
haul_id	Ordinal number of the haul within the trip	integer	Cannot be null
gear_category	ACCSP gear category	3-digit code	Cannot be null, if unknown use '000'
start_haul_datetime	collected by review platform when haul start is annotated	YYYY-MM-DD HH:MM:SS in ISO8601 format	Can be NULL if not observed by reviewer or necessary for gear type
start_haul_lat	collected by review platform when haul start is annotated	latitude in decimal places, can be positive, negative, or 0	cannot be blank (but can = 0)
start_haul_lon	collected by review platform when haul start is annotated	longitude in decimal places, can be positive, negative or 0	cannot be blank (but can = 0)
end_haul_datetime	collected by review platform when haul end is annotated	YYYY-MM-DD HH:MM:SS in ISO8601 format	Can be NULL if not observed by reviewer
end_haul_lat	collected by review platform when haul end is annotated	latitude in decimal places, can be positive, negative, or 0	cannot be blank (but can = 0)
end_haul_lon	collected by review platform when haul end is annotated	longitude in decimal places, can be positive, negative or 0	cannot be blank (but can = 0)
reviewer_id	Official Observer ID assigned by NEFSC to the reviewer.	3 character string (letter, number, number)	Required when start_haul or end_haul are not null
delayed_catch_process	Did delayed catch processing occur	Array (Y/N)	Cannot be blank
observed	Was the haul fully observed by the reviewer (Y/N)	Array (Y/N)	Cannot be blank
comments	Notes on a haul such as anything unusual that occurred, etc.	text	Can be blank

## Catch Handling Protocols:

Fish caught in the Multispecies Groundfish fishery can fall into three categories: allocated species, regulated species and species that do not have sector allocations and are non-groundfish. See Table 4 for a list of the groundfish species and which categories these species belong to. The EM program will focus on the groundfish species listed. Reviewers should have access to the current VMP while reviewing trips and large deviations from the approved catch handling behavior should be noted in the review data.

As specified in the VMP, vessels participating in the Audit Model EM program 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). Vessel participants 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). Vessels enrolled in the audit model may utilize a cutting machine to increase efficiency when cleaning gadids kept for market. The area around cutting

machines may be a point of unintentional groundfish discarding if fish fall from the machine and go overboard. If this is observed during review, discard annotations should be made. Reviewers should check the VMP to determine if a cutting machine may be observed during a review.

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 their hands from the vicinity of the catch item and measuring strip. The reviewer should use their best

```
"discard_events":
  [{"haul_id": 1,
    "species_common_itis": "COD, ATLANTIC",
    "species_code_itis": 164712,
    "weight": 1.5,
    "catch_weight_uom": "LB",
    "length": null,
    "catch_length_uom": "CM",
    "count": 1,
    "weight_determined_by": "VISUAL",
    "discard_datetime": "2019-08-02T16:24:45.000Z",
    "discard_lat": 42.123456,
    "discard_lon": -67.123456,
    "disposition": "031",
    "grade_code": "01",
    "reviewer_id": "X99",
    "comments": "string"}]
```

Figure 3: Example of discard annotations in JSON format.



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 = NULL, ESTIMATION\_METHOD=VISUAL and enter in the visually estimated weight.

## Species Identification Standards:

While sorting catch, 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.

The reviewer should make every effort to identify a catch item to species level (Table 4).

When an identification cannot be identified to a species found in Table 4, the reviewer will make an annotation of FISH, NK, ESTIMATION\_METHOD= UNKNOWN. Examples of a FISH, NK include groundfish that cannot be identified to the species (right eye flounder or a gadid discarded), fish that could be a target species (i.e. a flounder of similar size to an ACE species but not a large animal) or fish that cannot be identified at all (i.e. a blur being tossed over, water drop over fish). Entries of identifiable non-groundfish (i.e. skates, dogfish, monkfish, crabs) should NOT be included as a FISH NK catch entry. Entries of FISH NK should be limited to any unidentifiable fish discards.

The reviewer should be able to eliminate and exclude species based on what is visible. The reviewer should take the time to make sure the fish cannot be identified and that any non-groundfish species have been ruled out.

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.

## Groundfish Hake Identification:

There are a handful of hake species encountered by fishermen participating in the Multispecies Groundfish Fishery. 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 filamented hakes (red, spotted, southern 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 count ALL filamented hake (i.e. white, red, and spotted hakes), regardless if a reviewer 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/SPOTD/SOUTHERN MIX will be made with the UNIT\_COUNT filled out with the total number of 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.

Only under rare circumstances should hake be identified to species. Typically this occurs on gillnet gear types and is isolated to the following circumstances: If a large hake that has been cleaned or processed (i.e. headed and gutted) or is of poor quality and is seen being discarded, an annotation with the species code HAKE, WHITE should be made. If a White Hake is discarded due to damage (predation, net damage, etc.) a discard with the disposition code 031- Poor Quality should be made. If a cleaned White Hake (i.e. headed and gutted) is discarded, an annotation with the grade code 024- Gutted, Heads off, tail on, belly flaps attached should be made. See the Documentation of Fish Disposition and Grade Code sections for more details.

### **Scorpionfish Identification:**

There are multiple red-colored scorpionfish species encountered by fishermen participating in the Multispecies Groundfish Fishery. These fish have similar colorations and morphological characteristics that make ID via video footage impossible. Because Acadian Redfish is a regulated groundfish species that cannot be differentiated in footage alone from other red-colored, bass-shaped fish (Blackbelly Rosefish, and other Scorpionfishes), clearly documenting all of these individuals is important for generating accurate estimates of the catch of Acadian Redfish. All whole red-colored scorpionfish that are discarded will have a catch annotation using the **SCORPIONFISH, NK** species code. Vessels are required to process all scorpionfish per normal groundfish discard protocols (i.e. placement on the measuring strip for length collection and subsampling when/if applicable) and discard these fish at the groundfish discard control point outlined in the VMP.

### **Species Verification Program:**

Accurate species identification, including proper documentation of groundfish, is essential for evaluating catch data. Species verification of EM reviewers will be evaluated by FMRD using a quarterly quiz. Reviewers will be required to take and pass quizzes at the beginning of each quarter via the internet or meet additional criteria outlined below in order to participate in EM video review. Quizzes will include images of all 13 federally managed groundfish species (Table 4) and also include some other similar non-groundfish species. EM reviewers will be required to identify species and in some cases list characteristics necessary to properly identify the species in the image. These assessments are used to verify that EM reviewers can consistently identify groundfish species according to the protocols used in the EM review program and to correctly discriminate groundfish from other commonly encountered non-groundfish species. EM reviewers must pass achieve a minimum passing score of approximately 85%, determined by the formula: (number of questions \* 0.85) rounded down to the nearest whole number. Quiz results are made available to EM reviewers and EM provider staff via the Fishery Monitoring Portal.

Table 4: Federally managed groundfish species of the northeast multispecies complex.

<b>Groundfish Species of the Northeast</b>		
<i>Common name</i>	<i>'Allocated'</i>	<i>'Regulated'</i>
Atlantic cod	Yes	Yes
Haddock	Yes	Yes
Pollock	Yes	Yes
White hake	Yes	Yes
Atlantic halibut <sup>†</sup>	Yes	Yes
Winter flounder	Yes	Yes
American plaice flounder	Yes	Yes
Yellowtail flounder	Yes	Yes
Acadian Redfish	Yes	Yes
Witch Flounder	Yes	Yes
Ocean pout*	No	Yes
Windowpane flounder*	No	Yes
Atlantic wolffish*	No	Yes

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

## 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 at sea human on board observers use to describe why fish are discarded. The disposition code will be entered in for each catch item under the DISPOSITION\_CODE field of the EM Detail. A unique disposition code must be applied to each catch entry. The reviewer should make their own best judgment as to which disposition code is best suited for the situation. The reviewer should never assume the disposition of a fish. For example, if a large groundfish is placed on the strip it should not automatically be coded as damaged or a LUMF. Check for signs of damage or indications by the captain that the fish is of less quality. The disposition codes can be found in Table 5.

Table 5: List of Fish Disposition Codes and Description

Code	Description
031	POOR QUALITY, REASON NOT SPECIFIED
099	DISCARDED, OTHER
900	UNKNOWN KEPT OR DISCARDED
000	DISCARDED, UNKNOWN REASON

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\_CODE 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.

Any catch item that does not show visible damage and is not kept by the vessel and is discarded will have a DISPOSITION\_CODE 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.

For catch items that the reviewer cannot determine the end status (kept or discarded) the DISPOSITION\_CODE 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.

For catch items that the reviewer can confirm as being discarded (i.e. seen going overboard and into the water), but cannot confirm the condition (i.e. whole vs. damaged), the DISPOSITION\_CODE should be recorded as 000-DISCARDED, UNKNOWN REASON. There may be events such as but not limited to Cameras Not Maintained, Weather Induced Poor Visibility, Improper Catch Handling, etc. noted in the data if this code is used. A piece count should be applied to the catch item(s) and a visual estimate applied when applicable. For example, if the cameras covering the measuring strip are too dirty to determine the condition of the fish, but the fish is seen being discarded in another view, that fish would receive the 000 code.

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 fish do not require a discard annotation. These fish are considered Not Brought On Board and are not included in catch accounting. 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). Additionally, if fish from a prior trip are seen falling from the net during the set of the first haul no annotations are required.

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 should be documented as catch items with a DISPOSITION\_CODE = 099- DISCARDED, OTHER applied. These fish have been seen by the captain and therefore be included in the eVTR. Depending on the situation, a Crew Event for Improper Catch Handling may be needed. See Event Documentation section for CSE-ICH examples.

## Protocols for Obtaining Lengths:

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 are installed on deck and the view from at least one camera is focused on this 'measuring station'. 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 current observer program's measuring protocols.

Reviewers will estimate a length in whole centimeters *each* time a regulated groundfish is placed correctly on the measuring strip and discarded on an EM multi-species trip. Proper placement on the measuring strip means the fish is straight, nose is flush to the stopper or hash mark, and no hands are under the fish. If groundfish are not placed correctly on the measuring strip (i.e. crooked, not flat, tail to stopper, etc.) a length should not be collected and another estimation method should be used. 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\_CODE= 900 UNKNOWN KEPT OR DISCARDED.

Atlantic wolffish are exempted from length measurements as they can pose a safety risk to measure, and can be discarded without being placed on the strip. Make an annotation of WOLFFISH, ATLANTIC, LENGTH = NULL, DISPOSITION=099, ESTIMATION\_METHOD=VISUAL and enter in the visual weight. A length measurement can be collected for Atlantic wolffish that are placed on the measuring board.

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 6. 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. While annotating catch data, reviewers should inspect each animal to ensure that it is whole and intact. **Lengths should not be collected for discards that cannot be identified (i.e. Fish, NK), or from groundfish that are missing body parts, have been bled, reveal signs of significant predation, gear damage, or decomposition or any fish assigned a grade code other than 01-ROUND.**

## Groundfish Flounder Catch Handling and Length Collection:

In order to collect accurate data on groundfish flounder discards (American Plaice Flounder, Yellowtail Flounder, Winter Flounder, Witch Flounder, and Windowpane Flounder) VMP's outline specific handling guidance. Vessels are required to present both the blind and eyed sides displayed hands free to allow for proper identification to species. This can be either by presenting both sides of the flounder on the measuring strip, or showing one side during measuring and the other when the fish is on the conveyor, bin, tote, etc. that the measuring strip is kept on. If processing groundfish flounders by species, only the first 5 individuals of each species need to have both sides presented. If measuring mixed flounders, they are required to

present both sides of each fish for all individuals. If this does not occur, reviewers should note a CSE- Improper Catch Handling.

The dorsal side up view should be used to collect a length when feasible. In cases where both sides are presented, on the measuring strip (i.e. nose to stopper if applicable, fish flat, etc.) the dorsal side up view should be used to collect a length. If the ventral side up view is the only usable length, reviewers should report that length.

Table 6: Length types for groundfish species

SPECIES	LENGTH TYPE	SPECIES	LENGTH TYPE
<i>COD, ATLANTIC</i>	<i>FL</i>	<i>HADDOCK</i>	<i>FL</i>
FLOUNDER, AM. PLAICE	TL	HAKE- RED, WHITE, SPOTTED, SOUTHERN MIX	TL
FLOUNDER, WINDOWPANE	TL	HALIBUT, ATLANTIC	TL
FLOUNDER, WINTER	TL	OCEAN POUT	TL
FLOUNDER, WITCH	TL	<i>POLLOCK</i>	<i>FL</i>
FLOUNDER, YELLOWTAIL	TL	<i>SCORPIONFISH NK</i>	<i>FL</i>
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
- Fish not placed nose to stopper of measuring strip

## Grade Code and Description:

Catch annotations will be given a grade code or market category that describes what the weight represents that is similar to the ASM/NEFOP programs. This is to ensure the appropriate weight conversion is applied and the correct weight is provided to end users and the processed condition of the fish. This flag will be annotated for each catch item. The GRADE\_CODE for EM will consist of three codes/descriptions. Fish that are intact or not altered will have a GRADE\_CODE=01 (ROUND). Fish marked as ROUND include any fish with a length measurement (ESTIMATION\_METHOD=LENGTH), any flounder catch annotation, any fish that has been bled but not gutted, and any whole fish seen being discarded. Fish that are gutted, but have their heads on, will have the GRADE\_CODE= 23 (GUTTED, HEAD ON, TAIL ON) and include the gadid species and upgraded Atl. Halibut. Fish that are deemed to be of poor quality (DISPOSITON\_CODE=031 POOR QUALITY) can have either (01) or (23) depending on if the fish is processed prior to the determination of its quality by the crew. However, reviewers should keep in mind that not all processed fish will be considered poor quality. The GRADE\_CODE =24 (GUTTED, HEADS OFF, TAIL ON, BELLY FLAPS ATTACHED) applies *only* to White Hake. Catch entries with an ESTIMATION\_METHOD=VISUAL may have either three codes applied, depending on species.

Any visual weight should represent what is seen by the reviewer and not what it would be whole. If an altered fish is seen being discarded, the appropriate market code should be applied. Common signs a fish has been processed is if it comes from the kept catch pile, you see them process it and then discard it, the fish is missing its head (White Hake are processed in a manner where their heads are removed but the filaments are still visible), or a clean slit along the belly is seen on the fish.



## Determining Species Weights and Sub-sampling Methods:

Discarded species weights will be determined either by length-weight conversion (LENGTH), visual estimates (VISUAL), tally count sub-sampling (TALLY), or receive no weight (UNKNOWN).

If a vessel is seen using another estimation method besides what is described in this document, a note should be made.

### Length:

Fish will be placed on the designated measuring strip and have a length measurement collected by the reviewer. The weight will be generated by the agency after the review is submitted.

### Visual Estimate:

Fish that are not placed on the measuring strip 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 or intact. 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. If the UNIT\_COUNT field >1 the reviewer should extrapolate the weight out to the total number of fish in the discard entry (ex: if the visual estimate for 4 fish is 0.4 lbs each, enter a weight of 1.6 lbs ( $0.4 \times 4 = 1.6$ )). Please reference the [Length/Weight Conversion Guide](#) located on the NEMIS website under the “Reviewer Guidance Doc” tab.

### Unknown:

Fish that cannot be identified and are subsequently assigned Fish, NK do not receive a weight. Since Fish, NK entries are not parsed out to further denominations no weights are needed. Reviewers should enter the estimation method for these fish as UNKNOWN. In addition to entering UNKNOWN as the estimation method, there should be no lengths associated with unidentifiable fish.

### 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. Reviewers need to understand these protocols so they can interpret what captains are doing and tailor their data collection to match the captain’s preferred handling methods. 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 (See pages 32-24).

ESTIMATION\_METHOD=TALLY should be applied *only* when 20 or more length measurements are obtained per species per processing unit (i.e. haul or DCP unit). When TALLY is used as the estimation method reviewers will only annotate a unit count and leave the weight blank. The weight entered should be null or blank **but not zero**. 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 20 or more lengths are obtained and the captain continues measuring and lengths could not be determined, that portion should be added to the total tally count for the sub-sampled species with an ESTIMATION\_METHOD=TALLY.

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 ESTIMATION\_METHOD=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 ESTIMATION\_METHOD=VISUAL and a visual weight entered.

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 UNIT\_COUNT=78, ESTIMATION\_METHOD=TALLY, wt left null.

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 UNIT\_COUNT=59, ESTIMATION\_METHOD=VISUAL. 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 Specific Event- Improper Catch Handling 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 Catch 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 UNIT\_COUNT filled out with the number tallied and ESTIMATION\_METHOD=TALLY. If **non-hake** groundfish are discarded during sorting and the ESTIMATION\_METHOD = TALLY please annotate a Crew Specific Event- Improper Catch Handling as all groundfish should be passed under the measuring camera, even when subsampling occurs.

### **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 and they should NOT be considered as Not Brought On Board and therefore included in the catch records. 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. Fish that fall from the hook and there is no attempt to retrieve or the captain did not unhook the fish, these do not require catch entries. 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 ESTIMATION\_METHOD=VISUAL or TALLY.

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 ESTIMATION\_METHOD=VISUAL.

### **Hake:**

During the haul, the captain/crew will randomly collect 20 individuals from the combined southern/spotted/red/white hake species group (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/SPOTD/SOUTHERN MIX](#). The captain and crew are allowed to discard dorsal-filamented hake as long as  $\geq 20$  are measured per sampling unit and 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/SPOTD/SOUTHERN MIX](#) with the UNIT\_COUNT filled out with the numbered counted and ESTIMATION\_METHOD=TALLY or VISUAL.

## 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. There are five circumstances when a reviewer can group multiple discards of one species classification into a single catch entry (UNIT\_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 and a count can be determined, a single catch entry that represents identified species will be submitted with a total count entered in the UNIT\_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. Note: if the contents cannot be ID'd **and** quantified, a reviewer should annotate a CSE- Bulk Discarding.
2. 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.
3. 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.
4. 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 CSE- Improper Catch Handling applied if VMP protocols are not followed (ex: if <20 hake are discarded on a haul, if no attempt to retain and measure hake is made on a haul, or if >20 hake are discarded but <20 were measured).
5. If >1 groundfish of the same species is discarded at the same time (i.e. washed overboard, discarded over the conveyor, etc.) reviewers can create a discard annotation with the count seen discarded and appropriate weight of the fish.

Table 7: Elements of Catch Entries in the EM JSON Submission

Name	Details/Instructions	Units/Format	Unknown Values
haul_id	sequential by order hauled	integer	can be null for discards that occur outside the haul
species_code_itis	either collected by reviewer or transcribed by software when submitted	6-digit code	cannot be unknown, all discards receive an ITIS code

weight	The weight of the discard	integer	Can be null, Cannot be 0, Can be < 1
catch_weight_uom	The unit associated with the entry	text (LB)	Always LB
length	The length measurement of a fish placed on the provider's measuring strip	integer	Cannot be null or 0
catch_length_uom	The unit associated with the entry	text ( <b>cm</b> , in, etc.)	Always CM
count	1 is most common but there are instances >1 discard per entry is observed	≥1	cannot be unknown or 0
weight_determined_by	The estimation method used by the reviewer to obtain weight	text	Cannot be blank
grade_code	ACCSP grade code indicating whether the weight represents round or dressed.	text	Cannot be unknown
discard_datetime	collected by review platform when annotation is created	YYYY-MM-DD HH:MM:SS in ISO8601 format	cannot be unknown
discard_lat	collected by review platform when annotation is created	latitude in decimal places, can be positive, negative, or 0	cannot be blank (but can = 0)
discard_long	collected by review platform when annotation is created	longitude in decimal places, can be positive, negative or 0	cannot be blank (but can = 0)
disposition	what was the fate of the discard (ex: not brought on board, damaged, etc.)	3-digit code	Cannot be null, if unknown use code '900'
reviewer_id	observer/reviewer ID collected by review platform when annotation is created	3 character string (letter, number, number)	cannot be blank
comments	notes on a discard such as ID characteristics, reason for Fish NK, etc.	text	Can be null, requires comments if Fish NK

## 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 three 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. Overlap may occur for certain duration events that are documented at the haul level. Location information (collected in the timestamp) and detailed comments will be included with the event entry.

```
"other_events": {
  "event_category": "FISHING OPERATIONS",
  "event_code": "BAG",
  "event_duration": "PT0D4H10M20S",
  "haul_id": 1,
  "event_datetime": "2019-08-02T16:24:45.000Z",
  "event_lat": 42.123456,
  "event_lon": -67.123456,
  "reviewer_id": "X99",
  "comments": "string"
}
```

Figure 4: Example of an Event annotation in JSON format.

- Fishing Operations (Table 9)
- Crew Specific (Table 10)
- EM System Specific (Table 11)

Events are processed to document a variety of specific issues or concerns and will be used to 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 assist in rapidly responding to system malfunctions or improve catch handling techniques. See Tables 9-11 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.

Table 8: Elements of “Other Events” in the EM JSON Submission

Name	Details/Instructions	Units/Format	Unknown Values
event_code	event code will be translated from review platform (ex: gear conflict = GEARCON)	text code	cannot be unknown
event_duration	how long an event spanned, difference between event start and end times	string (PT0D4H10M20S) in ISO8601	can be blank, documented as PT0S for point events
haul_num	sequential haul number	number	only filled out if event occurs during a haul; can be null
event_datetime	either timestamp of point event, or start of duration event	YYYY:MM:DD HH:MM:SS in ISO8601	cannot be blank

event_lat	either latitude of point event, or start of duration event	latitude in decimal places, can be positive, negative, or 0	cannot be blank (but can = 0)
event_lon	either longitude of point event, or start of duration event	longitude in decimal places, can be positive, negative or 0	cannot be blank (but can = 0)
reviewer_id	observer/reviewer ID collected by review platform when an event is created	3 character string (letter, number, number)	cannot be blank
comments	summary or details of the event, cameras impacted, etc.	text	cannot be blank, all events require comments

## Fishing Operations Events:

Fishing Operations events are related to the operations on a fishing vessel. These are outside of the crew's control and have the potential to increase review time and make discards hard to track. FOE's can be related to released bags of catch, damage to the system by the gear or waves, poor lighting or sun glare, and other weather related issues. Reviewers will annotate all FOE's as a duration based on the descriptor and provide as much information as the reviewing software allows.

Table 9: Fishing Operations Event Descriptors

RELEASED BAG	WEATHER
POOR LIGHTING OR SUN GLARE	OPERATIONS INDUCED CAMERA DAMAGE
OTHER OPERATIONS ISSUES	

**Released Bag:** In the trawl fishery, sometimes the contents of a tow are released in the water or the catch is not released on deck or sorted. This can be intentional or unintentional. During these types of events, it is hard to quantify the catch released. This event is to document any discarding of unsorted catch not brought on board or released on deck. Some things to look for on video are, but not limited to, crew rushing to the stern/net reel, catch seen in the water as the net is brought up, or the crew cuts the net and lets catch escape, or the net is not dumped but let back out in the water to be cleared. This is a duration event. Comments should include all observations regarding potential causes, such as sustained gear damage, mechanical failure, or potential safety hazards and the species composition of released catch that was not brought on deck and handled by the crew. Since the volume or amount of catch that is lost cannot be quantified and/or occurs out of camera view, 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 during the event. If discards are seen outside of this event, they should be annotated appropriately.

Examples of Released Bag events:

1. If catch is seen spilling into the water during haulback or while bringing the net on board.
2. If the captain or crew are observed cutting net meshes while preparing to bring the net on board and catch is observed spilling from the net.
3. If after bringing the net on board the net is either cut or the codend is opened and catch is released overboard

Examples of when **not** to apply a Released Bag event:

1. If the net comes up with visible damage, but no catch is lost.
2. Hauls where there is very little or no catch landed, but the codend is closed when the net is brought on board.

Contents of the net are shaken down and a pile of fish can be seen inside the codend and then the codend is then released into the water without the catch being processed or dumped on deck. This would be noted as a Crew Specific Event- Bulk Discarding.

**Weather:** During fishing operations, reviewers will note when environmental conditions such as rough seas, fog, high winds, or precipitation impact review at the haul level. Scenarios where a video review may be impacted include: the inability to track fish, identify discards to species, collect lengths, visually estimate weights, or collect haul level elements. Examples of when to document this event when on deck operations are impacted include: when rough seas result in lost catch, difficulty tracking catch, or impact the vessels ability to haul or retrieve gear. If the volume of catch lost due to weather cannot be determined, no discard annotation is required and the haul will be marked as OBSERVED = N. In the instance weather is impacting the cameras, more than one is usually affected. This event does not include when the lens or dome cover is foggy or hazy due to damage. Video review that is impacted by a damaged camera or dome cover would fall under EMES-System Image Impairment. If the weather resolves during the trip and the cameras still have water on them (i.e. not cleaned after weather passed), a Crew Specific Event- Cameras Not Maintained should be annotated. This event has the potential to make a haul OBSERVED=N, depending on the scenario.

**Poor Lighting or Sun Glare:** During fishing activity (i.e. hauling, sorting, processing, or measuring catch) if sun glare or the deck lighting impacts the review, the reviewer will annotate this event. This event should be made when any lighting or shadows cause issues, including on the measuring strip. This is a duration event every time the review is impacted. The event starts at the first sign of glare or poor light and ends when the glare or poor lighting is resolved or the haul ends, whichever occurs last. Detailed comments should include what is impacted by the glare or low-light and what cameras were impacted. This event may lead to a haul being reported as OBSERVED=N if discards cannot be adequately tracked due to the lighting, glare, or shadow issues.

**Glare:** Reviewers will document glare whenever video of fishing operations is impeded by the presence of sharp-bright deck light or sun glare. This should be included when the primary camera(s) used by the reviewer are affected by glare or if glare directly impacts species identification or catch handling.



Note: In the trawl fishery the primary camera changes throughout the haul. Examples 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 can include instances where the cameras go into night mode, or low-light mode (image recording in grayscale or black and white) while catch is on deck being processed and/or sorted. Reviewers should refer to the VMP for additional information on when/if the system may record in greyscale.

**Operations Induced Camera Damage:** If a camera is damaged or destroyed as a result of fishing operations (ex: trawl doors, gear, booms, severe weather, etc. damaged a camera) this event should be annotated. This should be a duration event starting at the time in which the camera is damaged and extending to the end of the trip or when the issue is resolved. *The event will be all encompassing for the affected camera (ex: if video gaps are occurring as a result of camera damage, an EME-Video Gaps does not need to be annotated). If EM system issues occur on other cameras in the system following the camera damage, the appropriate EM event should be annotated.* This may lead to one or more hauls being marked as OBSERVED = N if overlapping views are not sufficient to capture activity and/or track fish. Additionally, if the camera damage results in the inability to confirm fishing effort or hauls the ALL\_EFFORT\_CONFIRMED should be NO. This event does not include instances where a camera appears out of focus due to pitting or scratches on the lens, that would be an EME-System Image Impairment event. This also does not include instances of camera/system tampering. If system tampering is observed during review, an Incident Report must be submitted to the Fishery Monitoring Portal.

**Other Operation Issues:** This descriptor is designated for operational events that do not align with event descriptions listed in the Fishing Operations Event category. Events that are inputted as 'Other' can be either a duration or point event. A reviewer should document any unusual event that disrupts operations and/or impacts review. Detailed comments should be provided to help explain the situation.

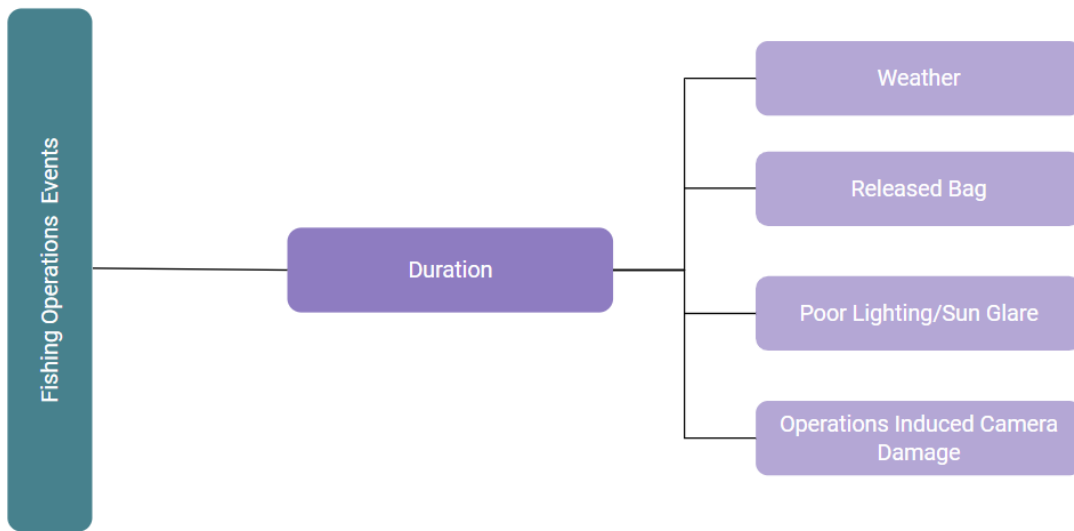


Figure 5: Chart depicting point vs. duration Fishing Operations Events

### Crew Specific Events:

In order to have a functional EM program captains must follow their VMP. 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. 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 or as a singular-point event.

Table 10: Crew Specific Event Descriptors

CAMERA SYSTEM NOT MAINTAINED	BULK DISCARDING
IMPROPER CATCH HANDLING	OTHER CREW ISSUES

**Camera System Not Maintained:** Cameras must be monitored by vessel personnel throughout a trip. If any camera has water spots, fish slime, or anything on the lens and the reviewer's ability to ID discards to species, collect lengths, or track activity on deck is directly impacted, an entry should be made. This is a duration event documented at the haul level when review is first impacted by the 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 or there is no longer catch processing occurring on deck. This event may lead to a haul being reported as OBSERVED=N if discards cannot be adequately tracked due to water spots, slime, debris, etc. If

a haul is marked as unobserved due to footage being unwatchable after annotating this event, an Incident Report should also be submitted to the Fishery Monitoring Portal.

Note: If camera(s) are impacted by weather, a CSE-CAMERA SYSTEM NOT MAINTAINED is not necessary. The FOE-WEATHER should be annotated instead.

**Improper Catch Handling:** Catch items (allocated and non-allocated species) that are not handled in accordance with the catch handling requirements outlined in the 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). This event is not specific to the vessel's crew and applies if a human observer does not follow catch handling requirements as well (ex: discarding at non-control points). These events can be annotated as either a point or duration, depending on the frequency. If Improper Catch Handling is documented 5 or fewer times during a haul the reviewer will use point events. If it occurs a sixth time the reviewer will begin a duration event until either the issue is resolved, the haul ends, or all discards are processed. ***In the instance when a duration event is annotated the prior point events do not need to be deleted.*** Any examples of ICH listed below will count towards the 5 point event threshold.

Examples of when to apply a CSE - Improper Catch Handling. Please note this is not an exhaustive list. Reviewers should refer to the VMP to familiarize themselves with handling practices.

1. Discarding poor quality or damaged fish without proper placement on measuring strip
2. Allocated or regulated groundfish discarded down the conveyor without measuring, or picked out of checker-pen, regardless of estimation method used, or disposition code applied.
3. Any discarding (groundfish, Fish NK, or non-groundfish) that occurs either out of camera view or not at a designated control point described in their VMP
4. If the vessel utilizes a measuring strip with a stopper and fish are not placed nose first to the stopper as is required in the VMP.
5. If a length *cannot* be collected or identification *cannot* be made due to part of the fish (nose and/or tail) being blocked by any part of the body or an object.
6. The measuring strip is taken out of camera view, or is not positioned in the correct location as shown in the VMP 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 species for measurement is made (i.e. all are discarded during sorting), regardless of quantity.
9. If less than 20 fish of a species are measured and a tally by the vessel is performed
10. If groundfish flounders are sorted to species and the first 5 flounders of each species do not have both the blind and eyed sides presented to the camera hands free, or if groundfish flounders are not sorted by species and all flounders do not have the blind and eyed side presented to the camera hands free.
11. Fish that are left unattended on deck after catch sorting has concluded and are eaten by seagulls or washed overboard.

#### Examples of when NOT to apply a CSE - Improper Catch Handling

1. For longline vessels when poor quality fish are unhooked.
2. For longline vessels during sub-sampling when intact fish are unhooked.
3. 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.
4. Fish that are classified as Not Brought On Board
5. Fish the captain attempts to gaff but are not retained.
6. Fish placed on the measuring strip that an identification *and* length are collected on the measuring strip, but a hand remains on the fish.

**Bulk Discarding:** Any discarding action where an accurate count of fish cannot be obtained. This includes when a container (tote, basket, etc.) of fish is dumped overboard or when catch that is piled or layered on deck is swept or shoveled overboard during video review. The contents cannot be confirmed as groundfish or non-groundfish. The distinction between a pile and single layer should be made. Fish discarded in containers or in piles cannot be observed, counted, or properly accounted for. Fish discarded in a single layer that can be tracked and accurately counted, would not constitute an event. This is a duration event that should span the entire time discarding is occurring. Detailed comments within the event should fully describe the situation. 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 discarded during this event. If catch from multiple hauls is on deck during a bulk discarding event (i.e. catch is deckloaded), all hauls with catch on deck will be marked OBSERVED = N. If discards are seen outside of this event, they should be annotated appropriately. 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.

#### 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 of the net are shaken down and a pile of fish can be seen inside the codend and then the codend is then released into the water without the catch being processed or dumped on deck.
3. 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.
4. Tote/container of unknown fish is dumped over.
5. When attempting to tally groundfish and fish are discarded in a way that does not allow for a count or ID of all fish (ex: dumping baskets overboard or down a chute, discarding clumps or piles down a conveyor or chute, etc.)

#### 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.
- 6. Tote/container of confirmed groundfish is discarded and both ID's and counts can be determined.

**Other Crew Issues:** 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.

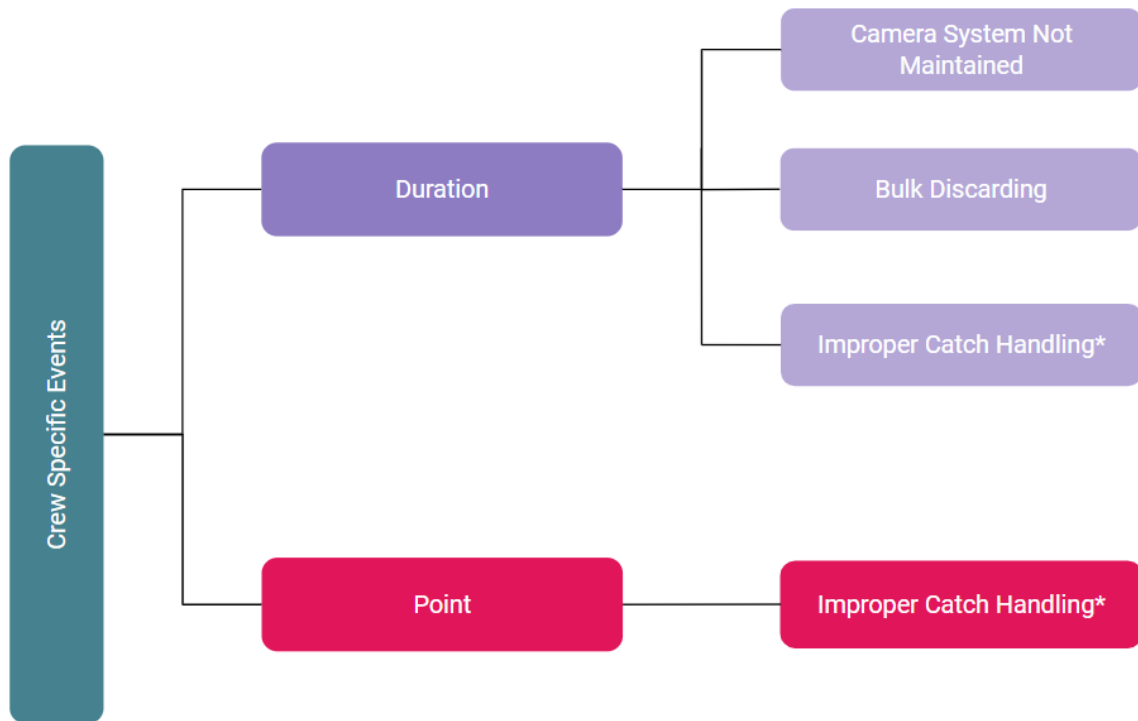


Figure 6: Chart depicting point vs. duration Crew Specific Events  
 \* Improper Catch Handling can be a point or duration depending on frequency

## EM Events:

EM 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 Events include when there are video or sensor gaps, camera(s) or system failure, when the EM system is not activated prior to departure, and out of sync cameras. EM events can be reported as either a duration event or a singular point event. Include any comments that may help to explain the situation. EM Events may impact the ALL Effort Confirmed and Observed fields. For further guidance on when to annotate ALL Effort Confirmed as Y or N please refer to the definition and examples on page 6 or individual event definitions.

Table 11: EM Specific Event Descriptors

SENSOR GAPS	VIDEO GAPS	CAMERA FAILURE
SYSTEM FAILURE	CAMERAS OUT OF SYNC	CAMERAS OUT OF POSITION
SYSTEM NOT ACTIVATED AT DOCK	SYSTEM IMAGE IMPAIRMENT	OTHER SYSTEM ISSUES

**Sensor Gaps:** If at any point during a trip, the GPS or other sensors are not functioning according to the specifications in the VMP, an event should be created. The reviewer should know how often the system pings or collects GPS (i.e. once every  $x$  seconds) and what it looks like in the software to know when a gap occurs. The event should encompass the entire time the sensors are not functioning. Comments should be made describing what type of sensor is not working and the impact to the review, if any. The ALL Effort Confirmed field should be marked as Y, as effort is confirmed via video.

**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 the video is out or missing. Comments should be made describing any impact to the review. Hauls that could not be successfully observed should be recorded as OBSERVED = N. If a large or prolonged video gap occurs, do not assume all hauls were seen (see guidance below). **Video Gaps refer to when the video goes out or cameras freeze BUT comes back on or resumes playing at some point in the trip. If video remains out, document it as a Camera Failure.**

### Guidance for Prolonged System Issues:

In the event that there is a camera outage (i.e. video gap or camera failure) and one or more hauls cannot be adequately reviewed or identified, reviewers shall follow the protocols:

If there is an EM camera malfunction and video of either a haul element(s) and/or catch processing cannot be viewed, the reviewer **should not** assume how many hauls occurred during the malfunction. Reviewers should continue haul documentation with the next sequential haul number. For example, if footage goes out during H9 sorting for 6 hours, the next haul that should be documented by the reviewer will be

H10, regardless if other hauls occurred. This may result in one or both of the start and end haul times to be NULL for the impacted hauls. If video resumes, and catch sorting for the next sequential haul has not started (i.e. trawl gear is deployed/in the water when footage resumes) the haul can be marked OBS = Y. However, if there is **any** footage of catch processing missing for the haul where the malfunction began, ended, or both, the haul(s) shall be marked OBS = N.

Examples of when a haul would be OBS = N include: if footage is missing during fixed gear hauls and catch processing is ongoing, or for mobile gear if footage ends or resumes while the crew is sorting, processing, or gutting catch, the net has been emptied into a checkerpen and catch is on deck, or during the measuring period. Any discards that are documented following the gap shall be attributed to the next sequential haul. In addition, reviewers shall enter the appropriate EM event (i.e. Video Gap, Camera Failure, etc.) and include detailed comments on what occurred.

**Camera Failure:** If video from one (1), multiple, or all cameras stop recording and no image is seen and persists for the duration of the trip an entry will be made. If the cameras come back on and video resumes, document the event as a Video Gap. This event signifies that the camera was lost for the duration of the trip. This is a point event and will be documented when the camera(s) first fails. If all cameras **and** the gps/sensors stop working and remain out for the rest of a trip, reviewers should document a System Failure event. The comments should include which camera(s) failed and what was seen when the cameras went out. If the reviewer could not successfully observe the haul, the haul will be recorded as OBSERVED = N.

**System Failure:** If the EM system (all cameras and all sensors) fails and stops operating and does not resume function, an event should be annotated. This event should be made any time the system fails, regardless of when it occurs within the trip and what is happening on deck. This includes, but is not limited to, instances when the system fails mid-trip, and when the system fails prior to landing at the dock. This is a point event made when the system fails. Detailed comments should include what was occurring when the system failed and any impacts to the data. Any haul impacted by the failure should be marked OBSERVED = N. If this event is annotated and footage of fishing activity is lost (i.e. footage ends when gear is in the water or being hauled, catch sorting is occurring, etc.), an Incident Report should be submitted on the Fishery Monitoring Portal.

**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 and catch items are harder to track. This is a duration event and should encompass the whole time the cameras are not synced to each other.

**Cameras Out of Position:** If at any point during the trip, one or more cameras are observed 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. This is a duration event and should encompass the whole time the cameras are not positioned correctly. The event may span several hauls, the entire trip, or multiple trips 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. If this event is annotated and data loss is observed to occur due to the event (i.e. the cameras turned on and the first footage is of the vessel in the middle of fishing effort), an Incident Report should also be submitted to the Fishery Monitoring Portal. 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. If all fishing activity could not be confirmed, the ALL Effort Confirmed field should be marked as N (i.e. if video begins with active hauling). If the vessel is just leaving the harbor or no gear has been deployed, the ALL Effort Confirmed=Y.

**System Image Impairment:** This refers to when the image has any issues that are caused by the EM system. This includes out of focus images/cameras, melting/running images, pixelated images, or any decrease in image quality. Damaged dome covers also fall under this event. See below for details on what impairs an image (Out of Focus, Melting/Running, Pixelization, and Recording at a Lower Frame Rate). This event should be annotated regardless of impact to review or data collection.

**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 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.

Not an example of 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

**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.

**Recording at a Lower Frame Rate:** This occurs when the image appears choppy or fragmented, but time is elapsing as normal. This can happen due to low light conditions, camera programming, or an unknown reason. Reviewers should reference the frame rate(s) listed in the VMP to help determine when this is occurring.

**Other System Issues:** 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.

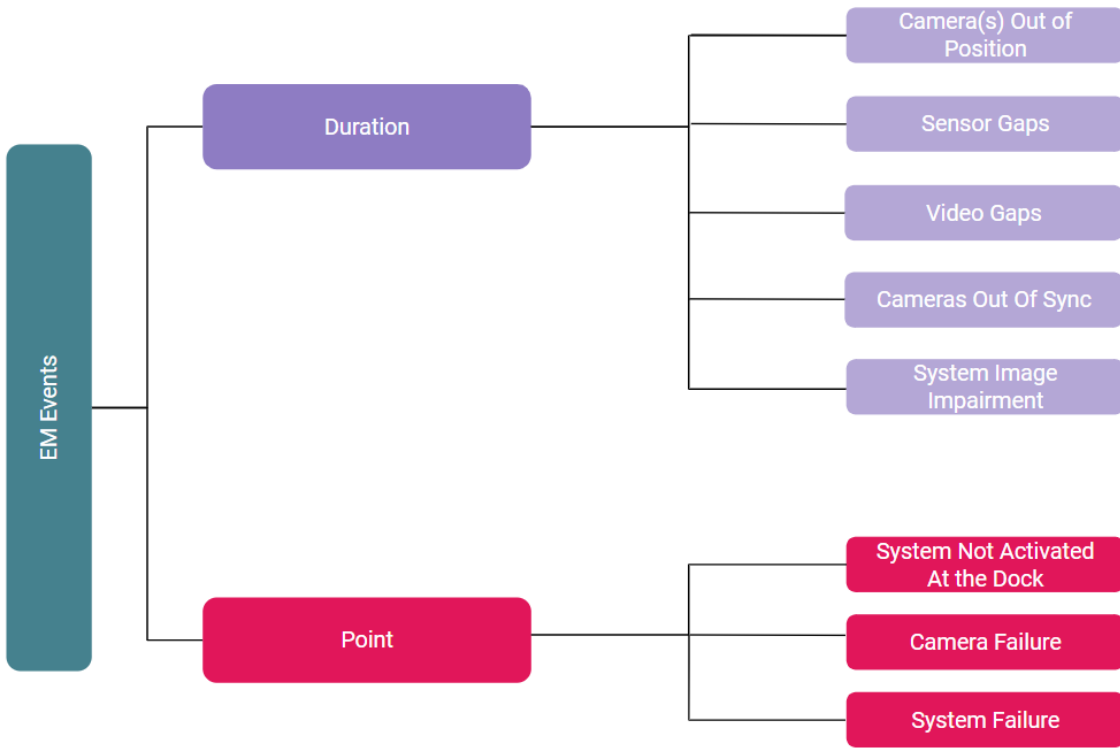


Figure 7: Chart depicting point vs. duration EM Specific Events

## Submitting Reviews without Data:

In some instances where an EM trip review is not possible, such as EM system failure or loss of a video data for an entire trip, the API (application programming interface) will accept an abbreviated JSON submission that marks the trip as submitted.

In addition to the elements `vessel_permit_number` and `evtr_num`, the following elements are required: `all_effort_confirmed` (must be "N"), and `comments` (an explanation for the abbreviated review must be noted). Please note the `reviewer_id` or name of the individual submitting the JSON.

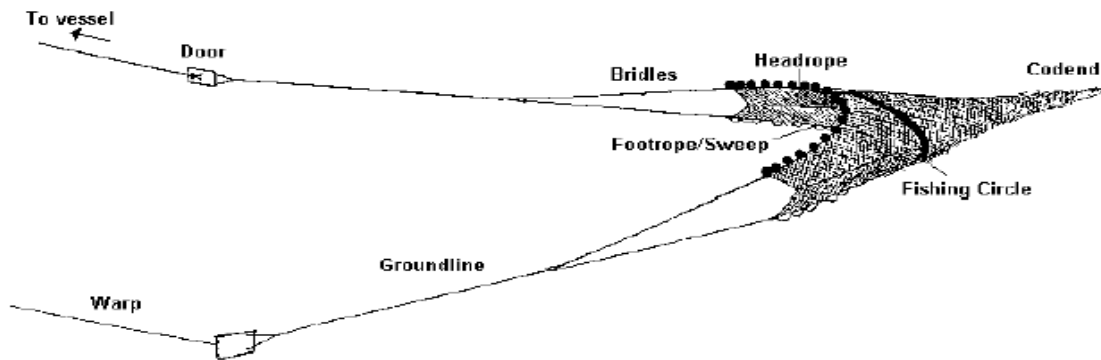
```
{
  "vessel_permit_number": 222222,
  "vessel_name": "Vessel B",
  "evtr_num": 2222220062901,
  "all_effort_confirmed": "N",
  "comments": "No video on HDD; pre-trip check completed,
  HDD appears to not have been seated properly to record; tech
  visit scheduled; submitted by X99."
}
```

Figure 8: Example of a trip with no data in EM JSON format

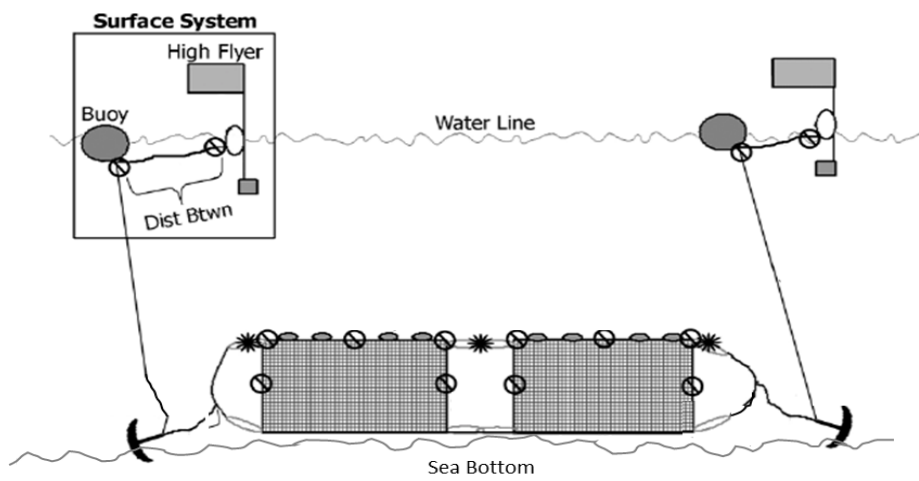
If there was a system malfunction an Issue should be entered in VMAN. If there was no hard drive data received for the trip an Incident Report should be filed.

# Appendix A: General Gear Category Diagrams

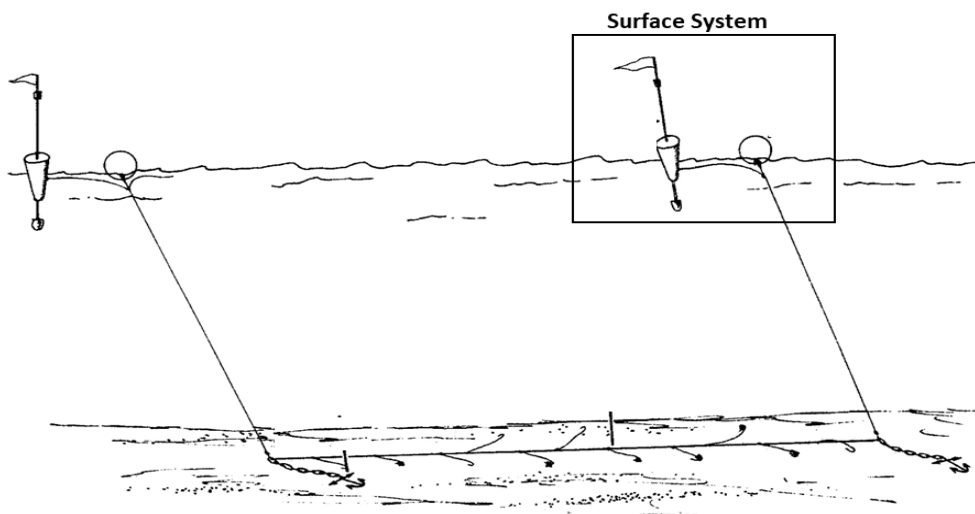
## Bottom Trawl:



## Gillnet:

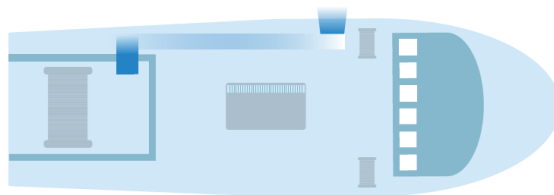


## Longline:

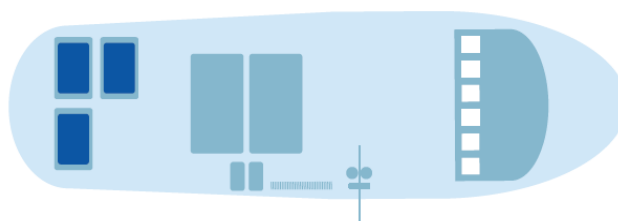


## Appendix B: Generic schematics of vessel layout

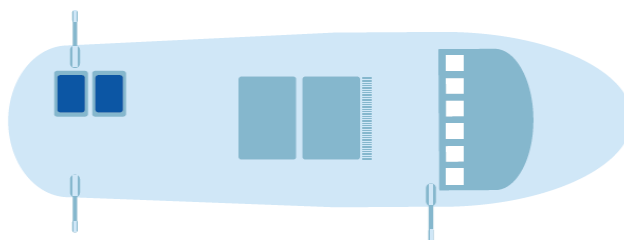
### Trawl



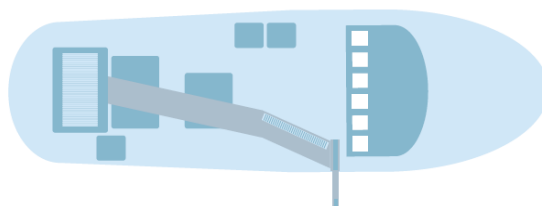
### Longline



### Handline/Jig



### Gillnet



## Appendix C: Primary Species Characteristics

### *Atlantic Cod*

- White lateral line, lateral line curves distinctly downward under second dorsal fin
- Greenish-brown to reddish color overall with darker rust colored spotting, color fades to white below
- Three dorsal fins, two anal fins
- Posterior margin of tail straight or with slight fork
- Subterminal mouth
- Long, distinct white chin barbel

### *Pollock*

- White lateral line that is uniformly straight along sides
- Solid blue gray dorsal color fades to white below
- Three dorsal fins, two anal fins
- Deeply forked tail
- Terminal mouth
- No obvious chin barbel

### *Haddock*

- Black lateral line
- Silvery on sides with white below
- Three dorsal fins, 2 anal fins
- First dorsal fin tall and sail like
- Dusky black patch located above and behind pectoral fin
- Slightly forked tail
- Subterminal mouth
- Small chin barbel

### *White Hake*

- When processed, fish will be headed and gutted with filaments likely visible
- When damaged, pelvic and dorsal fin rays present and likely visible
- Second dorsal and anal fin extend to caudal peduncle
- Body rounded in mid-section
- Milky/off-white coloration
- Dorsal and pelvic fin filament(s) present

### *Hake Mix (Red, White, Spotted, Southern) Group*

- Second dorsal and anal fins long and extend to caudal peduncle
- Body rounded in mid-section
- Body coloration ranges from brownish bronze or coppery brown to silvery gray, overall color lightening ventrally

- Pelvic filament(s) present

### ***Scorpionfish, NK Group (Acadian Redfish, Blackbelly Rosefish, etc)***

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

### ***Windowpane Flounder***

- Left eyed flounder with large mouth
- Thin bodied, underside of body appears translucent
- Black and white spots on dorsal side, anal, and caudal fins
- Round overall shape with pointed snout.

### ***American Plaice Flounder***

- Right eyed flounder with large mouth
- Dorsal side brown to tan in color with light ventral side
- Narrow caudal peduncle
- Tail rounded or with slight point at middle

### ***Witch Flounder***

- Right eyed flounder with small mouth
- Dorsal side brown color often with black hue
- Ventral side gray with blackish or brown hue
- Dorsal anal and caudal fins usually with black at outer margins
- Pectoral fin on upper side dark at outer edge black tipped
- Thin bodied; tail rounded or with slight point at middle
- Narrow caudal peduncle

### ***Winter Flounder***

- Right eyed flounder with small mouth
- Dorsal side brown to tan or gray in color, may be darker spotting overall
- White ventral side (but may have light yellow at base of dorsal, anal and caudal fins)
- Thick bodied with wide and thick caudal peduncle and tail
- Tail Rounded

### ***Yellowtail Flounder***

- Right eyed flounder with small mouth
- Dorsal surface brown to tan overall (rust/orange/yellow mottling or spots may be visible)
- Ventral side light but often with yellow at base of dorsal and anal fins and over tail
- Protruding, upturned snout (dorsal side) with distinct indent just above eye
- Rounded tail with thin caudal peduncle

### ***Atlantic Halibut***

- Right eyed with large mouth
- Thick, diamond shaped body
- Concave tail (not flat edged or rounded)
- Ventral side cream colored to white

### ***Ocean Pout***

- Long, slender body
- Overall color muddy yellow to reddish brown (bars may be visible)
- Broad, heavy head and large, fleshy lips (except small specimens, e.g., < 30 cm)
- Rounded pectoral fin

### ***Atlantic Wolffish***

- Bluish, gray color with broad dark bars along length of body, lighter ventrally
- Large head with blunt snout, large conical teeth
- Long dorsal and anal fins extending almost to tail
- Large, rounded pectoral fin
- Tail small and rounded

*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 species listed below are to assist reviewers in identifying non-groundfish.*

### ***Fourspot Flounder***

- Left eyed
- Large mouth
- Body shape splendid, not spade shaped like Windowpane Flounder
- Tail relatively thin, convex shape with small point, not a robust as Summer Flounder
- Overall brown to tan on top (some white spots or mottling may be present), ventral side white and may appear slightly translucent
- Usually 4 prominent ocelli on upper side, 2 ocelli at mid body and 2 at base of tail

### ***Summer Flounder***

- Left eyed flounder with widely spaced eyes (gap between eyes greater than eye diameter)
- Color sandy to dark brown in color (often with many ocelli usually visible on dorsal surface)
- Thick body
- Large mouth with small, sharp teeth
- Tail convex

### ***Silver/Offshore Hake***

- Dorsal surface dark gray, overall silver in color, lighter below
- Pelvic fin and first dorsal fin without filaments

- Overall round, cigar-like body shape (streamlined)
- Large terminal mouth (teeth may be visible)
- 2 dorsal fins with second dorsal fin long

### ***Wrymouth***

- Brown coloration with dark spotting on body and into dorsal fin
- Gaping upturned mouth
- Small eyes on top of head
- Continuous dorsal, anal, and caudal fin
- Rounded tail

### ***Cusk***

- Frog-like shaped head (dorso-ventrally compressed)
- 1 dorsal fin with partially joined caudal and anal fin
- Long chin barbell
- Fins edged in white with dark sub-marginal bands
- May have yellow band marks alongside body

### ***Fourbeard Rockling***

- Long slender body
- 2 dorsal fins; 1st modified into a dark filament
- 4 barbells around mouth
- Pelvic fins with rays
- Prominent black marking on tail (ink dip)



## Appendix D: Minimum Sizes for Commercial Groundfish Species

Groundfish Minimum Fish Sizes

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

\*Minimum legal size requirement for Acadian Redfish retention. Species code listed since dealers and vessels report as Acadian Redfish. Reviewers shall annotate as Scorpionfish NK.

## Appendix E: Electronic Monitoring EM Detail JSON Technical Requirements

<b>Description:</b>	<b>Trip review object</b>		
<b>vessel_permit_number*</b>	integer; The fishing vessel permit number.		
	<i>example: 222222</i>		
<b>vessel_name*</b>	string; The name of the fishing vessel		
<b>sail_datetime*</b>	string; Date the trip left the dock in ISO1806 standard datetime format		
	<i>example: 2019-05-31</i>		
<b>land_datetime*</b>	string; Date trip returned to dock in ISO1806 standard datetime format		
	<i>example: 2020-06-01</i>		
<b>evtr_num*</b>	integer; Electronic Vessel Trip Report serial number (formerly trip_id)		
	<i>example: 12345619010102</i>		
<b>all_effort_confirmed*</b>	string; Was the total fishing effort for the trip captured and confirmed, Y/N		
	<i>Array [Y, N]</i>		
comments	string; Notes pertaining to this trip or EM review.		
hauls	<b>description:</b>	<b>Haul object for each haul of this trip</b>	
	<b>haul_id*</b>	integer; Ordinal number of the haul within the trip.	
		<i>minimum: 1</i>	
		<i>example: 1</i>	
	start_haul_datetime	string(\$date-time); In ISO1806 standard datetime format	
		<i>example: 2019-08-02T16:24:45.000Z</i>	
	start_haul_lat	number(\$double); Latitude in decimal degrees	
		<i>minimum: 0</i>	
		<i>example: 42.123456</i>	
	start_haul_lon	number(\$double); Longitude in decimal degrees	
		<i>maximum: 0</i>	
		<i>example: -67.123456</i>	

	end_haul_datetime	string(\$date-time); in ISO1806 standard datetime format <i>example: 2019-08-02T16:24:45.000Z</i>
	end_haul_lat	number(\$double); Latitude in decimal degrees <i>minimum: 0</i> <i>example: 42.123456</i>
	end_haul_lon	number(\$double); Longitude in decimal degrees <i>maximum: 0</i> <i>example: -67.123456</i>
	<b>observed*</b>	string; Was the haul fully observed? <i>Array [Y, N]</i>
	<b>delayed_catch_processing*</b>	string; Was catch processing delayed on this haul? <i>Array [Y, N]</i>
	<b>reviewer_id*</b>	string; Official Observer ID assigned by NEFSC to the reviewer. <i>example: X99</i>
	<b>ACCSP_gear_category*</b>	string; See Reference Table 1
	<b>haul_id*</b>	integer; Indicates the haul from which this discard resulted, if known.
	<b>species_code_itis*</b>	integer; See Reference Table 2 <i>example: 164712</i>
	weight	number; Weight of the discard. <i>example: 1.5</i>
	catch_weight_uom	string; Unit of measure used when estimating the weight of the discard.
	length	integer; Length of discard. <i>example: 12</i>
	<b>catch_length_uom*</b>	string; Unit of Measure used to measure discard.
	count	integer; Number of discards this record represents.
	<b>weight_determined_by*</b>	string; How was weight of discard estimated? See Reference Table 3

		<i>example: LENGTH</i>
<b>discard_datetime*</b>		string(\$date-time); The date and time the discard occurred in ISO1806 standard format.
		<i>example: 2019-08-02T16:24:45.000Z</i>
<b>discard_lat*</b>		number(\$double); Latitude in decimal degrees
		<i>minimum: 0</i>
		<i>example: 42.123456</i>
<b>discard_lon*</b>		number(\$double); Longitude in decimal degrees
		<i>maximum: 0</i>
		<i>example: -67.123456</i>
<b>disposition*</b>		string; See Reference Table 4.
<b>grade_code*</b>		string; ACCSP grade code indicating whether the weight represents round or dressed. See Reference Table 6
		<i>example: 01</i>
<b>reviewer_id*</b>		string; Official Observer ID assigned by NEFSC to the reviewer.
		<i>example: X99</i>
comments		string; Notes that are specific to understanding this discard record.
<b>event_type*</b>		string; See Reference Table 5.
haul_id		integer; The haul within this event occurred, if known.
<b>event_datetime*</b>		string(\$date-time); Timestamp in ISO1806 standard format.
		<i>example: 2019-08-02T16:24:45.000Z</i>
<b>event_lat*</b>		number(\$double); Latitude in decimal degrees
		<i>minimum: 0</i>
		<i>example: 42.123456</i>
<b>event_lon*</b>		number(\$double); Longitude in decimal degrees
		<i>maximum: 0</i>
		<i>example: -67.123456</i>
<b>reviewer_id*</b>		string; Official Observer ID assigned by NEFSC to the reviewer.
		<i>example: X99</i>

	<b>comments*</b>	string; Notes that are specific to understanding this event.
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Reference Table 1 – Gear Types - Groundfish

<b>ACCSP_GEARCATCD</b>	<b>ACCSP_CATEGORY_NAME</b>	<b>ACCSP_TYPECD</b>	<b>ACCSP_TYPE_NAME</b>
000	NOT CODED	000	NOT CODED
091	OTTER TRAWLS, BOTTOM	004	TRAWLS
200	GILL NETS	006	GILL NETS
400	LONG LINES	008	LONG LINES
700	HAND LINES	013	HAND LINES

Reference Table 2: Species List - Groundfish

<b>COMMON_NAME</b>	<b>SCIENTIFIC_NAME</b>	<b>SPECIES_ITIS</b>
COD, ATLANTIC	GADUS MORHUA	164712
FLOUNDER, WINTER	PLEURONECTES AMERICANUS	172905
FLOUNDER, WITCH	GLYPTOCEPHALUS CYNOGLOSSUS	172873
FLOUNDER, YELLOWTAIL	PLEURONECTES FERRUGINEUS	172909
FLOUNDER, AMERICAN PLAICE	HIPPOGLOSSOIDES PLATESSOIDES	172877
FLOUNDER, WINDOWPANE	SCOPHTALMUS AQUOSUS	172746
HADDOCK	MELANOGRAMMUS AEGLEFINUS	164744
HAKE, WHITE	UROPHYCIS TENUIS	164732
HAKE, RED/WHITE/ SPOT/SOUTHERN MIX <sup>1</sup>	UROPHYCIS SP	164729
ATLANTIC HALIBUT	HIPPOGLOSSUS HIPPOGLOSSUS	172933
SCORPIONFISH, NK	SCORPAENIDAE	166704

OCEAN POUT	MACROZOARCES AMERICANUS	630979
POLLOCK	POLLACHIUS VIRENS	164727
WOLFFISH, ATLANTIC	ANARHICHAS LUPUS	171341
FISH, NK	OSTEICHTHYES	914179

<sup>1</sup> HAKE, RED/WHITE/SPOT/SOUTHERN MIX: the reviewer should aggregate all unidentifiable hake (i.e., red, white, southern, and spotted) discards and report them under “HAKE, RED/WHITE/SPOT/SOUTHERN MIX”.

Reference Table 3 – Discarded Fish Weight Determined By

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

Reference Table 4 – Fish Disposition Codes and Descriptors

Code	Description
031	POOR QUALITY, REASON NOT SPECIFIED
099	DISCARDED, OTHER
900	UNKNOWN KEPT OR DISCARDED
000	DISCARDED, UNKNOWN REASON

Reference Table 5: Event Categories, Descriptions and Codes

EVENT_CAT	EVENT_DESC	EVENTCD
CREW	CAMERA SYSTEM NOT MAINTAINED	CAMMAINT
CREW	BULK DISCARDING	BULKDISC
CREW	OTHER	OCI
CREW	IMPROPER CATCH HANDLING	ICH

EM SPECIFIC	SYSTEM FAILURE	SYSTEM
EM SPECIFIC	CAMERA FAILURE	CAMFAIL
EM SPECIFIC	SENSORS GAPS	SENSGAP
EM SPECIFIC	VIDEO GAPS	VIDGAP
EM SPECIFIC	OTHER	OSI
EM SPECIFIC	CAMERAS OUT OF SYNC	COS
EM SPECIFIC	SYSTEM NOT ACTIVATED AT DOCK	NAATDOCK
EM SPECIFIC	CAMERAS OUT OF POSITION	CAMKNOCK
EM SPECIFIC	SYSTEM IMAGE IMPAIRMENT	IMGIMPAIR
FISHING OPERATIONS	OTHER OPERATIONS ISSUES	OOI
FISHING OPERATIONS	RELEASED BAG	BAG
FISHING OPERATIONS	WEATHER	WEATHER
FISHING OPERATIONS	POOR LIGHTING OR SUN GLARE	LIGHTORGLARE
FISHING OPERATIONS	OPERATIONS INDUCED CAMERA DAMAGE	CAMDAMAGE

Reference Table 6: Market Codes and Grade Descriptions

CODE	DESCRIPTION
00	UNKNOWN
01	ROUND
23	GUTTED, HEAD ON, TAIL ON
24	GUTTED, HEADS OFF, TAIL ON, BELLY FLAPS ATTACHED

## 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:

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05/22/2023	FY23 DATA SPECS	1