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FISHERIES SERVICE
Northeast Fisheries Science Center
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NEFSC



Atlantic Herring Midwater Trawl Electronic Monitoring Project

Pelagics Fisheries: U.S. and European
Perspectives and Shared Experiences

Nichole Rossi, Northeast Fisheries Science Center

Morgan Wealti, Saltwater Inc.

Andrew Jones, Northeast Fisheries Science Center



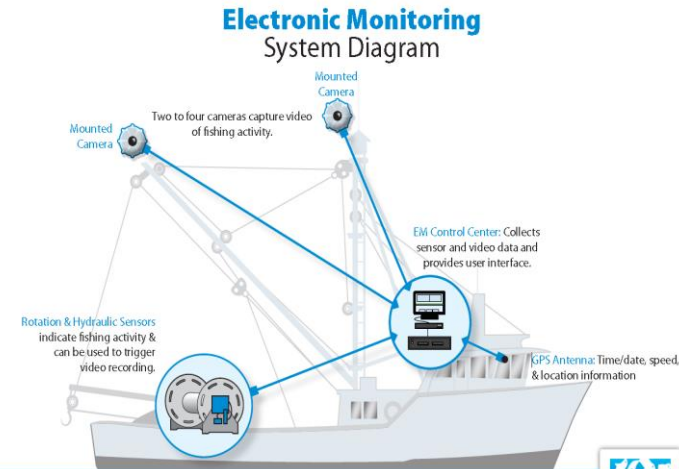
S a l t w a t e r I n c .

Project motivation

- Impending Industry Funded Monitoring (IFM) Amendment
 - Accurate estimate of catch (retained and discarded)
 - Accurate catch estimates for incidental species with catch caps (haddock and river herring/shad)
 - Affordable monitoring for the herring mid-water trawl fleet
- Electronic Monitoring (EM) proposed as a means to increase monitoring while also controlling program costs
- Determine if EM & portside coverage is an adequate substitute for ASM coverage aboard mid-water trawl (MWT) vessels
- EM would confirm catch retention for portside sampling and verify compliance with slippage restrictions
- Portside would collect species composition and age/length data

Electronic Monitoring mid-water trawl study

- Competitively awarded funding from FIS/NOP
- NMFS contracted services with Saltwater Inc. (August 2016 – January 2018)
- 11 MWT vessels volunteered to participate in the study
- Study objectives; (1) evaluate the utility of EM to monitor catch retention, and (2) identify (detect and categorize) discard events
- Final report produced January 2018
- NMFS conducted a peer review of the project findings with council staff



Project statistics

- Approximately 230 MWT trips sailed during the study period
- EM was operating and data was collected on 192 trips
- Saltwater, Inc. performed a “census” review (100%) on 126 trips
- NMFS performed a secondary “audit” review (video review during hauling gear/catch sorting) for 126 trips
- EM successfully recorded 97% of the fishing activity
- Video quality rated at least “excellent” or “good” on 77% of footage

Core Analysis

- To determine if EM could provide adequate catch monitoring to ensure catch retention we compared data sets to determine level of agreement
- Focused on paired EM reviews (the 126 trips with 100% video that were annotated by Saltwater Inc. and the Fisheries Sampling Branch)
- On these trips events that could be categorized as **slippage** (i.e., **full releases & partial releases**) were rolled up to the haul level (two partial releases on the same haul were lumped together) and counts of these events were compared
- Further comparison to NEFOP data for counts of similar events (only 32 trips ~25% had NEFOP observers)

Documenting Discard Events

- **Full Release Slippage**

Release of the entire contents of the net back into the water

- **Partial Release Slippage**

Release of a portion of catch from net or components used to pump catch (pumping activity is initiated)

- **Operational discards**

Fish that cannot be pumped and remain in the codend after pumping operations

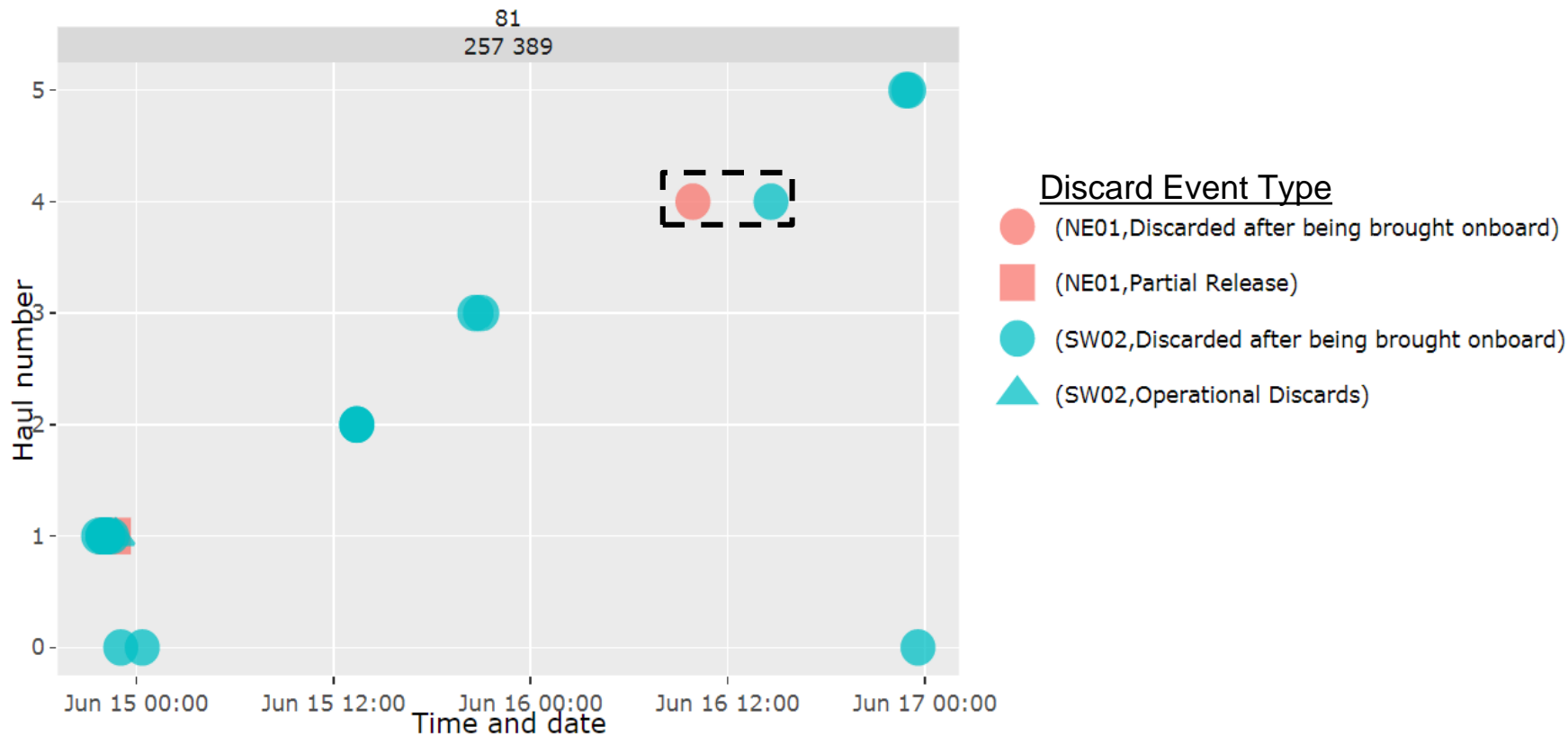
- **Discard after onboard**

Individual discards or multiple fish primarily from dewatering box

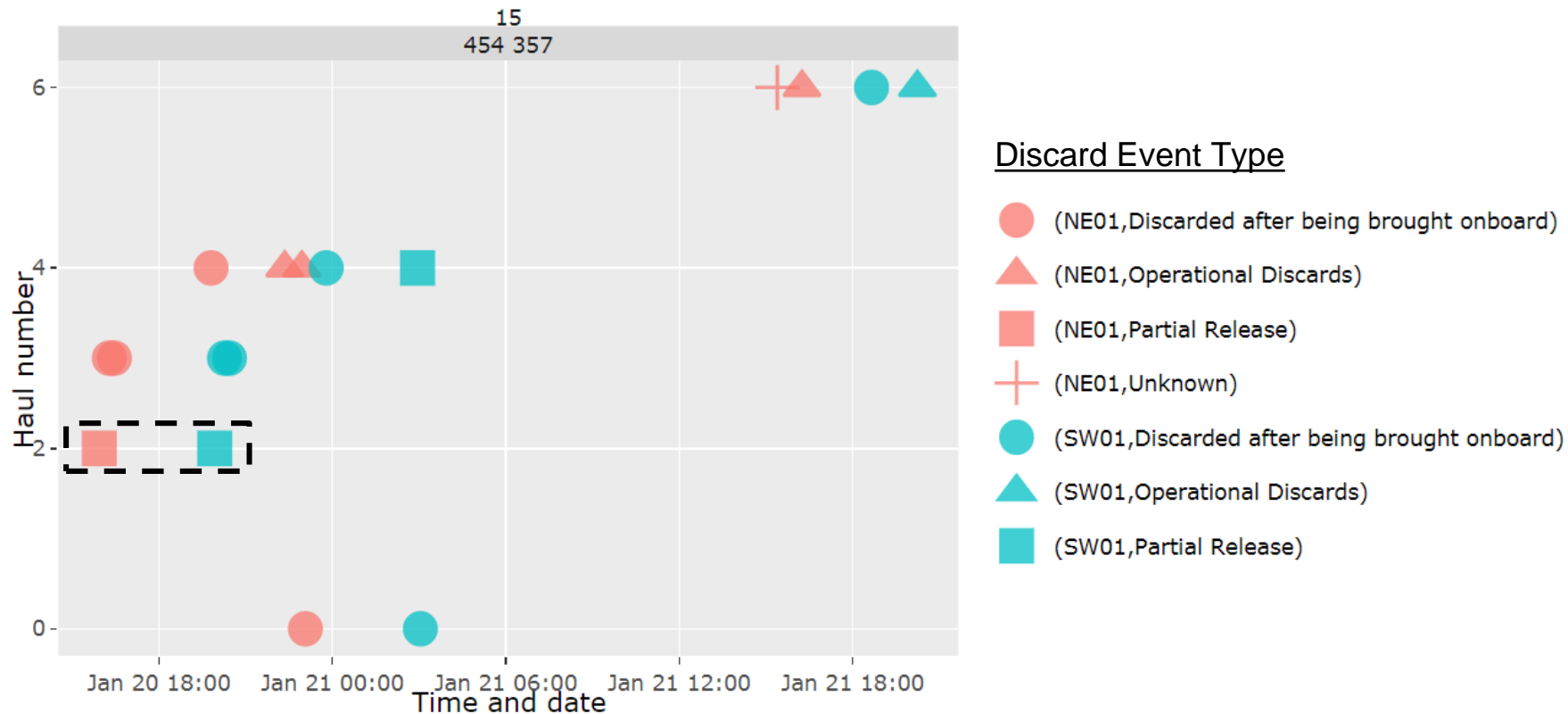
- **Unknown/Other**

Fish in water, unsure of source

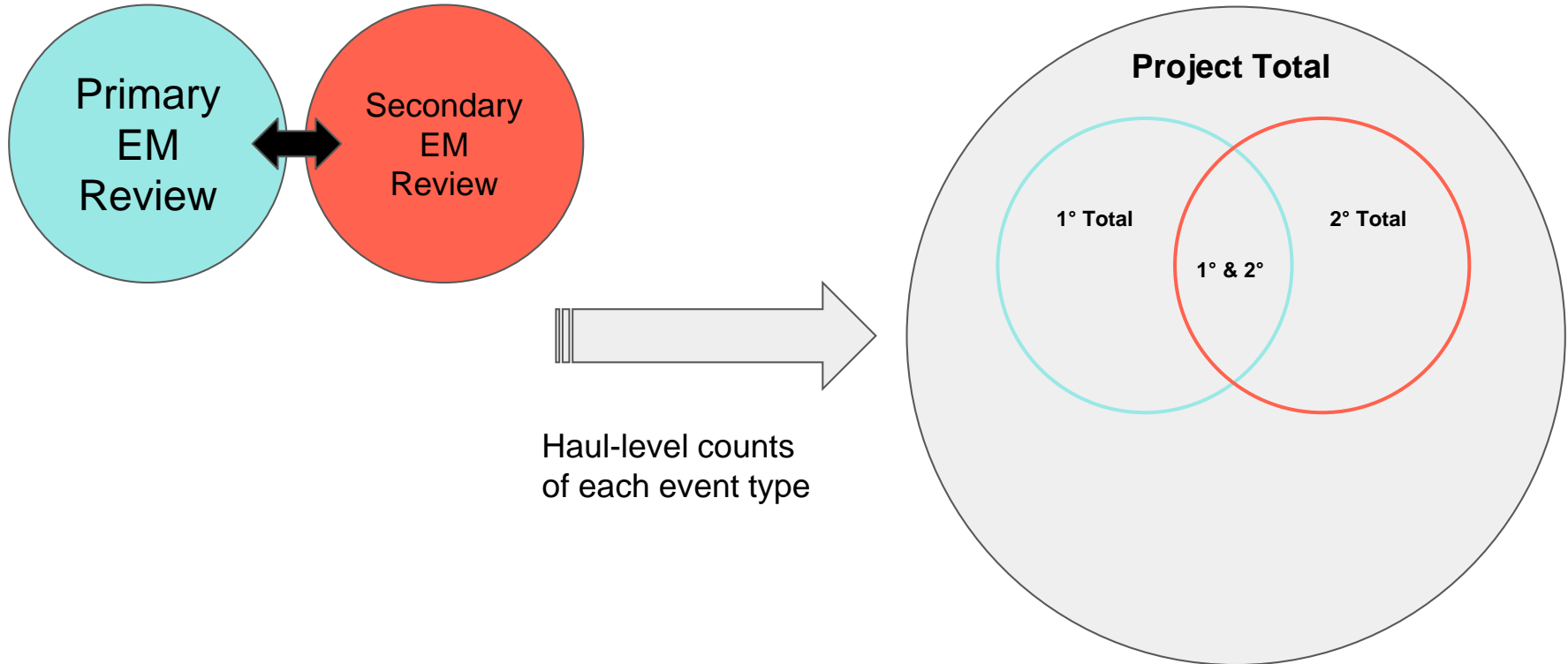
Analysis: Haul level comparison of notes



Analysis: Haul level comparison of notes

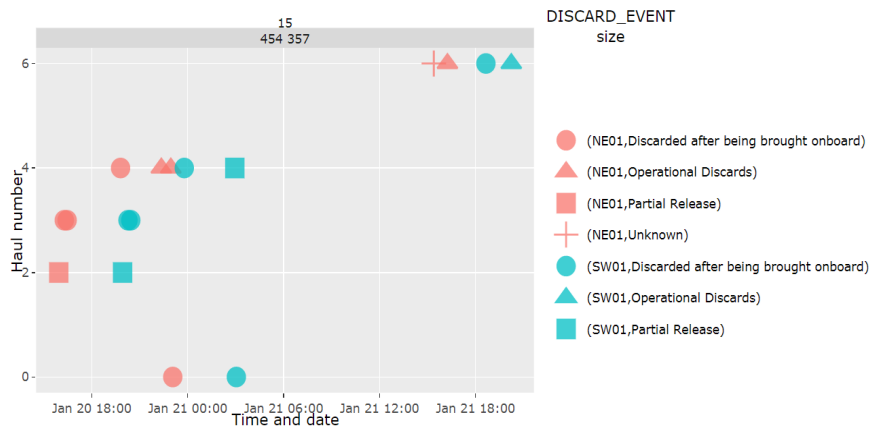


Analysis: Comparison of catch/discard data sources

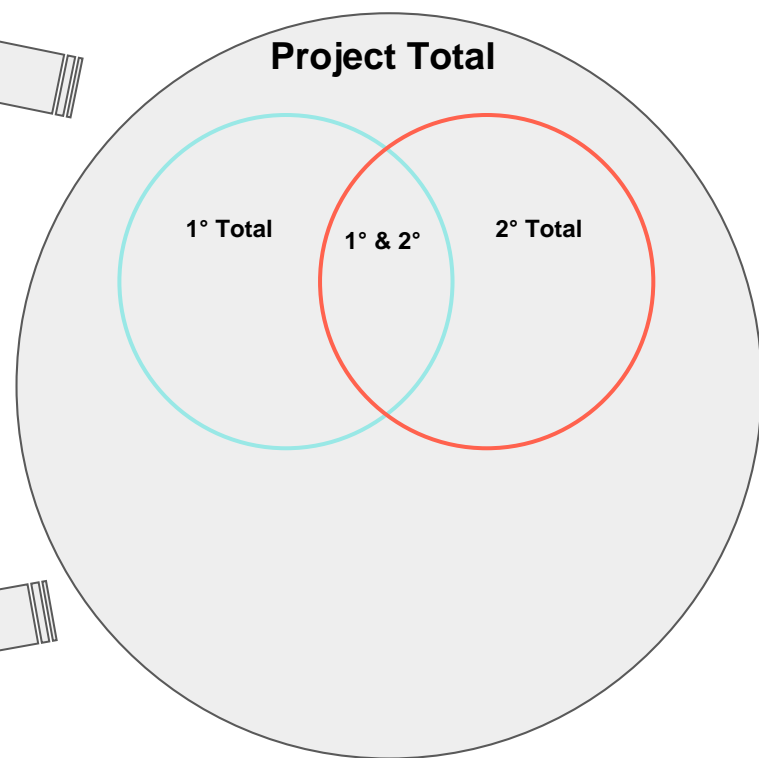
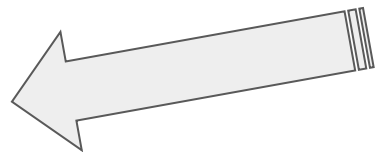
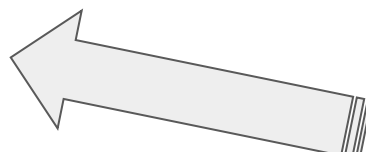


Analysis: Detection vs categorization

Categorization: an event seen and categorized consistently across data sets

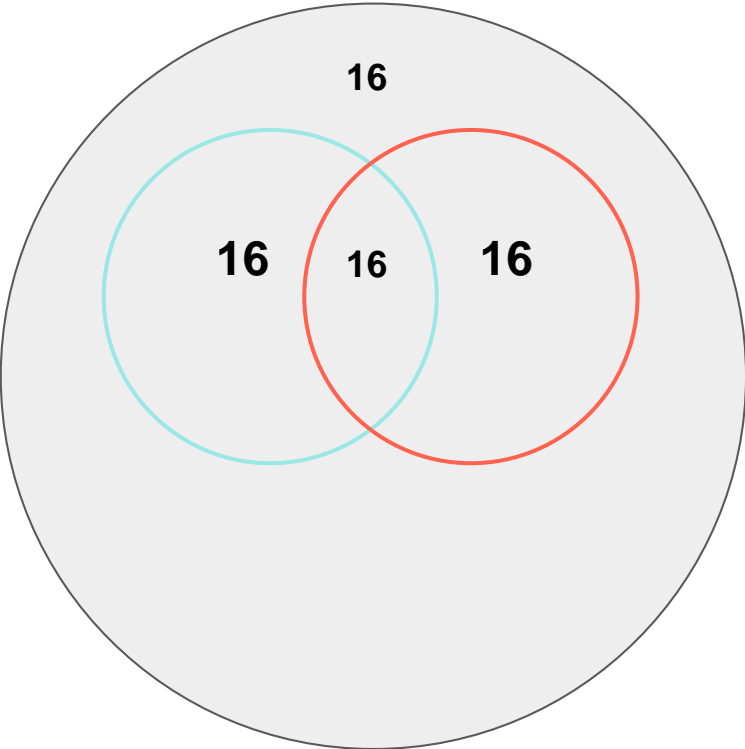


Detection: an event seen, but categorized differently by sources (typically inferred from comment fields associated with an event)

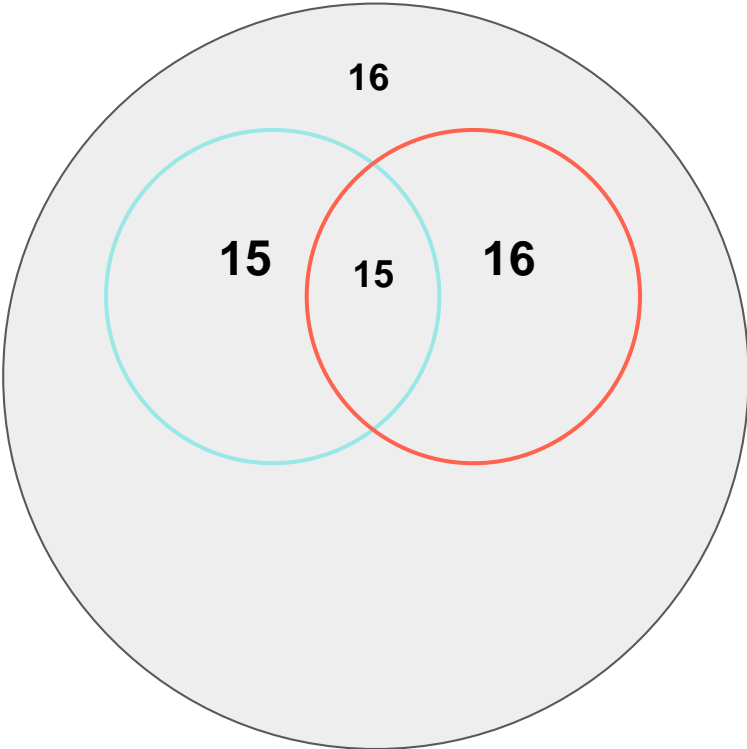


Full Release Discard Events

Detection

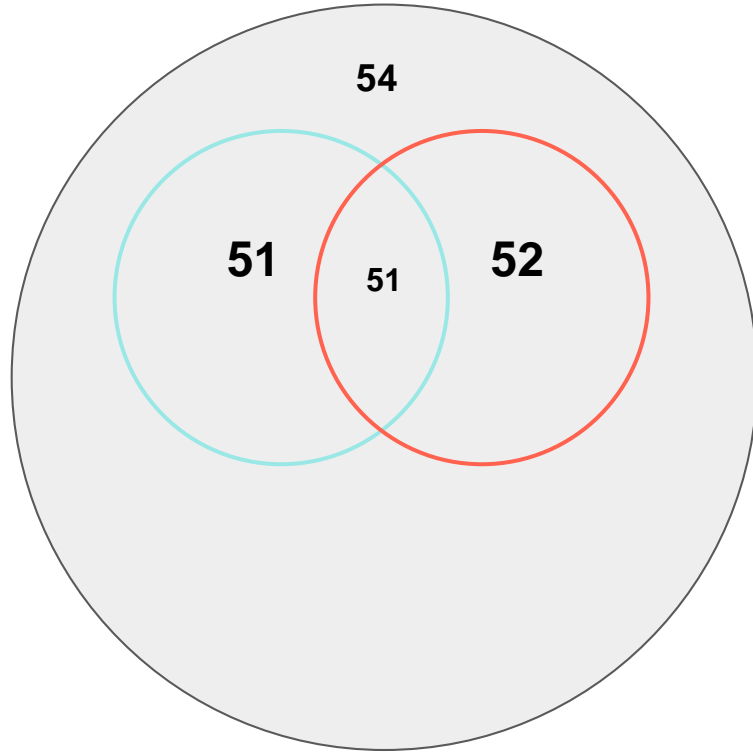


Categorization

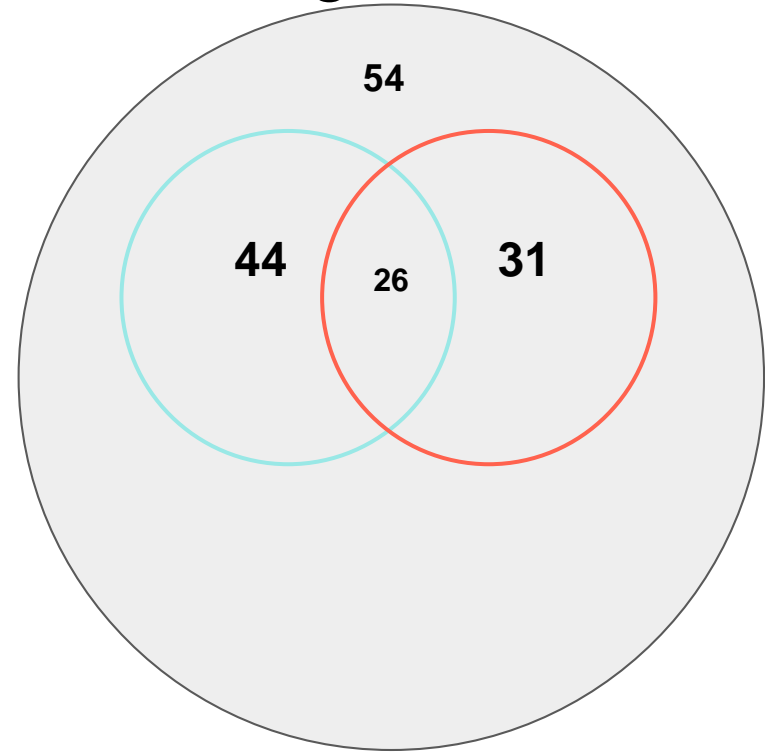


Partial Release Discard Events

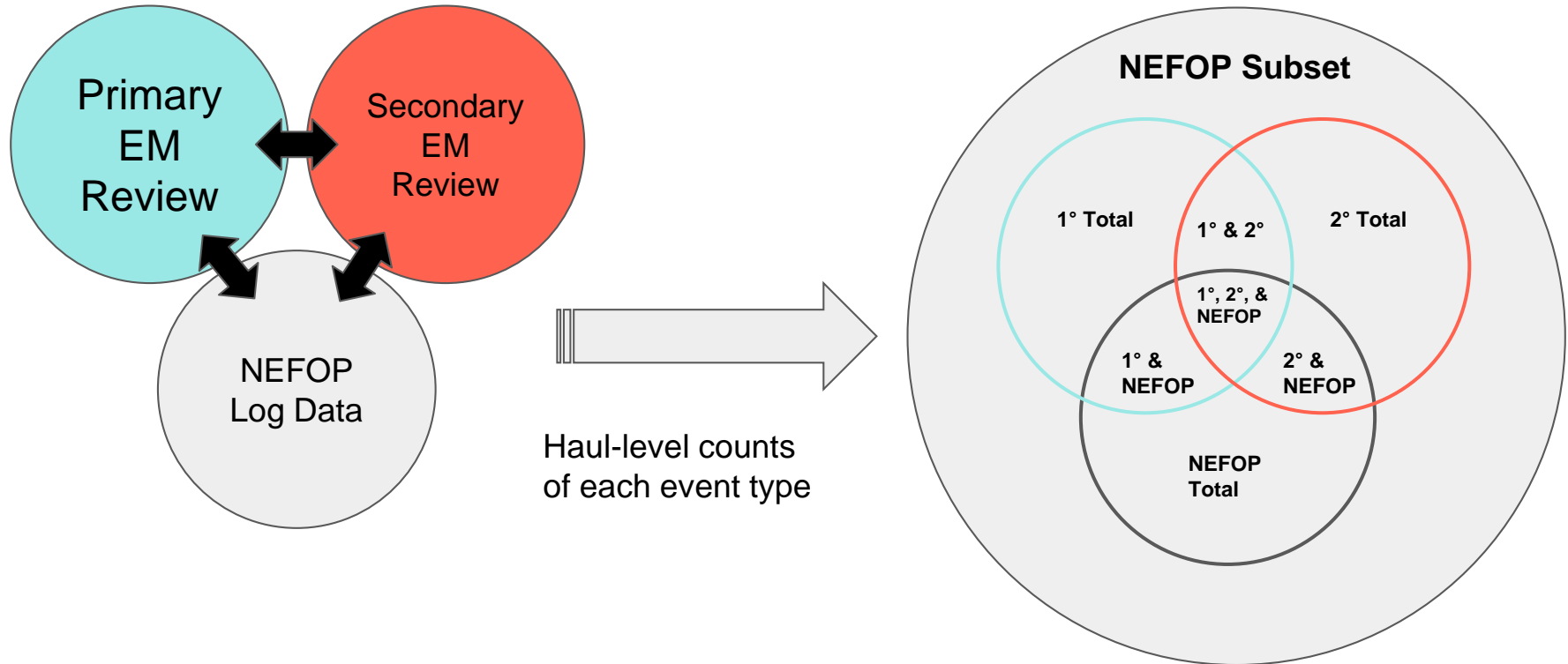
Detection



Categorization

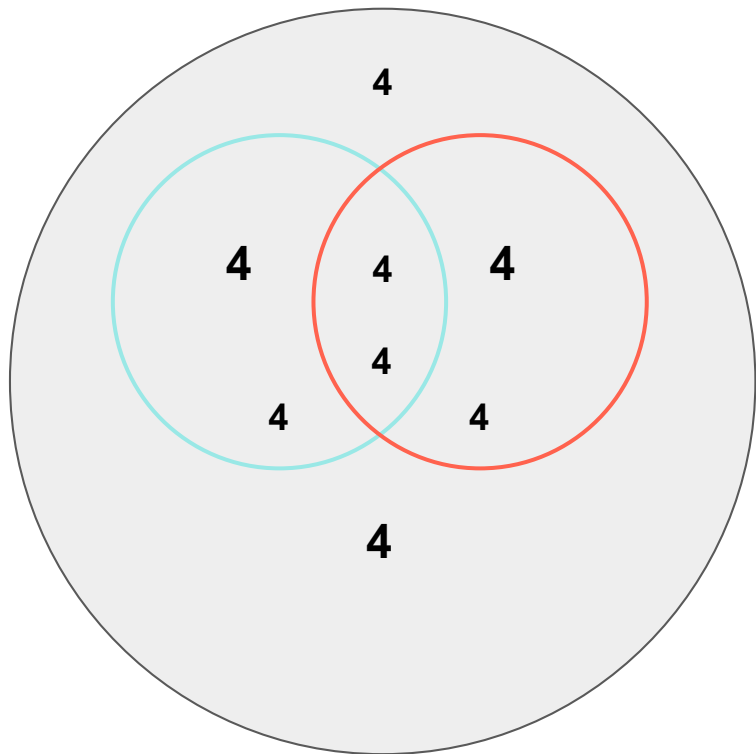


Analysis: Comparison of discard data sources

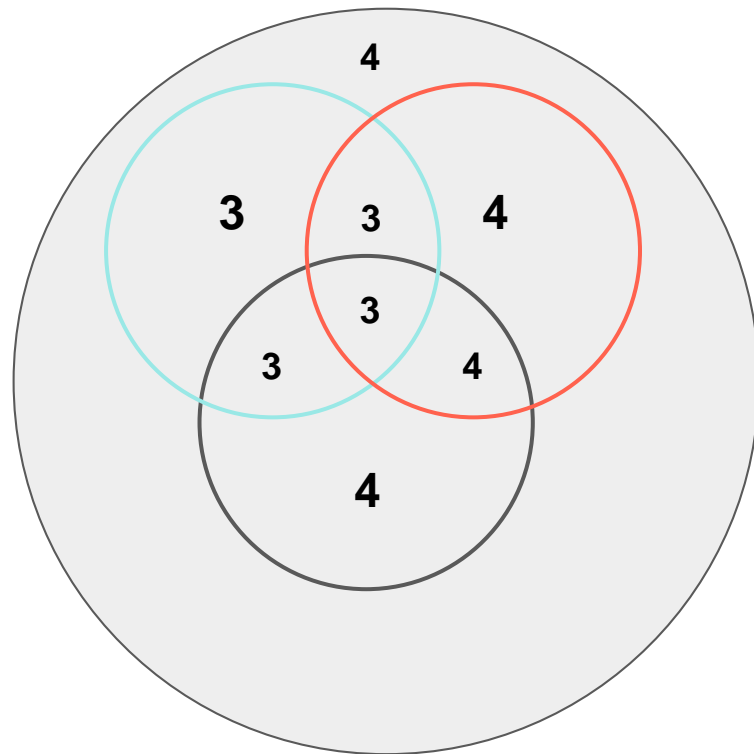


Full Release Discard Events

Detection

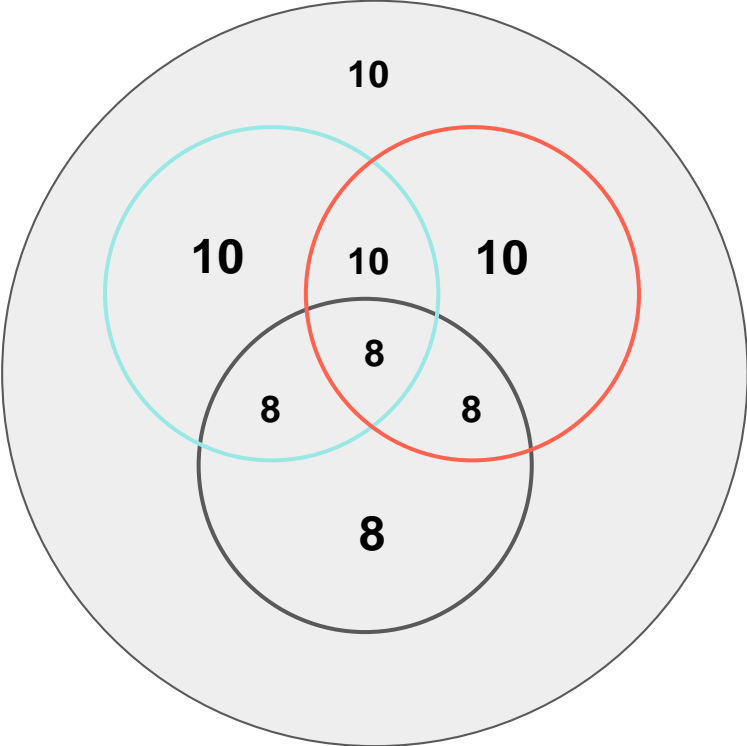


Categorization

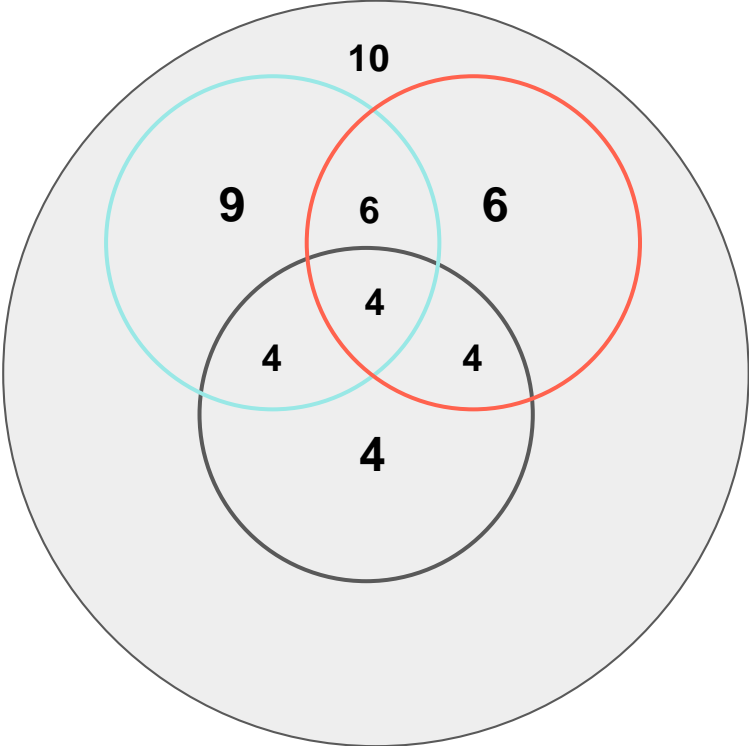


Partial Release Discard Events

Detection



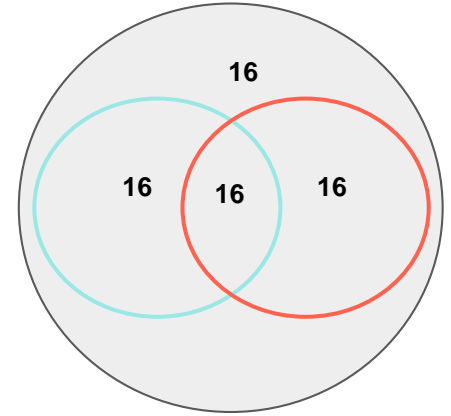
Categorization



Result summaries for slippage events

Strengths of Electronic Monitoring:

- Detection of full release events (agreement is high)
- Detection of partial release events
- Categorizing full release events
- Moderately successful at categorizing partial release events
 - Primary confusion was between operational discards and partial release events



Result summaries for non-slippage events

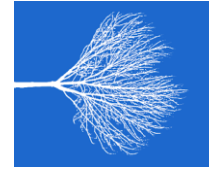
- Many small ‘discards’ occurred throughout the project
 - Operational discards (small amounts left at the end of pumping)
 - Discards of individual fish at the dewatering box grates
- Agreement was lower for these smaller more numerous events (likely could be improved with additional coordination/standardization of review protocols)
- Key difficulty was in determining the motivation for release events (which can play into the event categorization)
- The size of events was not a focus of this study, but results suggested that estimating the volume based on camera data alone was likely not possible





Review software allows reviewers to efficiently extract the information needed by fisheries managers

Collaborative development of
open-source review software
promotes efficiency and innovation



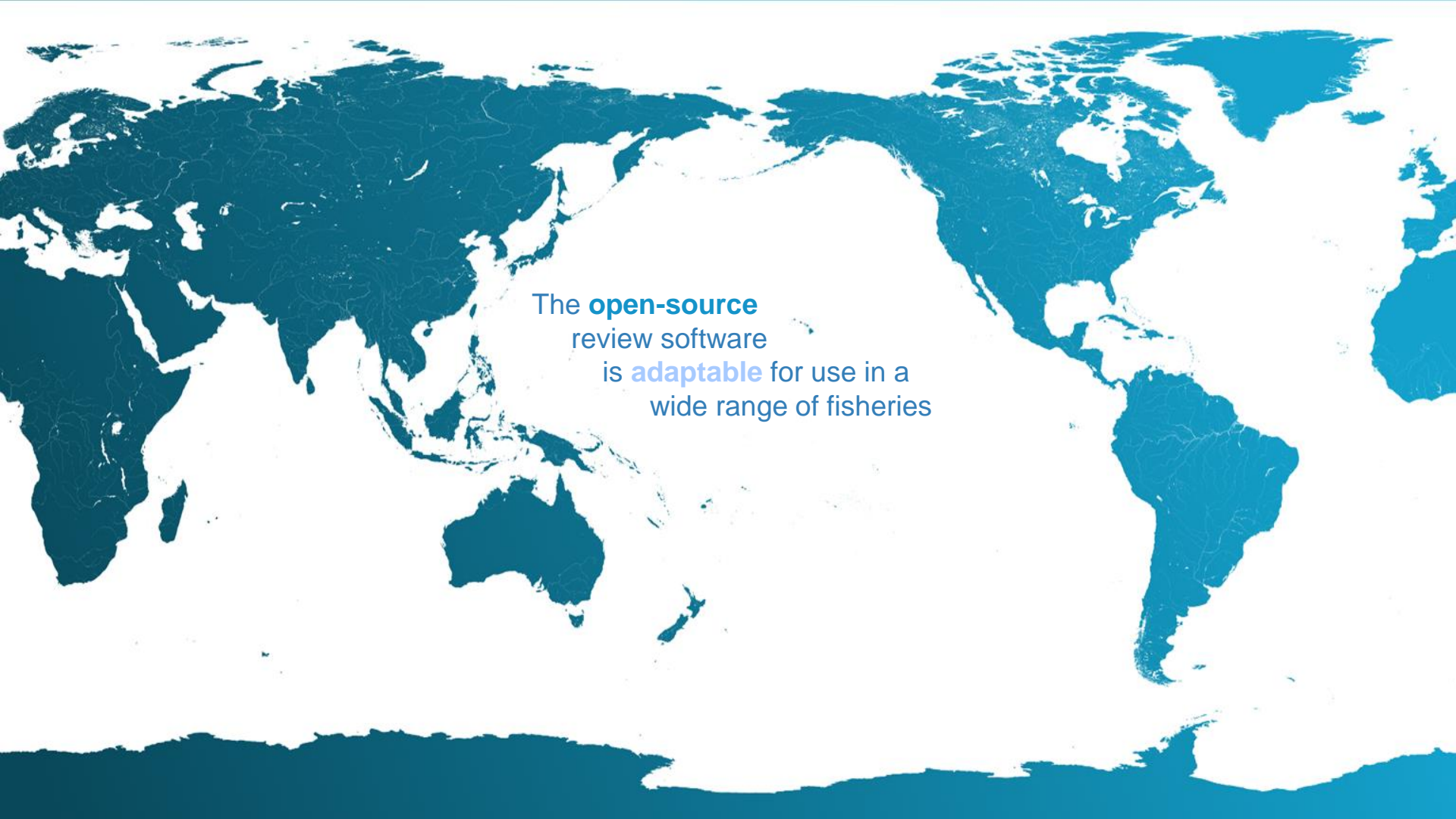
chordata llc



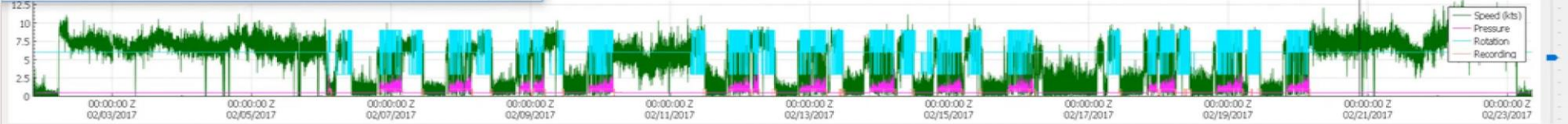
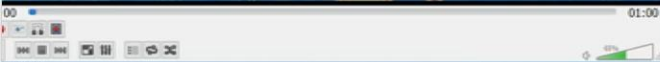
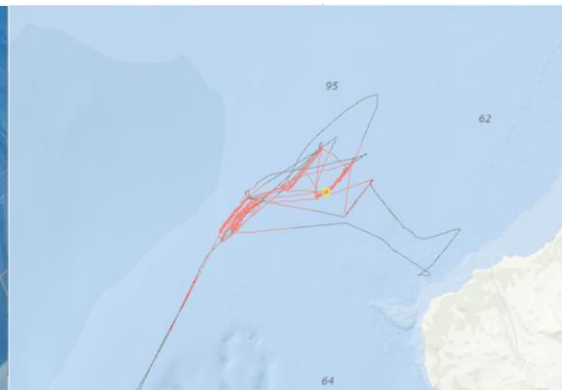
NFWF



Saltwater Inc.
Electronic Monitoring



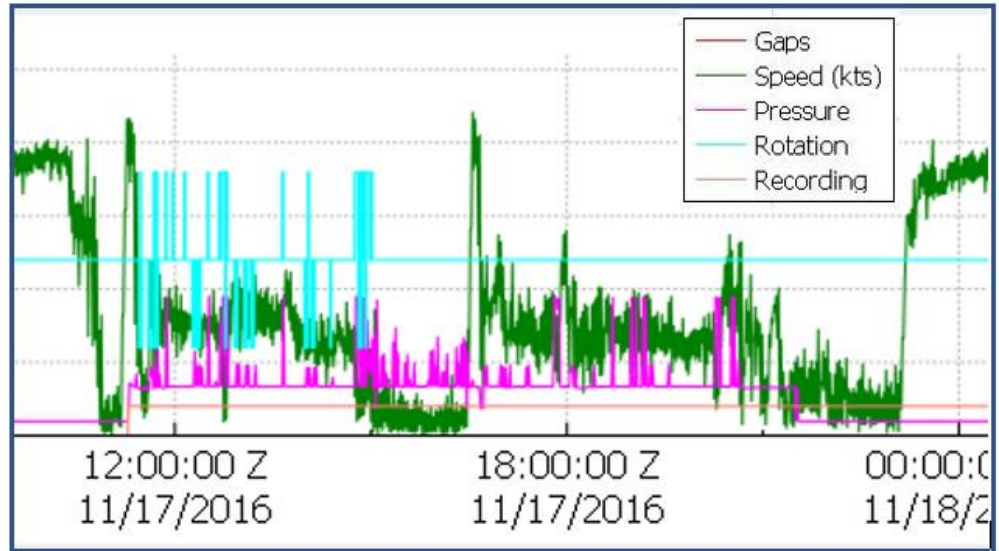
The **open-source**
review software
is **adaptable** for use in a
wide range of fisheries



Navigation and control buttons: << One Frame, Play/Pause, One Frame >>, Add Event, Event Detail, Delete Event, 02/20/2017 21:09:03 Z 1X

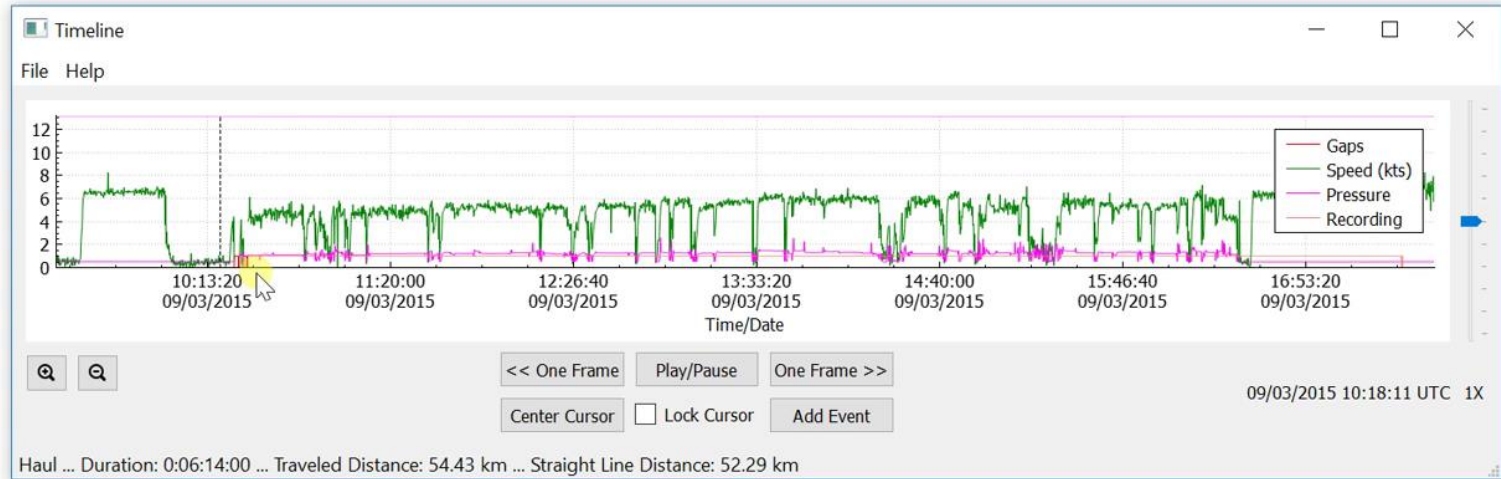
Advanced controls: Jump To..., Center Cursor, Lock Cursor

A timeline allows the reviewer to quickly identify fishing events

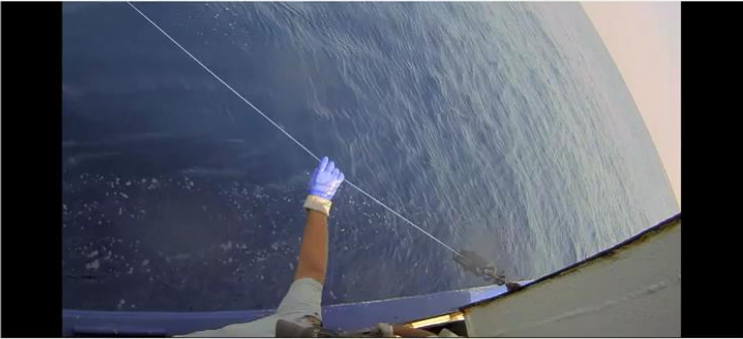




Reviewers can see graphically when fishing occurs and then accurately jump between fishing events



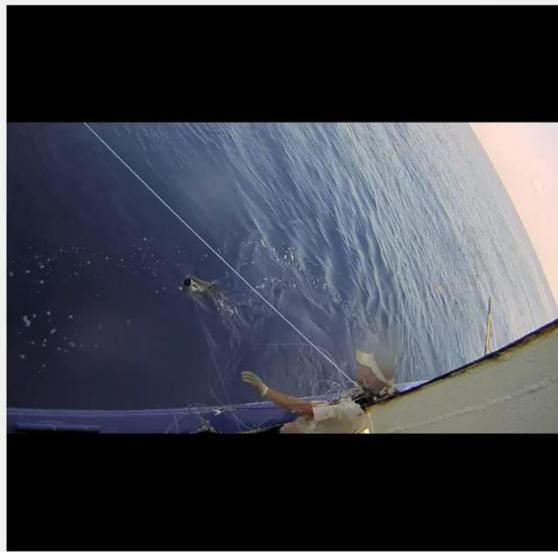
Reviewers can mark fishing event start and end times with ease



01:37:14 01:59:59

Save Image Measure Play/Pause Lock Playback to Timeline 09/02/2015 15:35:17 UTC

The video player displays a scene where a person's arm, wearing a blue nitrile glove, reaches out to hold a thin white rope. The rope extends across the upper portion of the frame. Below the rope, a dark, textured surface, possibly a boat's hull or a piece of equipment, is visible. The background is a vast, blue body of water under a clear sky. The player interface includes a progress bar at the top with a slider, and a control bar at the bottom with buttons for 'Save Image', 'Measure', and 'Play/Pause', along with a checked 'Lock Playback to Timeline' checkbox and a timestamp '09/02/2015 15:35:17 UTC'. A mouse cursor is positioned over a small icon in the bottom right corner of the player.



04:40

01:59:59

Save Image

Play/Pause

Lock Playback to Timeline 09/02/2015 14:02:43 UTC



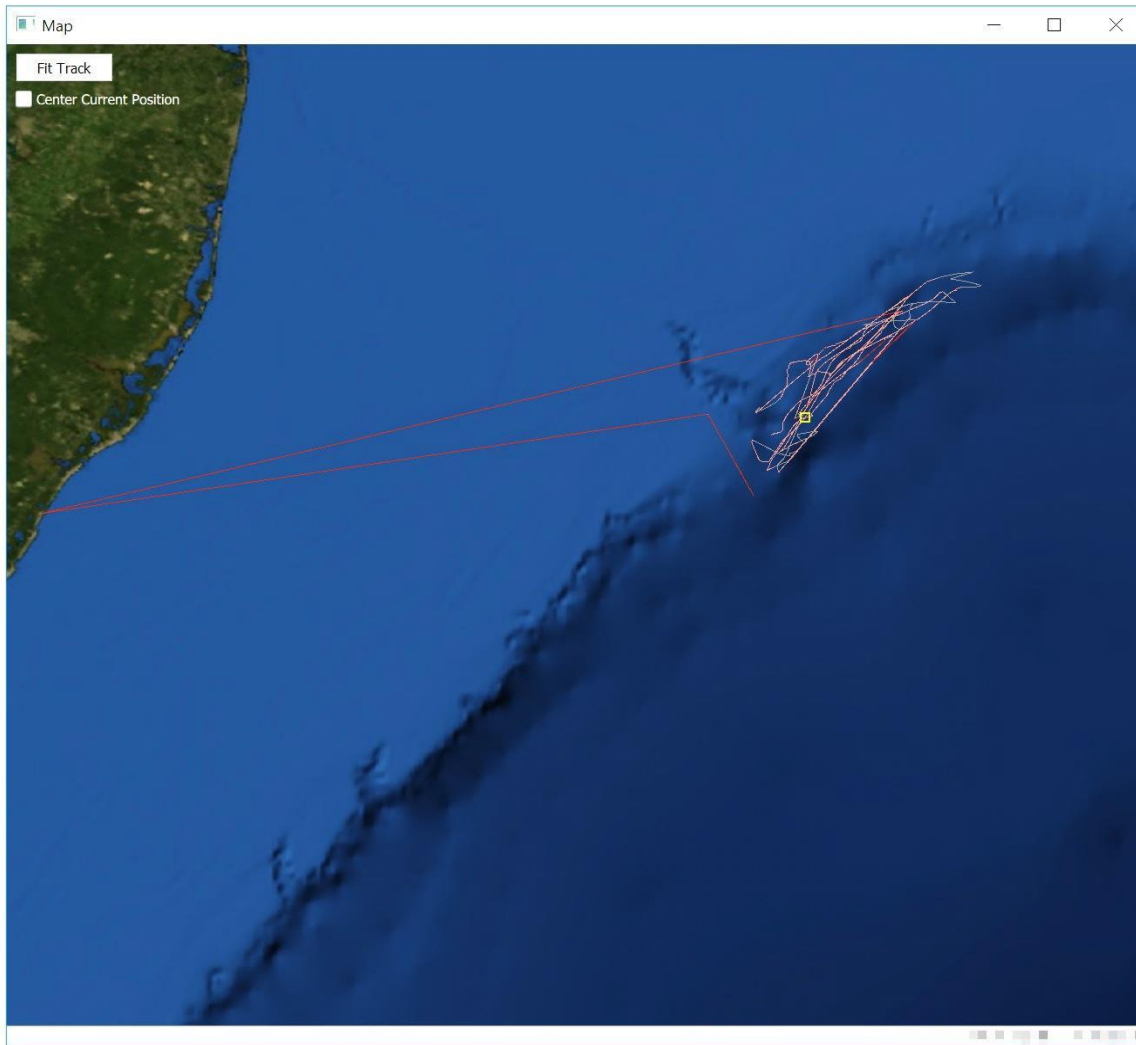
04:40

01:59:58

Save Image

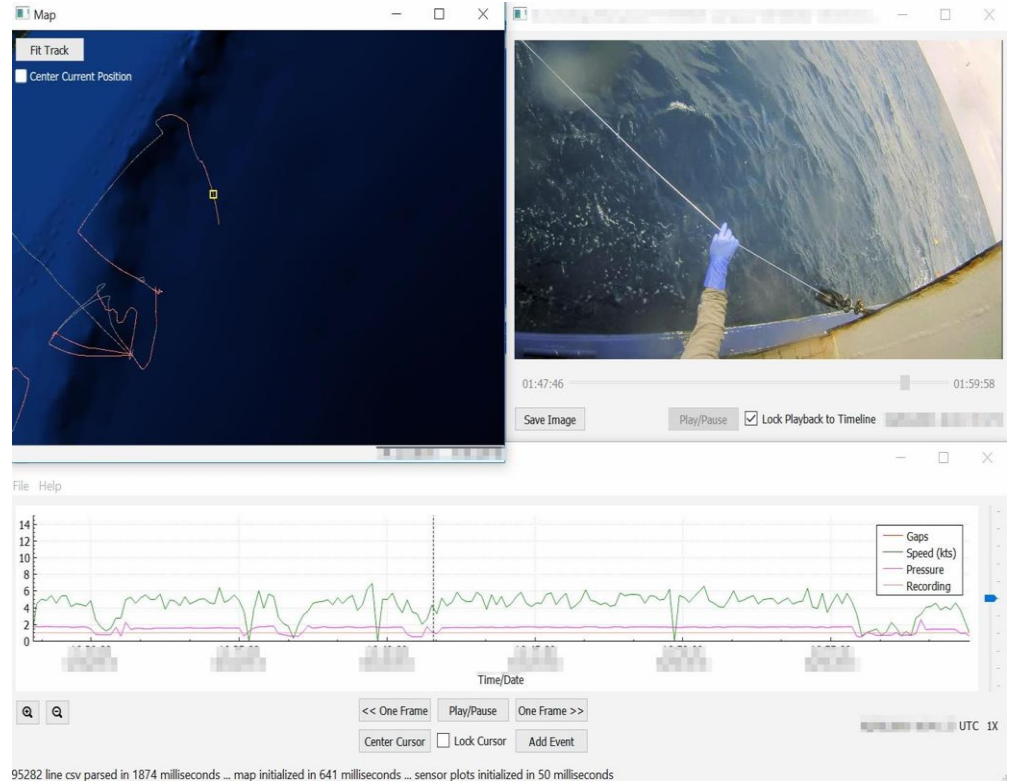
Play/Pause

Lock Playback to Timeline 09/02/2015 14:02:42 UTC

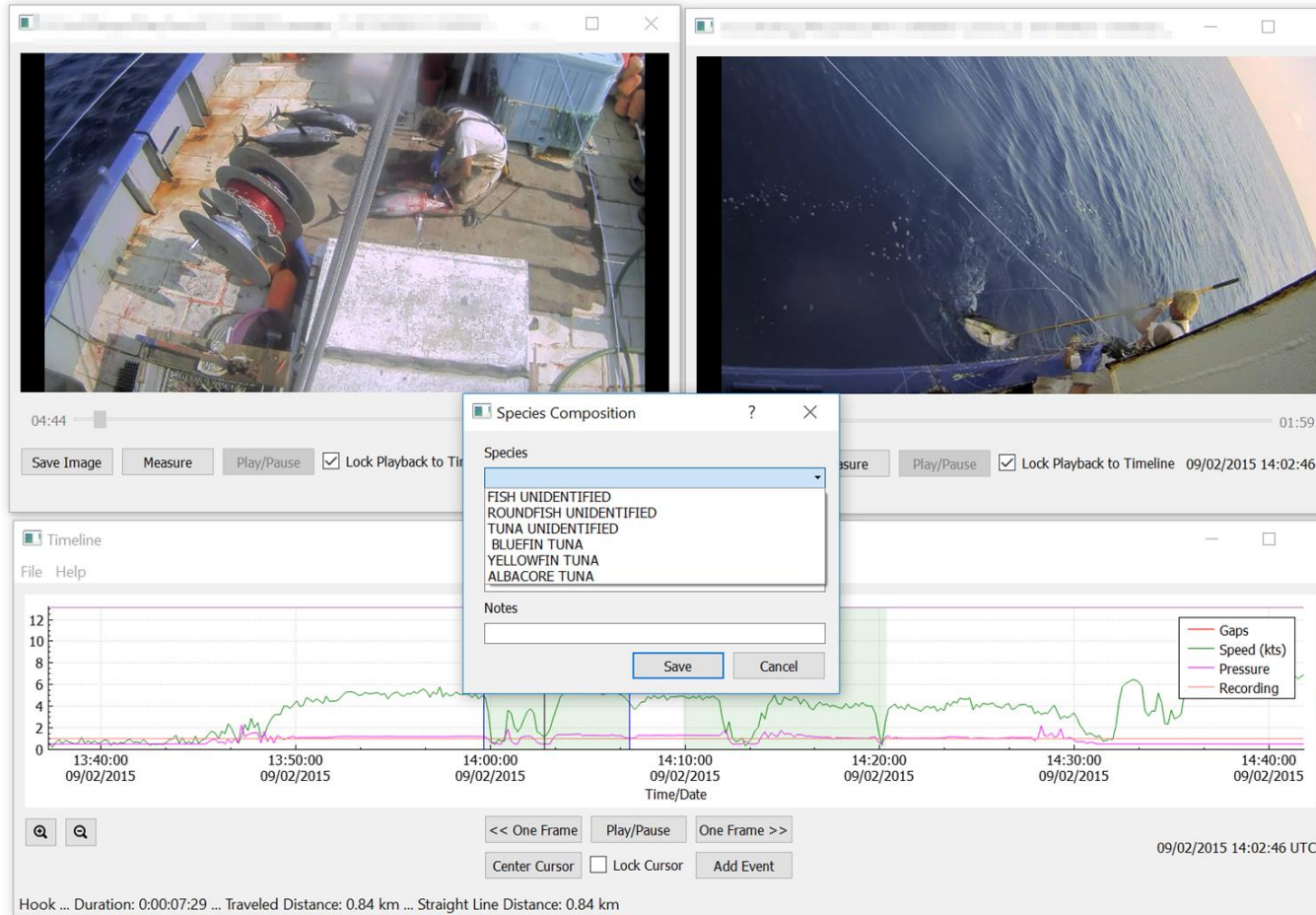


The review software plots GPS data on a map to track fishing activity

The map is synchronized to the video and timeline so reviewers can leap to any time and place



Reviewers can note when catch was retrieved and identify the species



haul_starttime	haul_endtime	lat_start	long_start	lat_end	long_end	haul_number	haul_notes
1452033368.89	1452042164.32					"1"	"
1452046371.66	1452054039.62					"2"	"
1452061214.80	1452066582.12					"3"	"
1452068099.14	1452073668.06					"4"	"Engine Trouble"
1452077537.68	1452084052.56					"5"	"
1452110136.94	1452118487.25					"6"	"
1452123858.03	1452132034.31					"7"	"
1452135438.83	1452138287.79					"8"	"Bluefin in Haul"
1452141278.38	1452148283.92					"9"	"
1452153639.70	1452158909.27					"10"	"
1452162994.59	1452172060.17					"11"	"
1452173180.63	1452179307.27					"12"	"
1452196725.12	1452201733.86					"13"	"
1452205606.02	1452208693.41					"14"	"



Reviewed datasets can be easily exported to fisheries databases

Lessons Learned

- Early collaboration to develop and finalize data fields
- Clear definition of events of interest
- The following views are required to capture all discarding behaviour:
 - Fish Pumping (Often requiring a boom)
 - Dewatering Box
 - Full Deck
 - Stern
- Vessel Monitoring Plans customized to each vessel in regards to views, catch handling, system use and issue reporting.

Review panel findings

- EM Review Panel determined EM is suitable for detecting discard events in the herring MWT fishery
- NMFS determined that EM/Port Side Monitoring is an adequate substitute for ASM coverage aboard MWT vessels
- NMFS recommends the Council approve EM/PS as a monitoring option for the herring MWT fishery
- NMFS recommend that EM/PS be initially administered under an EFP (to be highly flexible and able to respond to emerging issues)

Summary of council actions in New England

- NEFMC took final action on the IFM Amendment at its April 2017 meeting
- Proposed regulations were sent to NEFMC for deeming in December 2017
- Proposed rule is being reviewed by NMFS
- Implementation would be fall 2018
- NEFMC passed a vote to support that EM/PS is an adequate substitute for ASM aboard MWT vessels and that an EFP be used to initially administer the EM/PS program (April council meeting)

Questions