Industry Funded Monitoring: EM Reviewer Manual for High Volume Herring Trips

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

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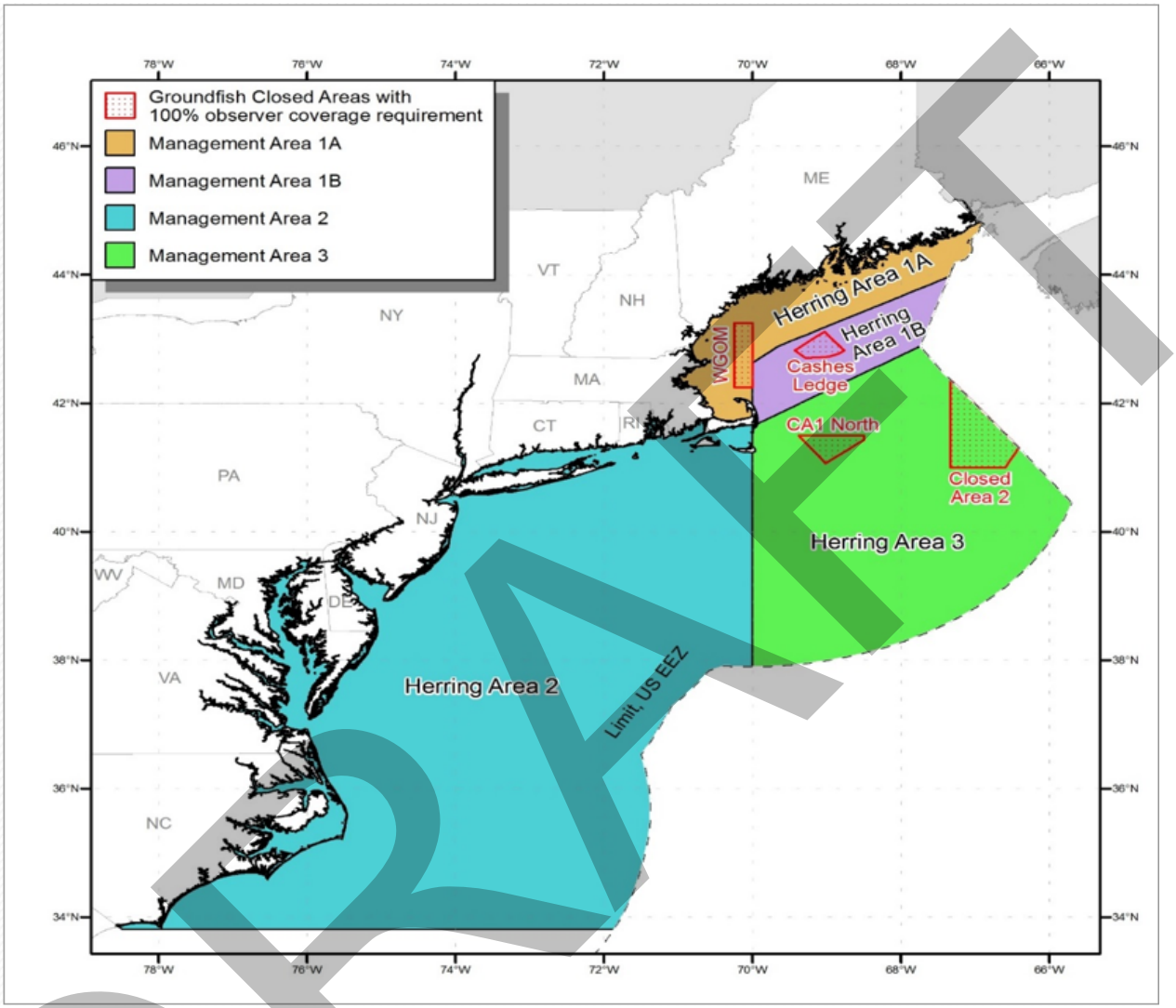

Figure 1. Atlantic Herring Management Areas including Groundfish Closed Areas.

Introduction:

The Northeast Fishery Science Center contracted with Saltwater Inc. between 2016 and 2018 to conduct a preliminary study to determine if electronic monitoring (EM) was a suitable implementation to enhance monitoring and survey discarding events in the Atlantic herring and Atlantic mackerel midwater trawl fisheries[1]. Based upon the analysis and results of the project, the New England Fishery Management Council (NEFMC) approved the use of EM in conjunction with portside sampling coverage under the Industry-Funded Monitoring (IFM) Omnibus Amendment as a monitoring option for midwater trawl vessels declared into the Atlantic herring fishery.

During the 2022 fishing year (April 1, 2022-March 31, 2023), midwater trawl vessels with Category A or B herring permits and purse seine vessels are eligible to participate on an Exempted Fishery Permit (EFP) that exempts vessels from IFM at-sea coverage requirements. EFP participants will utilize a combination of portside sampling and EM when selected for IFM coverage to meet requirements. The EFP specifically exempts vessel participants from at-sea monitoring requirements, including slippage compliance measures, seasonal restrictions of groundfish closed areas, and operational discarding events when declared into a Northeast multispecies closed area. Vessel operators must ensure that their systems are operating on all herring trips if the vessel plans to pump catch onboard. Vessels are also subject to portside sampling and NEFOP SBRM coverage.

Purpose:

This manual is designed to provide general information and distinct data collection points for IFM Atlantic herring video reviewers. The scope of the data collection is aligned with the rules and requirements described in the EFP. Review protocol may be modified by Fisheries Monitoring Operations (FMO) staff during the year to further guide program development.

Keys to Review:

Vessels are participating in this program to further develop EM and portside sampling in the Atlantic herring fishery and to fulfill the requirements of the New England Industry Funded Monitoring Omnibus Amendment.

- EM herring data will be used to confirm catch retention as well as verify compliance with slippage restrictions.

- Reviewers will not confirm species identification or collect species counts for targeted catch or haddock discards that are not brought onboard.

- Primary and secondary reviewers will use the Fishing Operations descriptor: 'High Volume Discard' to document scenarios for targeted or haul-level catch that is not brought onboard the vessel.

- Primary and secondary reviewers will select 'Unknown' as the event description for all High Volume Discard events documented during video review.

- Fisheries Monitoring Operations staff will evaluate High Volume Discard events and make the final determination for each entry based on additional video review. The outcome of each event will be documented based on the high volume fishery definitions for: Operational Discards, Partial Release, and Full Release.

- Reviewers must create a discard entry for each Individual Animal observed that may occur during a haul

- Reviewers must create a discard entry for each Protected Species interaction that may occur during a haul.

- Reviewers must document discarding of haddock that are brought onboard, however, a discard entry is not required for other groundfish species or non-target species identified by reviewers when discarded by the crew.

EM vessels participating in the EFP are permitted to discard non-regulated species that are removed from the dewatering box.

- If a reviewer has identified haddock being retained or discarded by the crew at a previous time during the trip and the reviewer cannot verify a discarded catch item then a discard entry is warranted for fish that can not be identified. Entries will be recorded as Fish, NK.

- Species identified as Fish, NK signals the presence of haddock observed during the trip. The reviewer will include the comment: "*Haddock previously identified by the reviewer on this trip*." for each Fish, NK discard entry.

- Portside data will be used to collect information about species composition of the catch including age and growth data collection.

- Trips selected for Standardized Bycatch Reporting Methodology (SBRM) coverage must operate EM in addition to carrying an observer when selected. IFM reviewers will consider an observer (or sea-sampler) as part of the crew in the event of non-compliance with VMP catch handling requirements.

The reviewer will evaluate all video, sensor, and/or imagery files from a trip and attempt to annotate hauls, pumping operations, and discard events regardless of whether the haul will be OBS Y or N. The ability to track fishing operations and on-deck activity may be impacted at times but all recorded video and sensor files should still be assessed to document activity that occurred during the trip. It is acceptable for reviewers to scan video at faster playback speeds while a vessel is transiting to/from the fishing grounds, or while patrolling for fish when no catch is present on deck. However, fishing activity or any segment of a trip when unprocessed catch is present should be reviewed at a slower speed to ensure accuracy with data collection and compliance monitoring.

Documentation for Northeast Electronic Monitoring Information System (NEMIS):

An in depth user instructions for NEMIS API can be found here:

https://apps-nefsc.fisheries.noaa.gov/NEMIS/index.php/docs/readme#dual

The guide offers a thorough overview of the API production points, submitting test trips, and troubleshooting trip submission errors for resubmission. EM trip reviews that are successfully submitted to the API will receive a unique report identifier once the JSON file has been uploaded. The following is an example of a successful submission:

```
{ "error': false,
"review_id" : "319",
"logged" : true }
```

Trip Level Information:

A trip duration is defined as port-to-port and does not necessitate offloading catch at the end of the trip. A 100% trip review (port-to-port) is required for each EM trip selected by the agency regardless of a vessel's PTNS declaration.

Vessel and trip information will identify the vessel name, hull and permit numbers and an indicator for pair trawl submissions. Data elements such as eVTR and vessel permit must correspond with a trip record identified in the NOAA Fishery Monitoring Portal: (https://apps-nefsc.fisheries.noaa.gov/fmportal/).

Sail Date: The reviewer will annotate a timestamp when they see the vessel leaving the dock with the intent of going fishing. This can be when the vessel either tosses the dock-lines or when you see them steam away from a 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 EMS-SYSTEM NOT ACTIVATED AT DOCK event should be annotated when the video begins. This field should **only** be NULL **if** the EMS-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 continue watching the video to confirm all discards are processed. If video ends prior to being able to fully account for discards, DO NOT annotate a LAND_DATETIME. The EMS-SYSTEM OFF PRIOR TO LANDING event should be annotated when the video cuts out. This field should **only** be NULL **if** the EMS-SYSTEM OFF PRIOR TO LANDING is annotated.

Program Code: FMRD analysts will identify and code selected trips on the backend. The Program code *250 EM-Industry Funded Monitoring Herring Compliance* will be assigned to each trip that is submitted through the API by a video reviewer, unless otherwise directed.

- ❏ Vessel Permit Number
- ❏ Vessel Name
- ❏ Sail Datetime
- ❏ Land Datetime
- ❏ All Effort Confirmed (Yes or No)
- ❏ eVTR
- ❏ Comments

Note: If fields are auto-populated, please confirm accuracy prior to submitting a trip. In the event of missing sensor and video data occurring periodically during a trip review, the project manager should notify FMO.

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, gear types, and the offload/hold inspection) 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).

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.

Trip Review API Submissions 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 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 NO and comments with an explanation for the abbreviated review must be noted. Please note the REVIEWER_ID or name of the individual submitting the JSON.

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

Gear Categories:

There are currently three gear categories operating in the IFM EM program. Each trip will have a primary gear used. Vessels are unlikely to use more than one gear type during a trip. 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 1.

Mid-water trawls are used to target species that run in schools near the surface of the water, such as mackerel or herring. A single midwater trawl gear is pulled by one boat and uses different trawl doors, designed to hold the mouth of the net open higher in the water column, as opposed to sliding across the seafloor (see Figure 2). Some larger nets are towed by two vessels and this gear is referred to as paired midwater trawl (see Figure 3). A purse seine is a wall of netting equipped with rings (purse rings) along the lower edge, with a cable passing through these rings enabling the fishermen to close off the space surrounded by the net from below (see Figure 4).

Table 1. ACCSP Gear Category Codes

ACCSP Category	ACCSP Gear Code
Single Midwater Trawl	092
Pair Midwater Trawl	092
Purse Seine	030

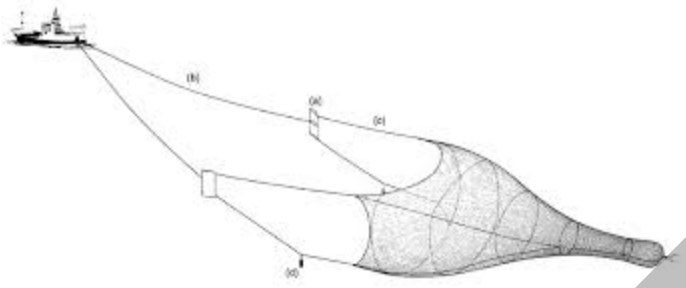

Figure 2. Single Midwater Trawl example with gear deployed.

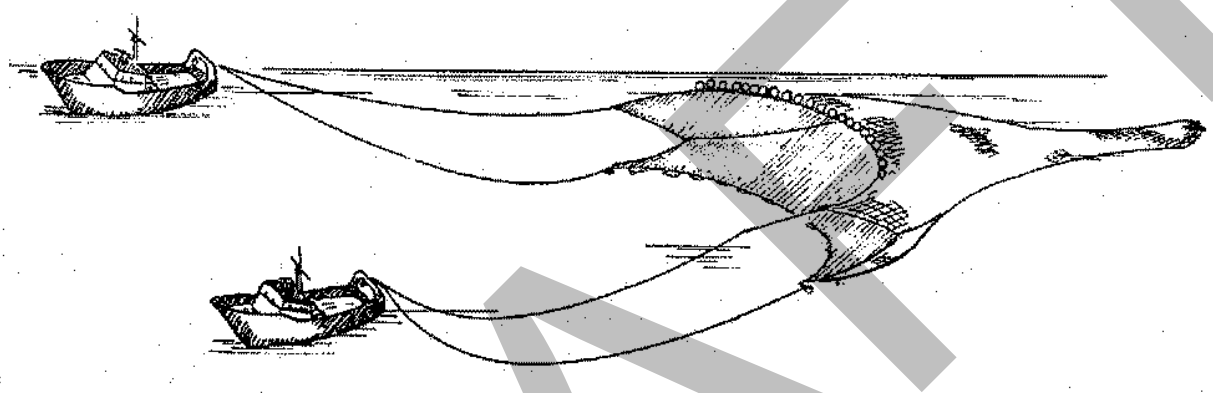

Figure 3. Pair Midwater Trawl example with gear deployed.

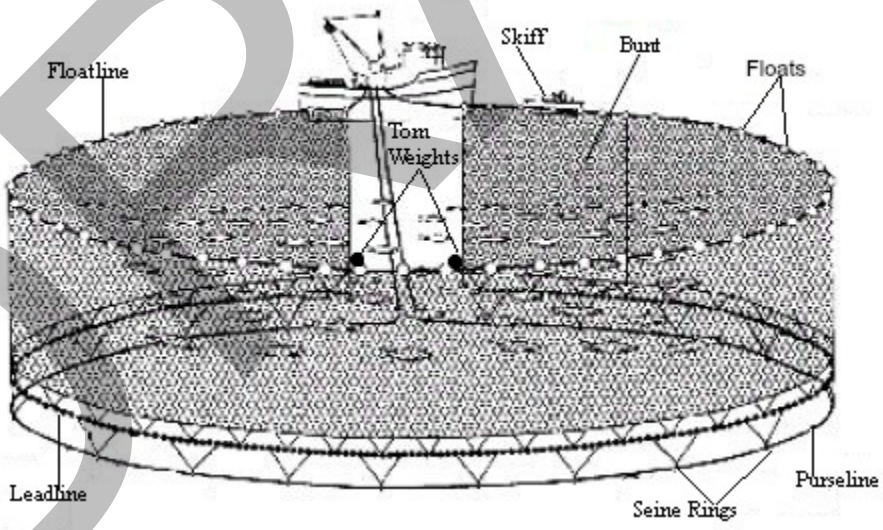

Figure 4. Purse Seine example with gear deployed.

Haul Level Data Elements:

Haul Observed Y/N:

Definition of an observed haul for IFM EM video reviewers:

> An ***observed haul*** certifies that there was video and sensor data available to monitor fishing operations: collect haul elements; assess pumping operations; confirm and verify catch retention and compliance; and track gear transitions that occur in preparation for pumping out the contents of the net and the retrieval of the gear over the stern, concluding a haul.

Delayed Catch Processing Y/N:

This field refers to if the catch is processed or not. This is primarily used in the groundfish EM programs. This haul field will always be DELAYED_CATCH_PROCESSING=N for midwater trawl vessels targeting herring.

Pair Trawl Y/N:

If the gear being used is a paired MWT, the PAIR_TRAWL field should be Y. If the gear being used is a single MWT, the PAIR_TRAWL should be N. Single and Pair Midwater Trawl share the same gear category code and this field further defines the gear used.

Haul Timestamps:

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.

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.

There are 2 elements used to define the duration of midwater trawl haul (MWT): *Start Haul* and *End Haul*. The end haul element collected from single midwater trawlers differ from the actions that define the end haul element for pair midwater trawlers. A MWT haul begins when the net (or codend) is lowered into the water for the purpose of setting out to target herring. The haul end time collected for single midwater trawl corresponds to the time when the winches are engaged to retrieve the net after the gear was fully deployed, including the doors and/or anchor weights.

For paired vessels, the haul end time is recorded when the tow cables have been fully retrieved aboard both vessels. Vessels are parallel and are within close distance of each other. A reviewer will be able to verify the end haul from crew actions that involves detaching the cables from the blocks.

Note: Sensor data may be used to annotate set start and end haul point events.

Single Midwater Trawl Haul Timestamps:

- ❏ The **Start Haul** is entered when the codend is lowered into the water for the purpose of fully setting out the gear.
- ❏ **End Haul** marks the time winches are engaged and tow wire is brought back fully signifying the end of the tow

Table 2. Haul Elements for Single Midwater Trawl

Single MWT Haul Element	Fishing Event
start_haul_datetime start_haul_lat start_haul_lon	Codend is lowered into the water surface
end_haul_datetime end_haul_lat end_haul_lon	Hauling equipment is engaged with intention to haul back and end the tow

Paired Midwater Trawl Haul Timestamps:

Vessel 1: Deploying Net

- ❏ The **Start Haul** is when the codend is lowered into the water for the purpose of fully setting out the gear.
- ❏ **End Haul:** Vessels have closed gap and are parallel, tow cables have been retrieved to signify the end of the haul.

Vessel 2: Wing Vessel

- ❏ The **Start Haul** when the warp has been passed over from the paired vessel that set gear; warp is retrieved by crew.
- ❏ **End Haul:** Tow cables have been fully retrieved to the blocks, vessels are parallel, crew begins detaching cable from the block signifying the end of the haul.

Table 3. Haul Elements for Pair Midwater Trawl

Pair MWT Haul Element	**Fishing Event (Vessel 1)**	**Wing Vessel Fishing Event (Vessel 2)**
start_haul_datetime start_haul_lat start_haul_lon	Codend is lowered into the water surface	Warp has been passed over from vessel that set gear
end_haul_datetime end_haul_lat end_haul_lon	Tow cable has been retrieved, paired vessel is parallel, crew is preparing to haul back net	Tow cable has been retrieved, vessels are parallel, and crew begins detaching cable from the block

Purse Seine Haul Timestamps:

- ❏ The **Set Start** is entered when the skiff, highflier, or sea anchor hits the water with the intention to set the net.
- ❏ **Start Haul** and **End Haul** times and coordinators are not collected for purse seine hauls.

Table 4. Haul Elements for (030) Purse Seine.

Purse Seine Haul Element	**Fishing Event**
set_start_datetime set_start_lat set_start_lon	Skiff, highflier, or sea anchor, hits the water with intention to set the net
start_haul_datetime start_haul_lat start_haul_lon	[Does not Apply]
end_haul_datetime end_haul_lat end_haul_lon	[Does not Apply]

Other data elements and values collected for each haul include:

- ❏ Haul number
- ❏ Gear category
- ❏ Set Start Timestamp OR Haul Start and Haul End Timestamps
- ❏ Triplex Used: (Yes or No)
- ❏ Did the vessel pump catch? (Yes, No, Unknown)
- ❏ Haul Observed: (Yes or No)
- ❏ Pair Trawl Trip: (Yes or No)
- ❏ Delayed Catch Processing (always No)
- ❏ Reviewer ID
- ❏ Comments

The triplex (or net winch) is a mechanical device that serves several purposes in a high volume fishery. Primarily, it is used to haul up a fishing net or seine and can be controlled at various speeds. A triplex can also be used to release fishing gear back into the water. In the Atlantic herring fishery, the device can also be used to force the remaining contents of a net or purse seine toward the pump intake hose. The machine consists of 3 high-powered rollers and it is commonly located middeck on the gunwale.

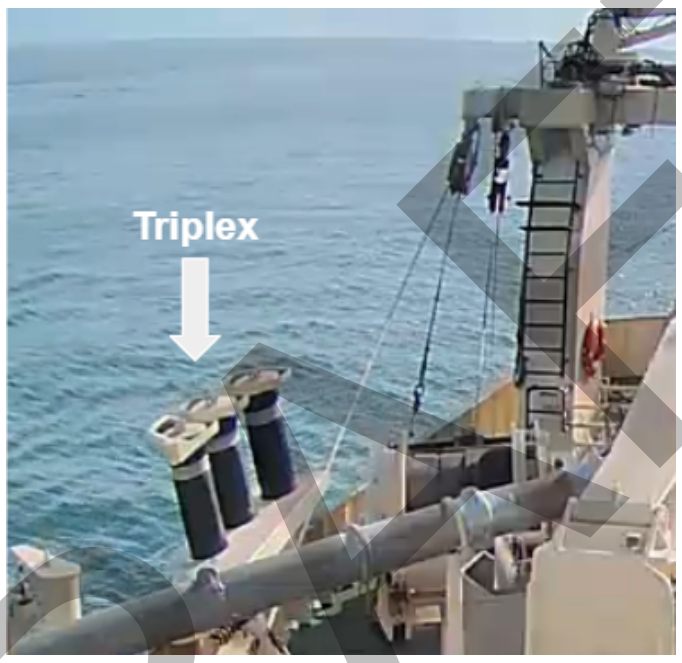

Figure 5. Example of a triplex.

Pump Operations:

There are 3 data elements related to uninterrupted catch pumping operations. Pump begin, pump end, and gear onboard, each element is a required field whenever a vessel uses their pump. Pump operation data elements will be entered as individual point events during review.

Pump Begin: Timestamp entry signifies when pump is activated and sea-water first enters the dewatering box.

Pump End: Timestamp entry signals the end of pumping operations; the pump has been turned-off and sea water is no longer entering chutes or dewatering box at full force. The crew will prepare to release the pump and will then proceed to reel the net back over the stern.

Gear Onboard: Timestamp entry indicates when the entire net has been brought back on deck.

Note: *If Haul Observed = 'Yes' then all 3 annotations for pump operations must contain a value.*

Figure 6. Overhead view of a dewatering box.

Pump Stop Events:

During review, if the pump is stopped during operations the reviewer will record a pump stop event for each occurrence throughout the duration of catch pumping. The reviewer will also select a reason that signals other actions taken by the crew.

> **Pump Stop**: An interval that documents when the pump is turned off in between pump begin and pump end segments. It is possible that a reviewer will encounter multiple pump stops during catch pumping activity. Each pump stop will be recorded as a ***point event***.

Reviewers will collect additional information related to each pump stop event. A pump stop reason will be assigned whenever pumping is halted before all catch has been pumped onboard. A reviewer will select one identifier for each pump stop event: *Unknown*, *Pump Detached*, *Pump not Detached, Other.*

Pump Stop Reason:

> ***Unknown*** - Select, if you cannot see the pump/net connection in the water because of video gaps, camera, or other system issues.
>
> ***Pump Detached*** - Select, if the pump is detached from the net and then refitted to resume pumping operations.
> ***Pump Not Detached*** - Select, if pumping operations are randomly halted and the pump fitting is not detached from the codend of the net. Pumping reconvenes at a later time, and the reason for stopping the pump was not clearly understood based on the actions that followed.
>
> ***Pump Adjustment*** - Select, if pumping operations are halted and the pump is raised from the water, lowered deeper into the water, or repositioned in any way without removing the pump from the net fitting. Pumping resumes after the adjustment has been annotated.
>
> ***Other*** - Select, if pumping stops and the crew engages in on-deck activity unrelated to the inspecting or repositioning the pump; pumping resumes at a later time.

High Volume Operations:

Reviewers should not make inferences and judgment calls when pumping operations are stopped due to perceivable safety or mechanical issues. Building evidence to support these conclusions require input from the vessel operator or engineer and cannot always be validated from video. Additionally, while a reviewer can make an assumption, for example, that dogfish are the reason for stopping the pump based on their abundance, making this determination requires direct communication with vessel personnel.

Occasionally, pumping operations are halted to attend to other concerns on deck. A few common examples are if a holding tank is near capacity, the engineer needs to gauge remaining volume, or if the holding tank has reached capacity, the engineer and crew will close off the holding tank

and prepare to switch over to another tank. In order to complete a transition to a new tank pumping operations must be stopped.

Discard Event:

IFM reviewers must record discard events for haddock that are brought on board and discarded by crew or swept overboard through scuppers, or washed out of camera view by water. A discard event is not required for species identification and/or species counts for haddock or target level catch that are not brought on board the vessel. The crew is permitted to discard regulated groundfish species other than haddock and non-allocated species, i.e., dogfish and skates. Incidental takes and individual animals will be documented with discard event annotations and the reviewer must document both types of occurrences: animals brought on board and animals that are not brought on board the vessel.

While vessels may discard most finfish species, if a reviewer has identified haddock being retained or discarded by the crew at any previous time during the trip and the reviewer cannot verify a discarded catch item then a discard entry is warranted for fish that can not be identified. If there is discarding over prolonged intervals of time, each identifiable haddock can be tally-counted and grouped into a single discard event entry: (See page 13 for details on grouping discards). *If more than one individual animal or incidental take occurs on a haul, each animal must be recorded as a discrete discard event record.*

- Ensure the correct haul number and timestamp is assigned to the discard entry.

- Species disposition code *099-Discarded, Other* will be applied to discarding of haddock that are required to be kept and Fish, NK entries for catch that was pumped onboard.

- Disposition code *052-Incidental take* is designated for incidental takes. Comments for incidental takes will include:
    - If the animal was brought on deck, or
    - If the animal fell out of gear, or
    - Was the animal not brought on deck and observed in the water?
    - Each incidental take animal will be annotated as a single entry.
    - **Incidental Take** Species include: Bird, NK, Seal, NK, Dolphin, NK, Whale, NK, Turtle, NK.

- Individual Animals will be coded as either *099-Discarded*, *Other* or *043-Not Brought On Board, Fell Out/Off of Gear*. Each animal will be annotated as a single entry
    - Each Individual animal will be annotated as a single entry.
    - **Individual Animals** include: Shark, NK, Sturgeon, NK, Swordfish, Tuna, NK, Ray, NK

- All catch entries will have the grade code of 01-ROUND as there is only a count collected.

- Any portion of the catch (target species, non-regulated, or regulated) that is not brought on board the vessel is documented as a High Volume Discard. See page 19 for the High Volume Discard definition.

- Species identification and counts are not required for High Volume Discard Event annotations.

- A discard entry is not used for finfish if they fall from the net or pumping equipment, are observed floating in the water, or are otherwise not brought onboard.

- For a comprehensive species list, see Table 6.

The reviewer will assign values or descriptors to each of the specific elements and ensure accuracy with each discard event.

- Haul number
- Discard Timestamp, Lat/Long
- Species Common Name
- Species Code
- Species Disposition Code
- Count (Total number of haddock or Fish, NK that were discarded)
- Weight determined by "UNKNOWN"
- Grade Code "01-ROUND"
- ID characteristics, Comments
- Reviewer ID
- Camera View:
  Pump; Dewatering Box; Stern; Other

Table 5. Species Disposition Codes.

Code	Description	Identifying Species
043	NOT BROUGHT ON BOARD, FELL OUT/OFF OF GEAR	Individual Animals
099	DISCARDED, OTHER	Haddock, Fish, NK, Individual Animals
900	UNKNOWN KEPT OR DISCARDED	Haddock, Fish, NK
052	INCIDENTAL TAKE	Mammals, Sea Birds, Sea Turtles

Table 6. FY 2022 Industry Funded Monitoring EM Review Species List.

COMMON_NAME	SCIENTIFIC_NAME	SPECIES_ITIS
HADDOCK	MELANOGRAMMUS AEGLEFINUS	164744
FISH, NK	OSTEICHTHYES	914179
SHARK, NK	SQUALIFORMES	159785
STURGEON, NK	ACIPENSERIDAE	161064
SWORDFISH	XIPHIAS GLADIUS	172482
TUNA, NK	EUTHYNNUS THUNNUS SP	172418
RAY, NK	RAJIFORMES	160806
BIRD, NK	AVES	174371
SEAL, NK	PHOCIDAE	180640
DOLPHIN, NK (MAMMAL)	DELPHINIDAE	180415
WHALE, NK	CETACEA, WHALE	180403
TURTLE, NK	CHELONIOIDEA	948936

Grouping Haddock/Fish, NK Discards into a Single Discard Entry:

IFM video reviewers should group haddock that are brought onboard and discarded into a single discard entry when they are confident that all groundfish consolidated into the entry meet specific physical identification characteristics of haddock.

If haddock are being retained by the crew, or have been identified previously as discarded and a reviewer can not confidently identify a finfish being discarded then that discard will be identified as a Fish, NK. Fish, NK will be recorded as single discard entries unless a specific timestamp is associated with multiple Fish, NKs discards.

The following scenarios are common examples of when an IFM reviewer will quantify multiple discards (UNIT_COUNT >1) as a single species catch entry:

1. If haddock are being retained in containers by crew but are then discarded in one action, 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 a container that cannot be identified as a non-restricted discard species will be counted and recorded as FISH, NK, if a higher classification cannot be made.

2. While the pump is on, if haddock are being tossed overboard after removal from chutes or the dewatering box, the reviewer can tally count haddock and group into a single discard entry once pumping has ended.

3. UNKNOWN KEPT OR DISCARDED: Fish, NK or haddock that land on deck or overflow from tanks or chutes and are not recovered or picked up by crew will be tally counted into distinct species groups and a reviewer will assign disposition code 900 to each discard entry with a estimated quantity > 1, if their fate cannot be determined.

4. If multiple haddock are washed overboard immediately following the end of the haul a single entry can be made. If multiple species (haddock and Fish, NK) are observed, a separate entry for each should be created with a tally count and estimated weight when applicable at the approximate end of the event.

Midwater Trawl Events:

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.

- EM Specific
- Fishing Operations
- Crew Specific

EM System Specific Events:

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

Table 7. EM Specific Event Descriptors.

Sensor Gaps	Cameras out of Sync	System Image Impairment
Video Gaps	Cameras out of Position	System Failure
Camera Failure	System not Activated at the Dock	Other System Issues
	System Turned Off Prior to Landing	

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.** Additionally the ALL_EFFORT_CONFIRMED field should be marked as N.

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. This event signifies that the camera was lost for the duration of the trip. This is a duration event and will be documented when the camera(s) first fails through the end of the trip. 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. Additionally the ALL_EFFORT_CONFIRMED field should be marked as N.

System Failure: If at any point during a trip, the complete EM system (all cameras and all sensors) fails and stops operating, an event should be annotated. 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. If this occurs during fishing activity, the haul should be marked OBS=N. Additionally the ALL_EFFORT_CONFIRMED field should be marked as N. If the System Failure occurs after fishing activity has been completed but before the vessel lands at the dock, the reviewer should annotate a SYSTEM OFF PRIOR event as well.

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

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

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

System Turned Off Prior to Landing: The EM system is required to be operational for the duration of the trip (departure from dock to landing at a dock). If the system is turned off prior to landing, an event entry should be made. This is a single point event and should be made when the video cuts out. If unprocessed kept catch from multiple hauls is present on deck or if catch processing is still occurring when the system is turned off multiple hauls could potentially be recorded as OBSERVED = N. Reviewers comments should include the approximate location of the vessel and if there was unsorted catch or crew present on deck at the time of the cameras being lost and generally what was taking place when the system was turned off. If all fishing activity could not be confirmed, the ALL_EFFORT_CONFIRMED field should be marked as N. For example if video begins with active hauling, the ALL_EFFORT_CONFIMRED=N. If the vessel is just leaving the harbor or no gear has been deployed, the ALL_EFFORT_CONFIMRED=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). 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.

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.

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 8. Crew Specific Event Descriptors.

Camera(s) not Maintained	Improper Catch Handling
Bulk Discarding	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.

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

Improper Catch Handling: Catch items that are not handled properly or any catch processing that is out of the purview of the vessel's VMP should be documented. This applies to any fish not properly handled, regardless of species classification (i.e. FISH NK entry made because cannot ID fish due to handling should also have an event made). 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 more than 5 times 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.* Each instance of ICH does not need 5 points and then a duration annotated. Each instance of ICH is documented up to 5 and then a duration is created. If the vessel makes an attempt to properly place the fish on the strip (i.e. lays it flat multiple times, pulls hands away but fish curls up), no event is needed. The vessel is making a good faith effort but the fish is alive and hard to lay flat. Fish that are curved due to stiffness or rigor and are not straightened, an event should be created. The weight of the catch entry should be a visual estimate or via a sub-sample.

Bulk Discarding: Refers to any action where 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 and the contents cannot be confirmed as a groundfish or non-groundfish species. The distinction between a pile and single layer should be made. Fish discarded in 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 occuring. Detailed comments within the event should fully describe the situation. 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.

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.

Fishing Operations Events:

Fishing Operations event descriptors for high volume fisheries are essential annotations that will be audited for additional evaluation by FMRD staff. It is critical for these annotations to mark specific sequences for tracking purposes. Reviewers should communicate directly with FMO staff prior to submitting a trip if there is any uncertainty with documenting Fishing Operation events.

Table 9. Fishing Operations Event Descriptors.

High Volume Discard	Start Fish Pump to Other Vessel	Stop Fish Pumped from Other Vessel
Release of Unidentified Matter	Stop Fish Pumped to Other Vessel	Start Fish Pumped from Other Vessel
Weather Induced Poor Visibility	Poor Lighting Or Sun Glare	Operations Induced Camera Damage
	Other Operation Issues	

High Volume Discard: Catch that is not brought on board, that is observed falling, spilling out of the net or pump will be documented by a reviewer as a 'High Volume Discard'. A discard event entry detailing species and count is not required unless the reviewer confirms that an Incidental Take or Individual Animal was caught and released. A High Volume Discard Event annotation will include an option to identify the camera that was used: *Pump, Stern, Both Views.* This event category is exclusively used in high volume fisheries and should not be applied to groundfish data collection specifications during the 2021 fishing year.

The point event entry will coincide with the exact time discards were observed. This point event is used to document any amount of catch that is not brought on board whether the action is seen or if a reviewer is confirming the presence of fish floating in the water that cannot be traced to catch that was pumped onboard and then washed off deck through scuppers or over the stern. If multiple High Volume Discard events occur during the haul or pumping operations, each event will be recorded separately by the reviewer.

Enter the event at first sight of an occurrence and from the options menu select the camera view(s) used to verify the event. Each event record will include comments describing the observation.

- ❏ Include a High Volume Discard Event for any portion of catch that is not brought onboard the vessel, whenever catch is observed in the water, escaping from torn sections of the net, or seen falling from gear or equipment.
- ❏ Confirm a camera view option was selected:
  - ❍ Camera View Options: *Pump, Stern, or Both*

Primary and Secondary reviewers will select *Unknown* as the Event Reason for all High Volume Discard events. These events will be further examined by Fisheries Monitoring Operations (FMO) and Data Quality Team (DQT) to determine if the reviewer annotation was an operational discard or slippage event.

Release of Unidentified Matter: If at anytime during pumping operations or gear maneuvering a large object is observed in the net or pump and cannot be positively identified, and the crew extracts or releases the object without bringing it on board the vessel, the reviewer will document a Release of Unidentified Matter event, if the reviewer could not distinguish general species characteristics and provide a discard event entry.

Weather Induced Poor Visibility: During fishing operations, reviewers will note when weather events related to fog, high winds, or precipitation reduce image quality and impact video review at the haul level. Typically, more than one camera is impacted. If the weather resolves during the trip and the cameras still have water on them a Crew Specific Event- Cameras Not Maintained would be annotated. This event does not include when the lens or dome cover is foggy or hazy due to damage. Video review that is impacted by a damaged camera or dome cover would fall under EMS-System Image Impairment.

Start Fish Pump to Other Vessel: When catch is pumped from the vessel's gear to a pair or carrier vessel, the start and stop times must be recorded. If catch from the vessel selected for review is pumped out of the net to another vessel, add the point event when pumping begins.

Stop Fish Pump to Other Vessel: When catch is pumped from the vessel's gear onboard a pair or carrier vessel, the start and stop times must be recorded. At the conclusion of pumping, add a Stop Fish Pump to Other Vessel event to verify that pumping has ended.

Start Fish Pump from Other Vessel: When catch from a paired or alternate vessel is pumped onboard the vessel selected for review, add a Start Fish Pump from Other Vessel event when catch first enters the dewatering box.

Stop Fish Pump from Other Vessel: When catch from a paired or alternate vessel is pumped onboard the vessel selected for review, add a Stop Fish Pump from Other Vessel event when the pump is turned off and operations are deemed complete.

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 point event made at the first sight of the glare or lighting issue. The reviewer does not need to create multiple point events within a haul if the glare impacts data collection multiple times within a haul. Detailed comments should include how often the lighting/glare was an issue 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.

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 EMS 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

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.

Note: Continuing during Year 2 of the EFP, reviewers will use the Other Operation descriptor and create a duration event when deck-cleaning occurs between fishing events or at the end of the trip. A Discard Event will accompany a deck-cleaning event if an incidental take or individual animal was removed and discarded; or if haddock was present during the trip or on a previous haul. The reviewer must include the comments field "Deck-cleaning" for each 'Other Operation Issues' whenever this particular event occurs.