

# **Artificial Intelligence (AI) models developed from electronic monitoring video automate detection of catch in the Hawaii longline fisheries**

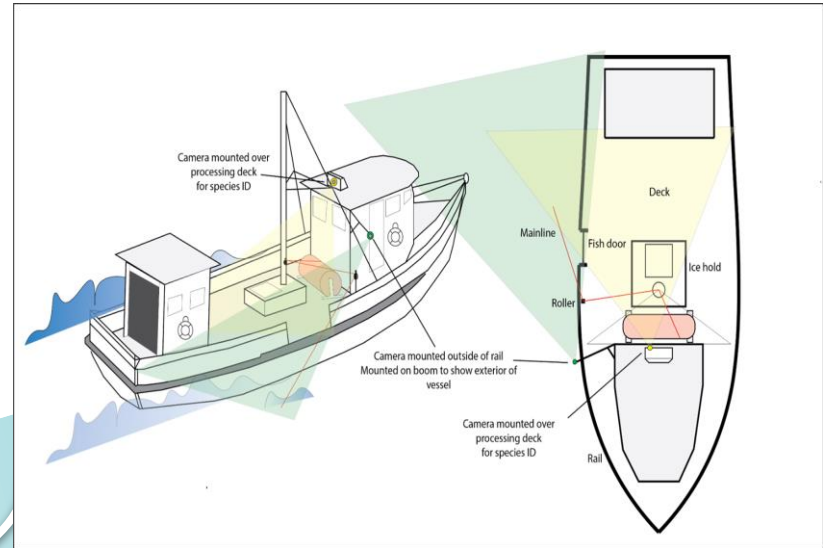
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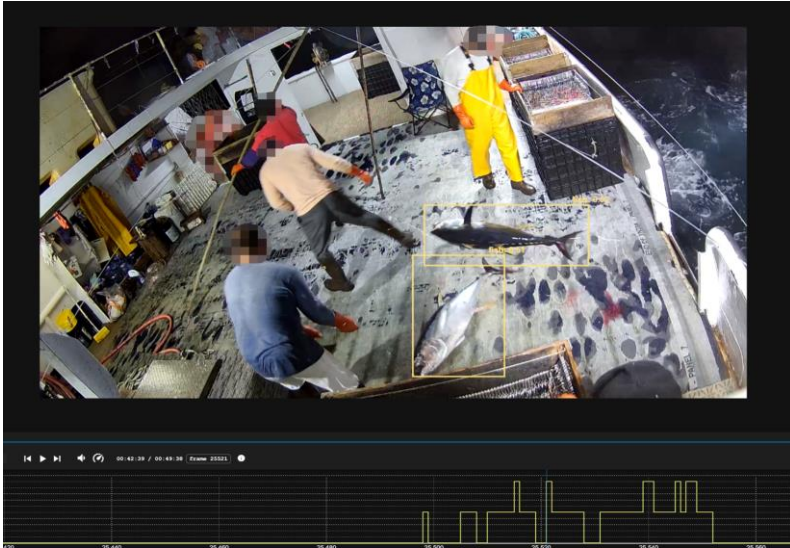
# Hawaii EM Project Overview

- Funding Provided by NOAA Fishery information system (FIS) program
- 20 volunteer longline vessels
- 2 cameras per vessel (deck and rail)
- Sensors trigger recording when hauling



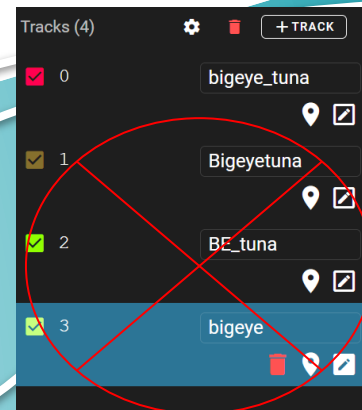
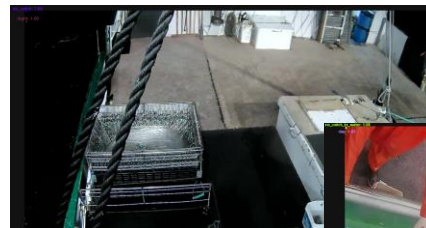
# Machine Learning Research Objectives

- Improve model detection accuracy
- Reducing human video review time as majority (90%) of haul has no catch

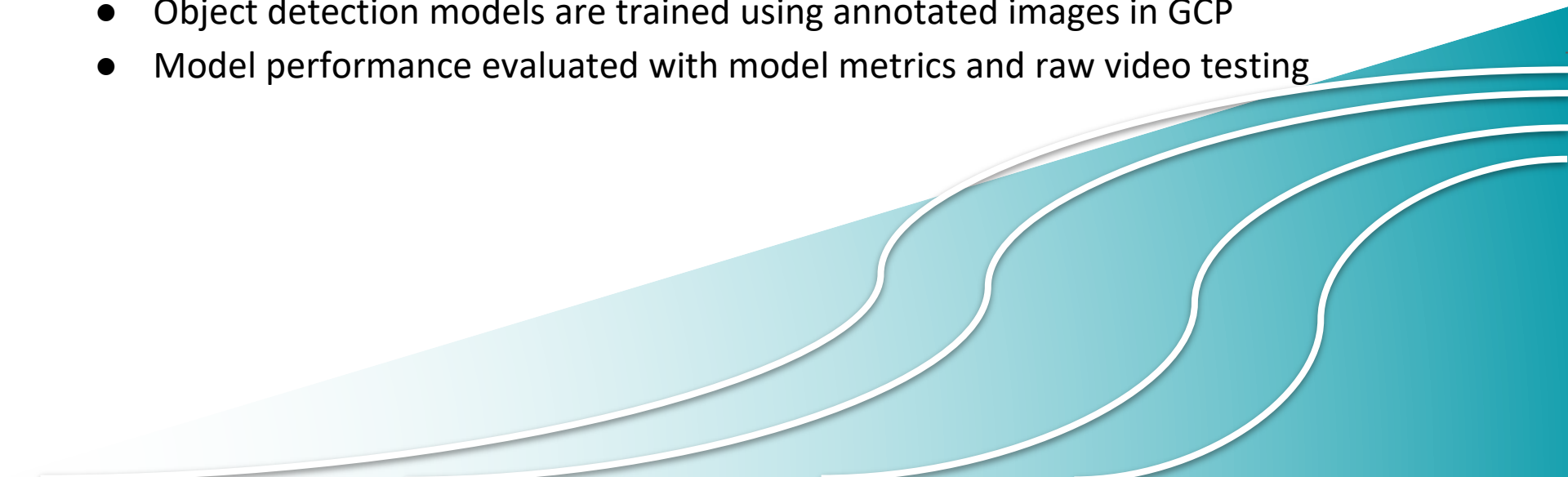


# Model Development Considerations

- **Balanced training data set**
  - Balanced distribution of classes
  - Vessel variety
  - Inclusion of non catch activity
  - Night/day
- **Accurate bounding boxes**
- **Label consistency**
- **Organization**
- **GIGO**



# Machine Learning- Methods

- AI image library consisting of fish and protected species annotations
    - ~200,000 images annotated - >121,000 fish, >10,000 sea turtles, >2,400 cetaceans.  
(Annotations consist of many permutations of the same animals.)
  - Setup Google Cloud Platform (GCP) training environment
    - Current VM using 4X Nvidia T4 GPUs, 8 VCPUS, 30GB RAM, 400GB disk
  - Object detection models are trained using annotated images in GCP
  - Model performance evaluated with model metrics and raw video testing
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# Model Training

- 86,000 annotations to detect fish on deck and sea turtles on deck and in water
- Yolov5\_medium
- 240 epochs, number of times training occurs on entire data set
- 7-8 day training time
- Inference run time of 15-20 min per 1 hour of video



# Model Results

- AI model detects fish on deck, sea turtles in water and on deck
- Reduction in false positives
- High confidence values
- Accurate bounding boxes



# Next steps

- Improving model accuracy by correcting mislabeled detections
- Developing models to include cetaceans, sharks and catch in water





# Aloha and Thank you!

