

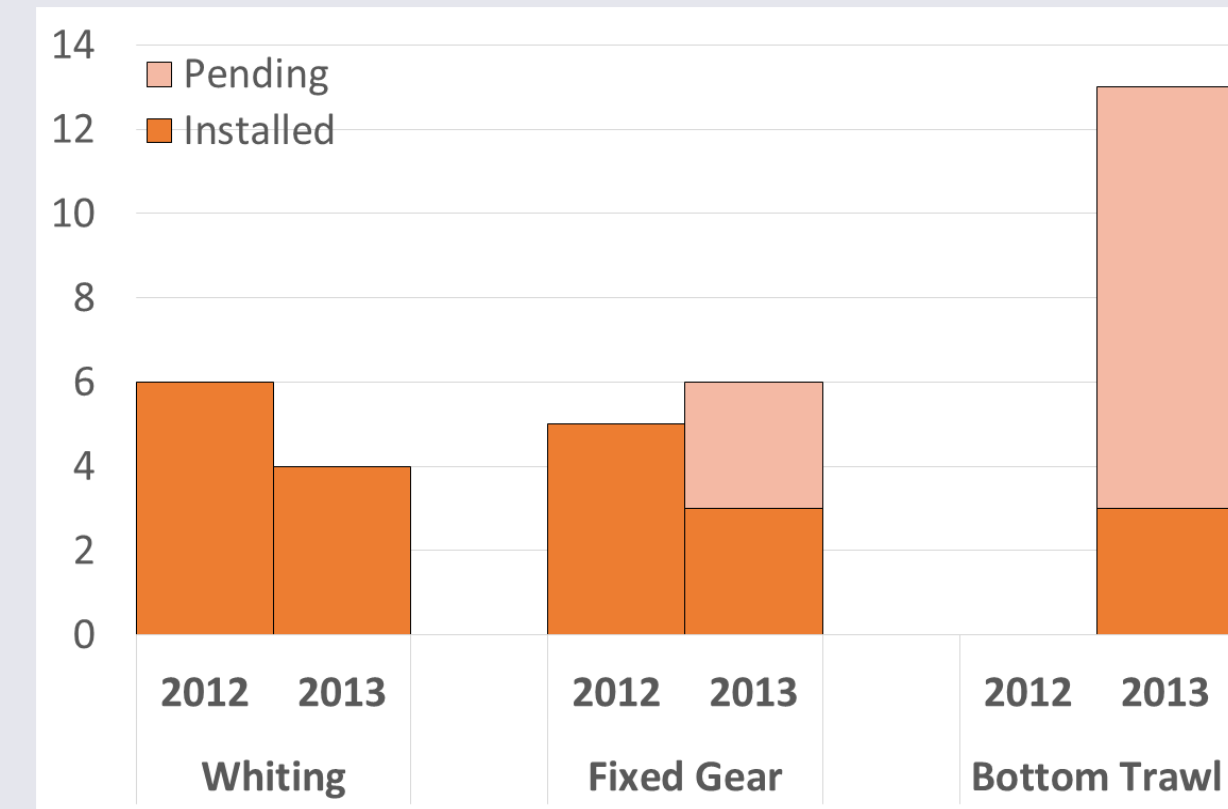
West Coast Groundfish Trawl IFQ Electronic Monitoring Program



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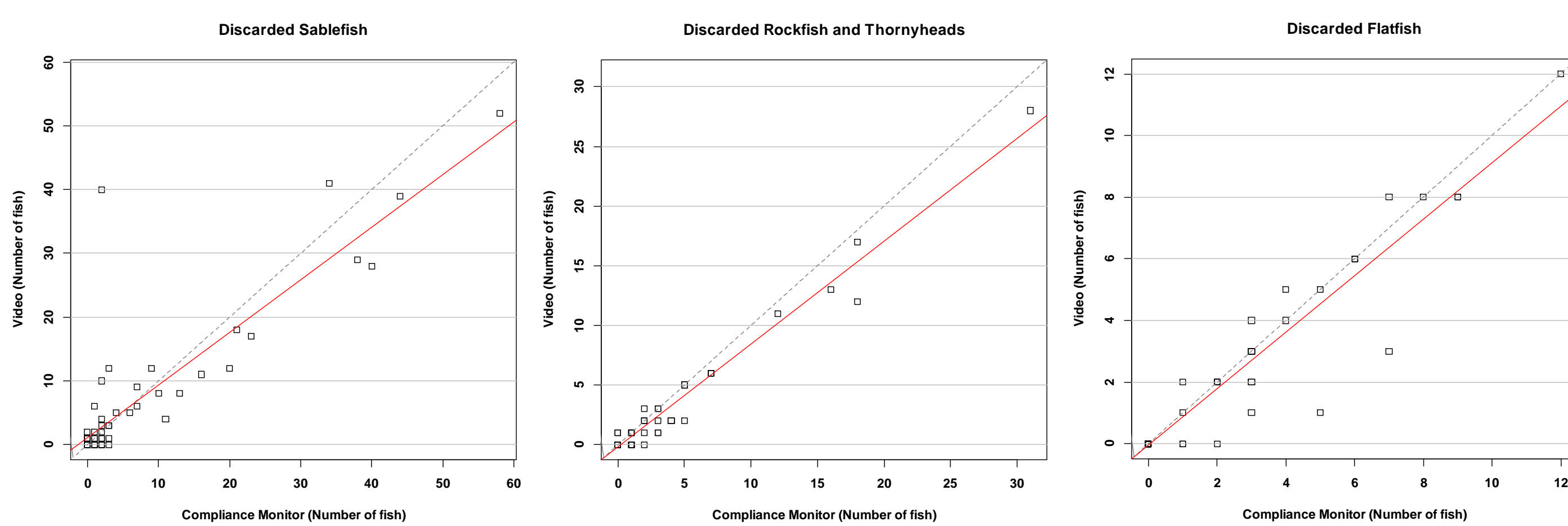
PSMFC Involvement

PSMFC began testing EM systems on three sectors of the west coast groundfish Individual Fishing Quota (IFQ) fishery in the summer of 2012. The project expanded to include bottom trawl vessels in 2013.

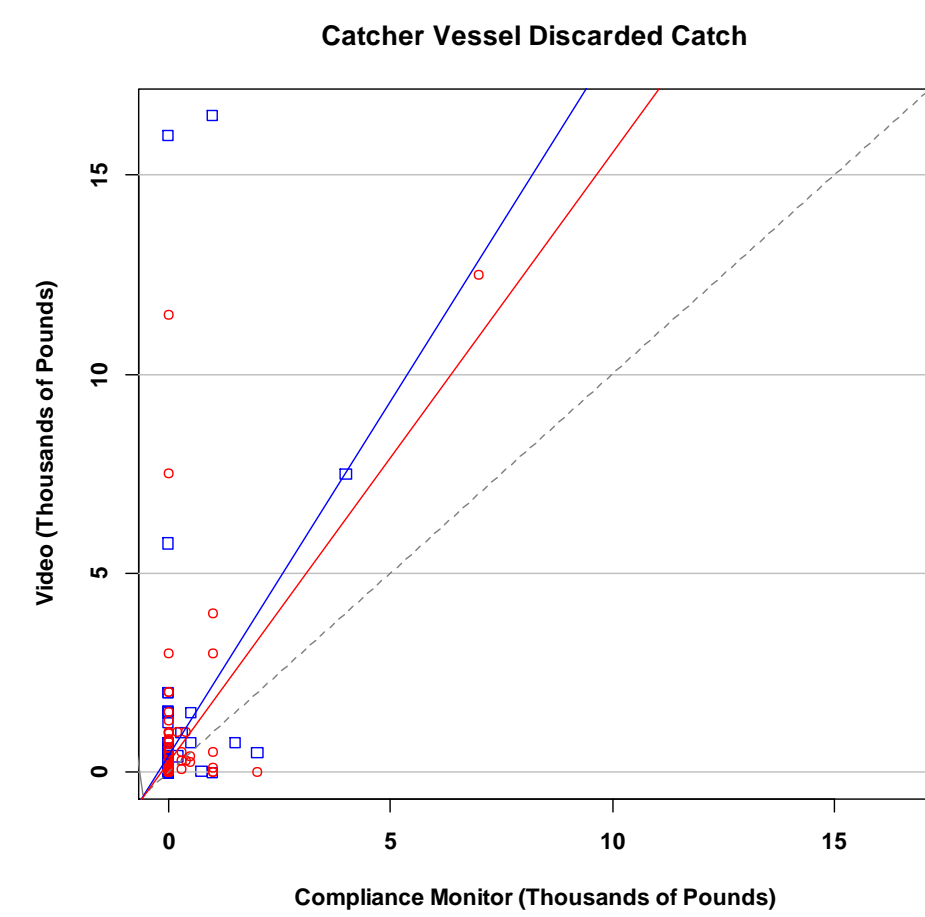


2012 Results

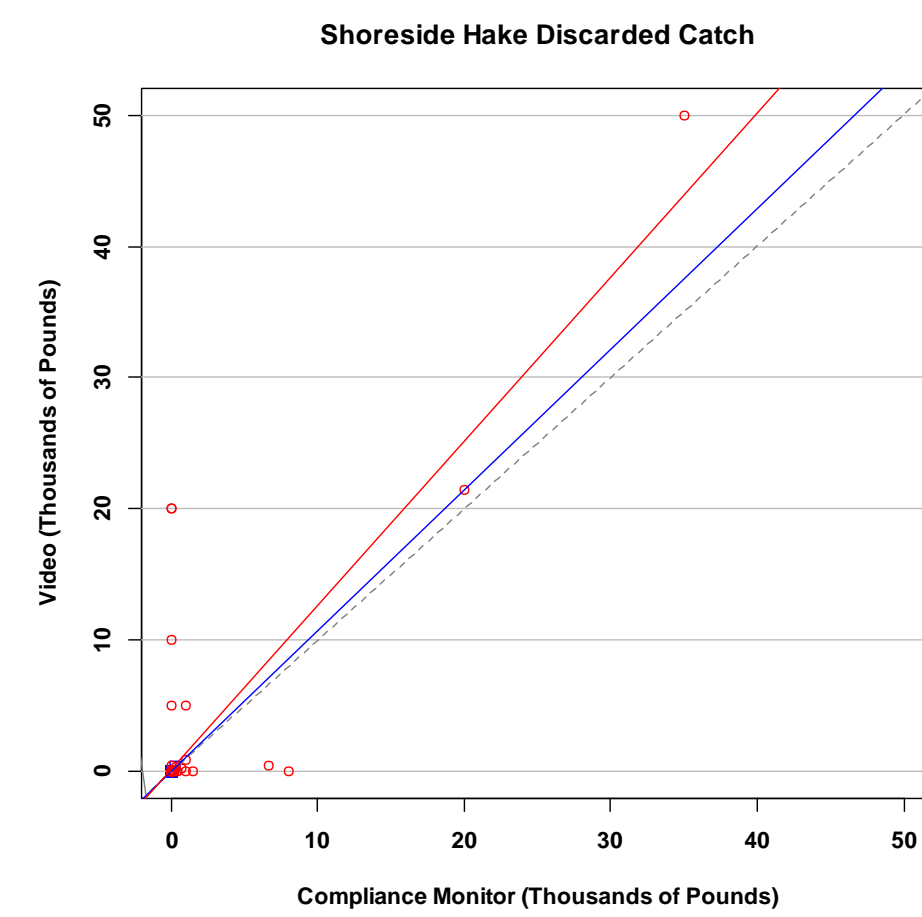
Fixed Gear Sector:



At-sea Hake Sector:



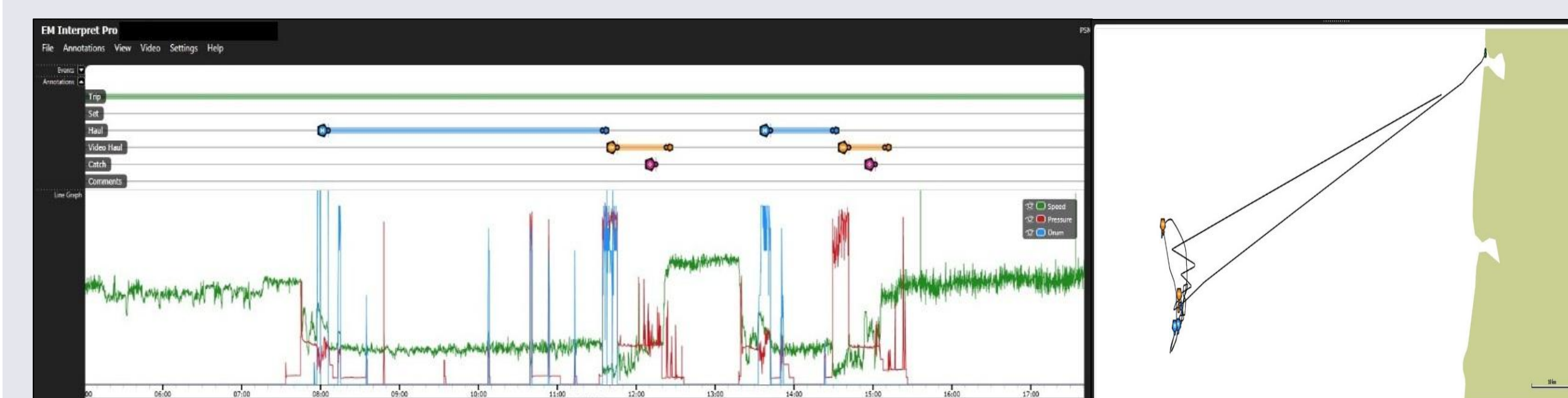
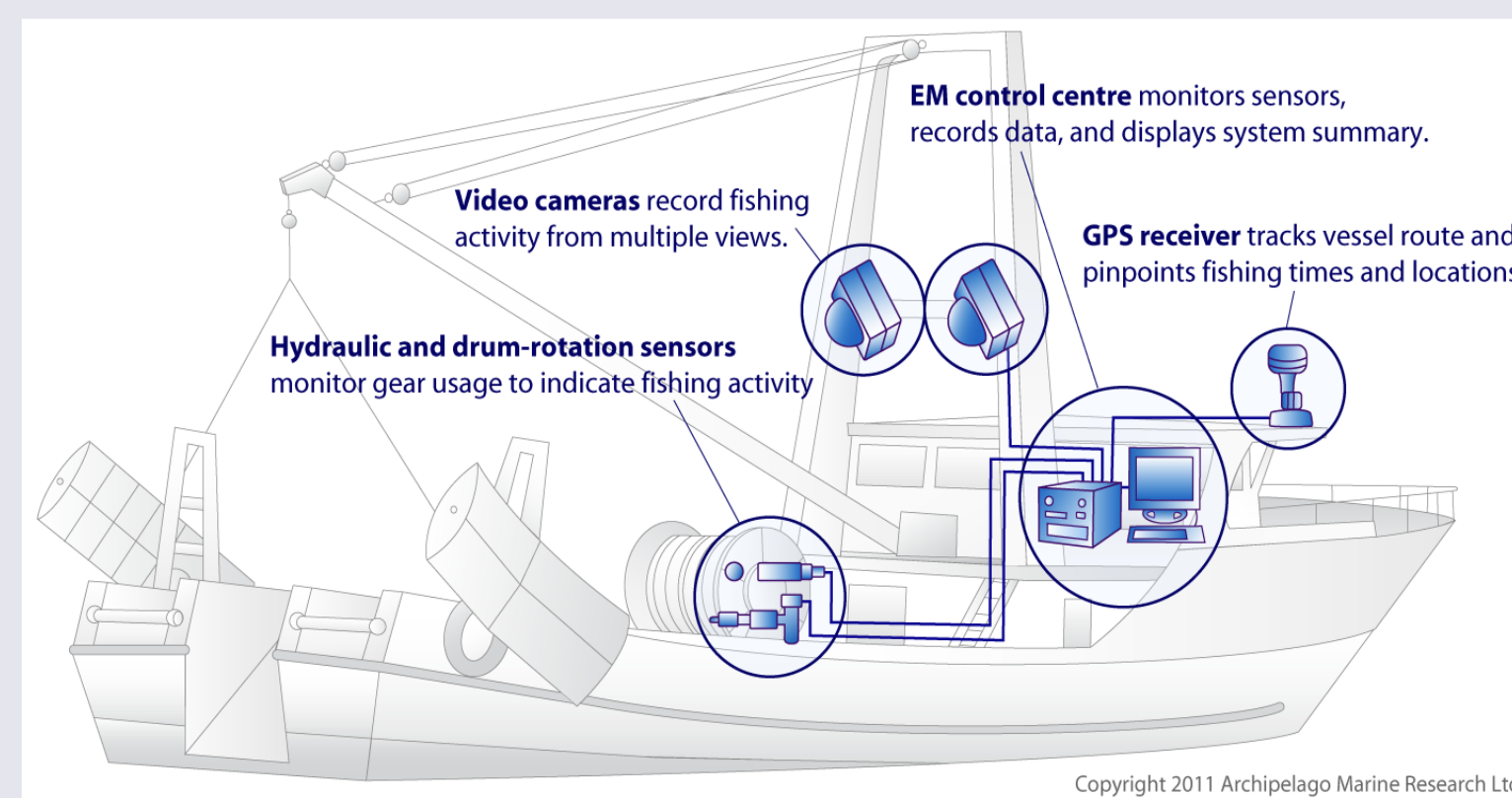
Shoreside Hake Sector:



Camera Systems

Camera systems typically consist of:

- Video cameras
- Sensors for:
 - Location and speed (GPS)
 - Fishing activity indication (drum rotation or hydraulic pressure)
- Control box that controls the system and stores the data.



Objective

To test the viability of Electronic Monitoring (EM) as a source of data to achieve effective individual accountability of catch and bycatch in the Pacific Trawl Rationalization Program.

Relevance

The Pacific Fisheries Management Council is considering EM for use in the Pacific Trawl Rationalization Program to assess methods of catch and bycatch monitoring of the fishery that are viable substitutes for the current 100% human at-sea monitoring.

Moving parts of an EM Program

Vessels and Willing Participants

Camera Systems

Field Services

- Install Systems
- Retrieve hard drives
- Fix camera systems

Software to Expedite Review Time

Review Sensor and Video Data

Database to Support Infrastructure and Analysis of Data

Issue

Obtaining weights of catch and bycatch

Accurate speciation

Changes in fisher behavior needed for clear camera views

Data security

Data review time

Defining catch and discard

Working Solution

Volumetric density, length/weight relationships with measurement strips, and full retention studies

Digital cameras, full retention/discard chute study

Feedback forms and direct contact

Encryption

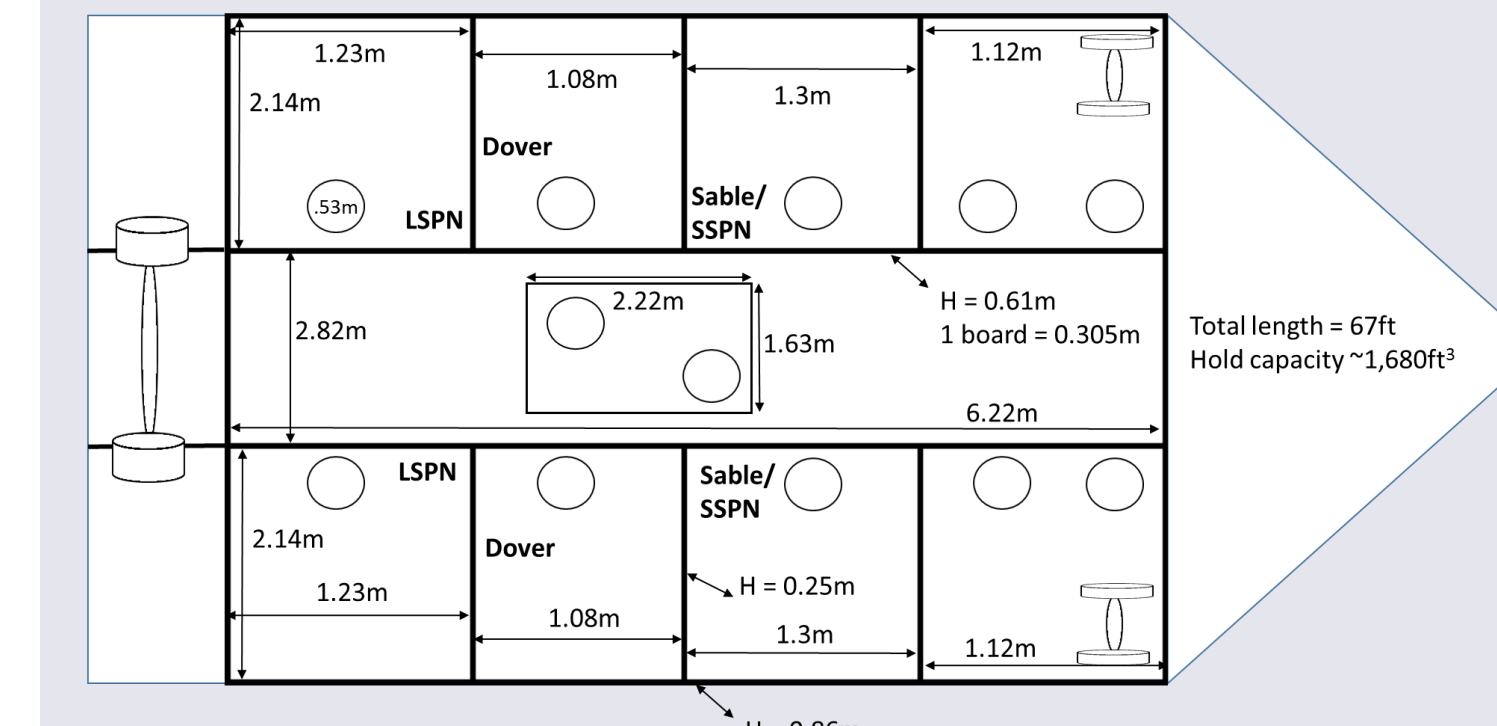
Logbooks as data source and audit a percentage of the video data

NMFS working to develop clear definitions

Obtaining Weights

Method 1: Volumetric Density

- Designing study to determine density of each species or grouping (kg/m³)
- Measurements of boats and containers on boats for volume calculations



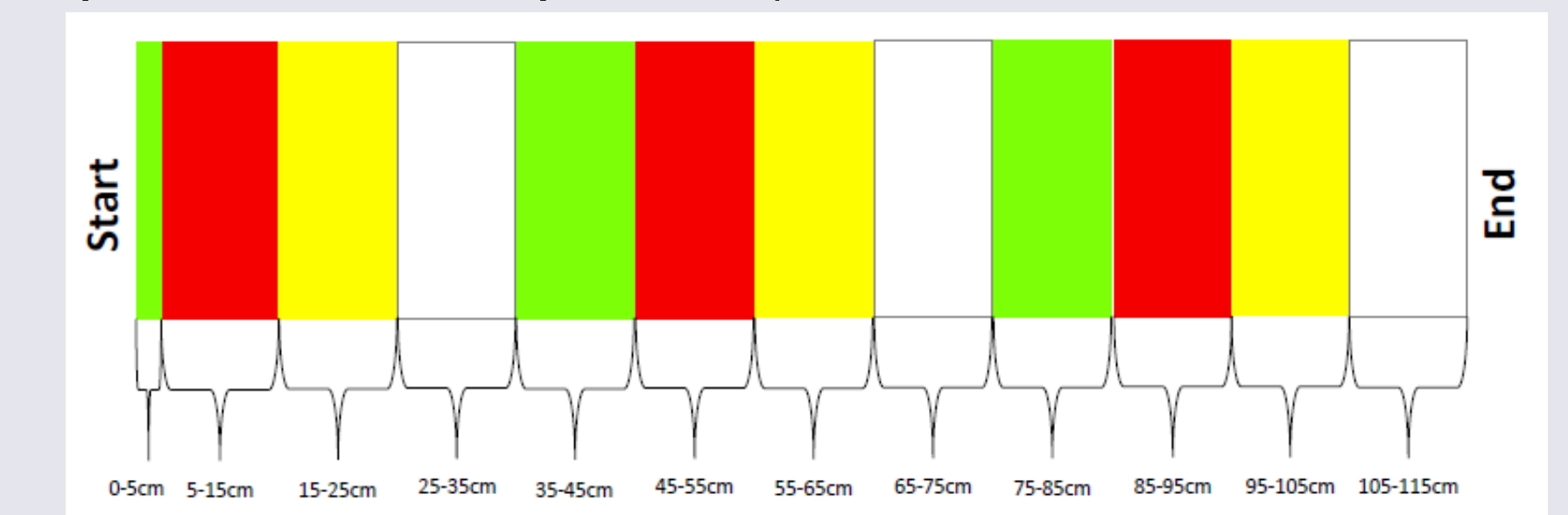
- Estimate % fullness of container with species or species grouping identified
- Calculate weight:

$$\text{Volume of fish (m}^3\text{)} = (\text{Length (m)} * \text{Width (m)} * \text{Depth (m)}) * \% \text{ Full}$$

$$\text{Weight of fish (kg)} = \text{Volume of fish (m}^3\text{)} * \text{Density (} \frac{\text{kg}}{\text{m}^3}\text{)}$$

Method 2: Length-Weight Relationships

- Estimate length of individual identified discarded fish using a measuring board (requires fisher cooperation)



- Insert length into established length-weight equation $W = aL^b$ to calculate weight

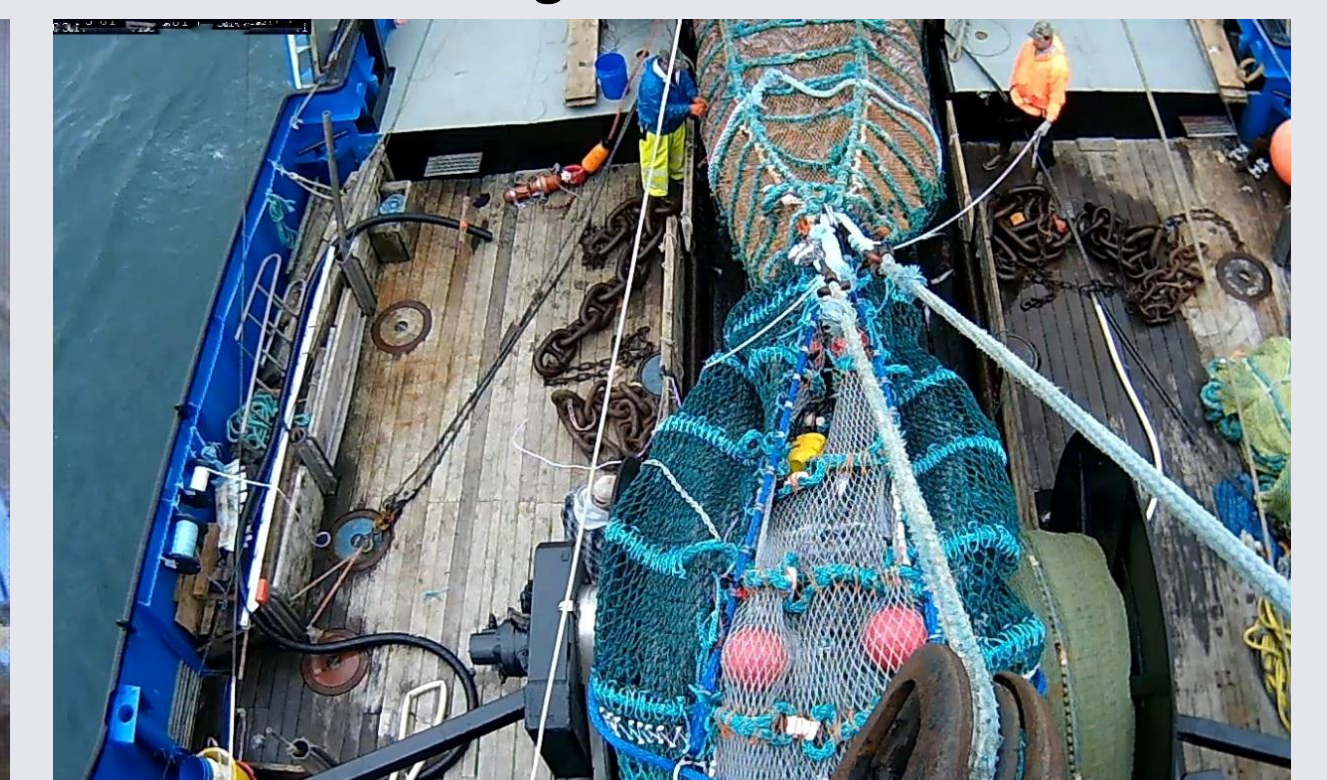
Accurate Speciation

Digital cameras improve the resolution of images captured

Analog Camera



Digital Camera



Discard Chute Study

- Fisher throws fish that would have been discarded through a chute with mounted camera into a separate container
- "Discard" fish are sorted and quantified at the dock
- Species ID and length information is captured by the video reviewer
- Speciation and weight estimates from video are compared to dockside values

Difficult to Speciate Small Red Rockfish and Mixed Flatfish



Acknowledgements

We would like to thank the owners, skippers, and crew of the participating fishing vessels for volunteering and helping this project move forward. We would like to thank the West Coast Groundfish Observer Program for providing at-sea compliance monitor data.