Innovative Camera Applications for Electronic Monitoring

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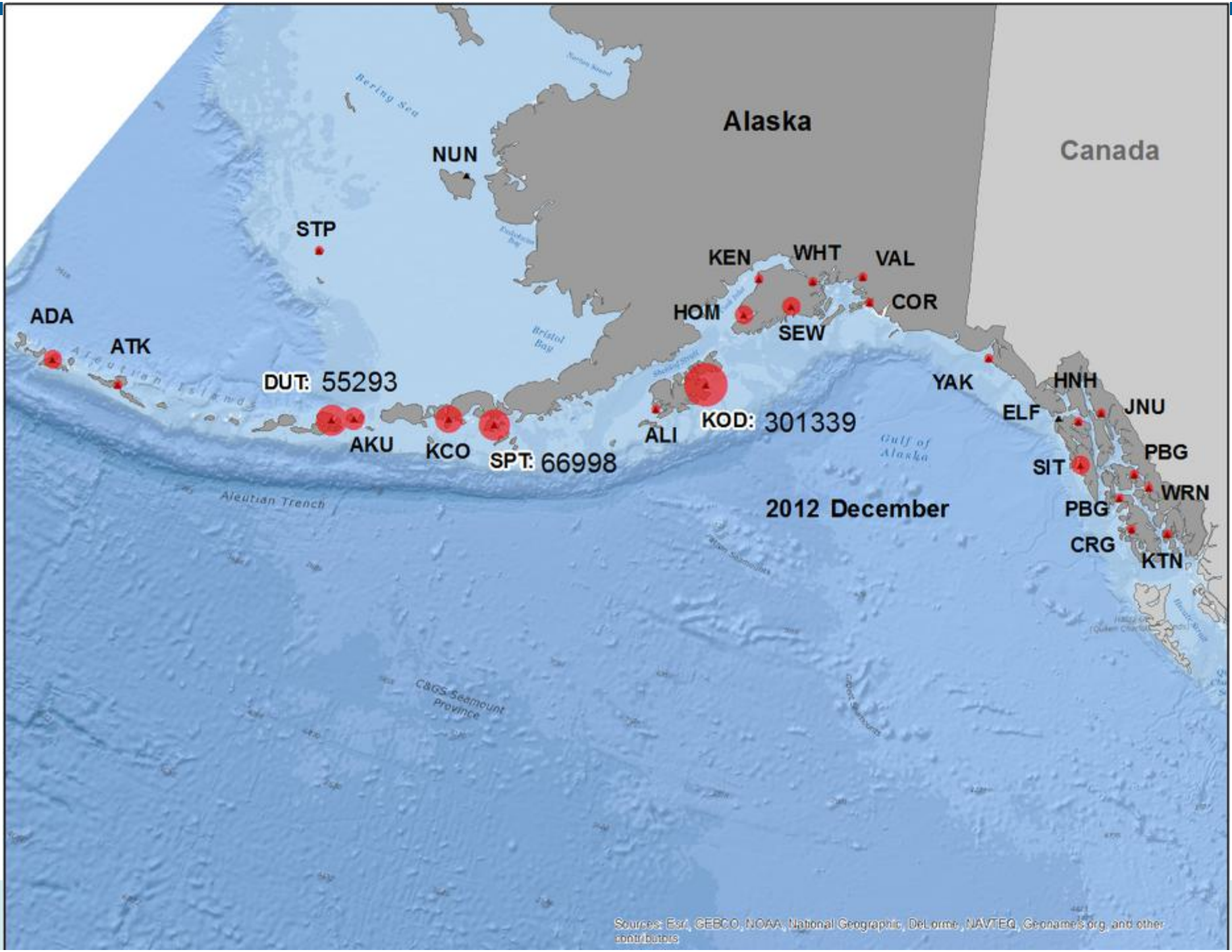
Overview

- Background
- Goals
- Beta version
- Image processing
- Future Work

The North Pacific Fisheries Management Council's October 2012 Motion

"The Council requests that NMFS provide a strategic planning document for electronic monitoring (EM) that identifies the Council's EM management **objective of collecting at-sea discard estimates from the 40' – 57.5' IFQ fleet**"

IFQ Fleet


Alaska
Canada
NUN
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DUT: 55293
AKU
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SPT: 66998
ALI
KOD: 301339
YAK
HNH
ELF
JNU
PBG
SIT
WRN
PBG
CRG
KTN
2012 December
Bering Sea
Aleutian Islands
Aleutian Trench
Gulf of Alaska
C&GS Seamount Province
Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, NAVTEQ, Geonames.org, and other contributors

What are the requirements to use EM for conducting at-sea sampling for bycatch estimation?

- Bycatch Estimation
  - Ability to estimate weight
  - Ability to provide disposition of catch
  - Ability to estimate effort
  - Representative sample
- Uninterrupted data stream of consistent high quality data and infrastructure to support it

- Must be timely
- Must be cost effective

NOAA FISHERIES

Current uses of Camera based EM

- Has been shown to be an effective tool to satisfy a variety of monitoring objectives in compliance based programs.
    - British Columbia, Canada (logbook audit)
    - Alaska (bin monitoring and flow scale)

- EM data are not used in bycatch estimation

Goals

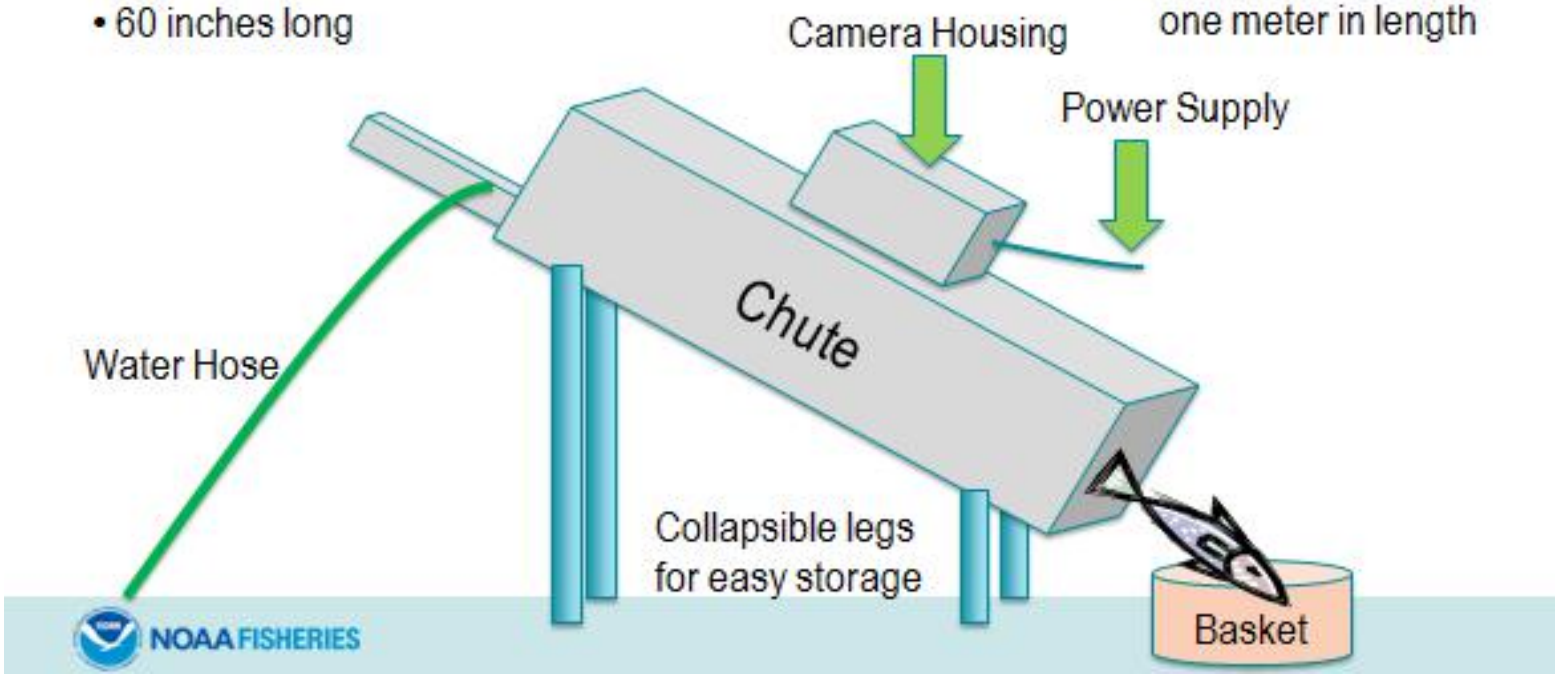
- Improve data quality
  - Collect high quality images consistently
- Support catch accounting system
  - Data integration into observer database
- Automate length acquisition and species ID
  - Decrease time between data collection and use
  - Improve cost benefit by minimizing post processing and storage
  - Infer weight from length for estimation

Beta test version

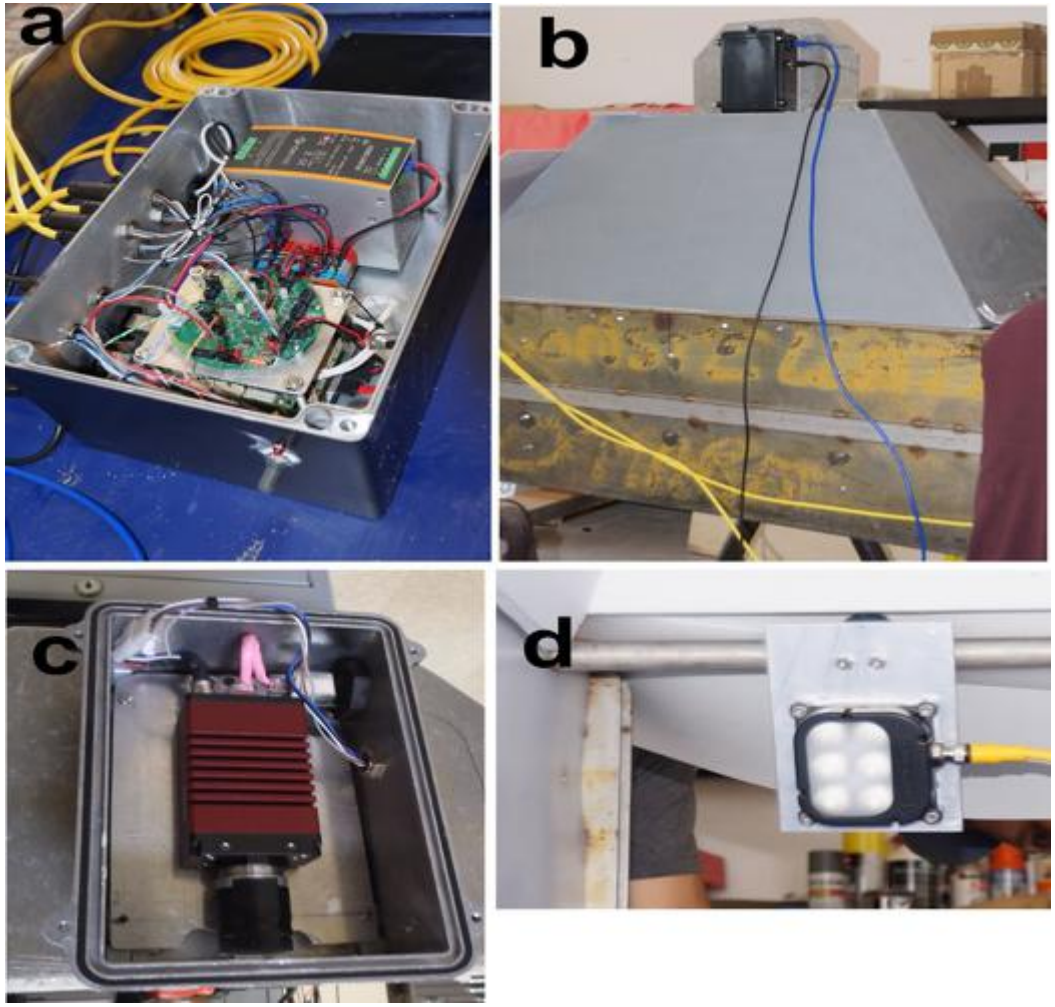
Camera Chute

- Aluminum construction
- Mobile
- Light shield both ends
- Two internal Strobes
- Photographs fish up to one meter in length

- Chute Dimensions
  - 30 inches wide
  - 18 inches tall
  - 60 inches long



Concept



Camera-Chute Length Measurement

- Self-contained software
  - Process images from camera-chute system
- Specifications
  - Camera calibration
  - Taking background images to adjust the lighting
  - Output the fish box coordinates and real-unit length

Image Processing

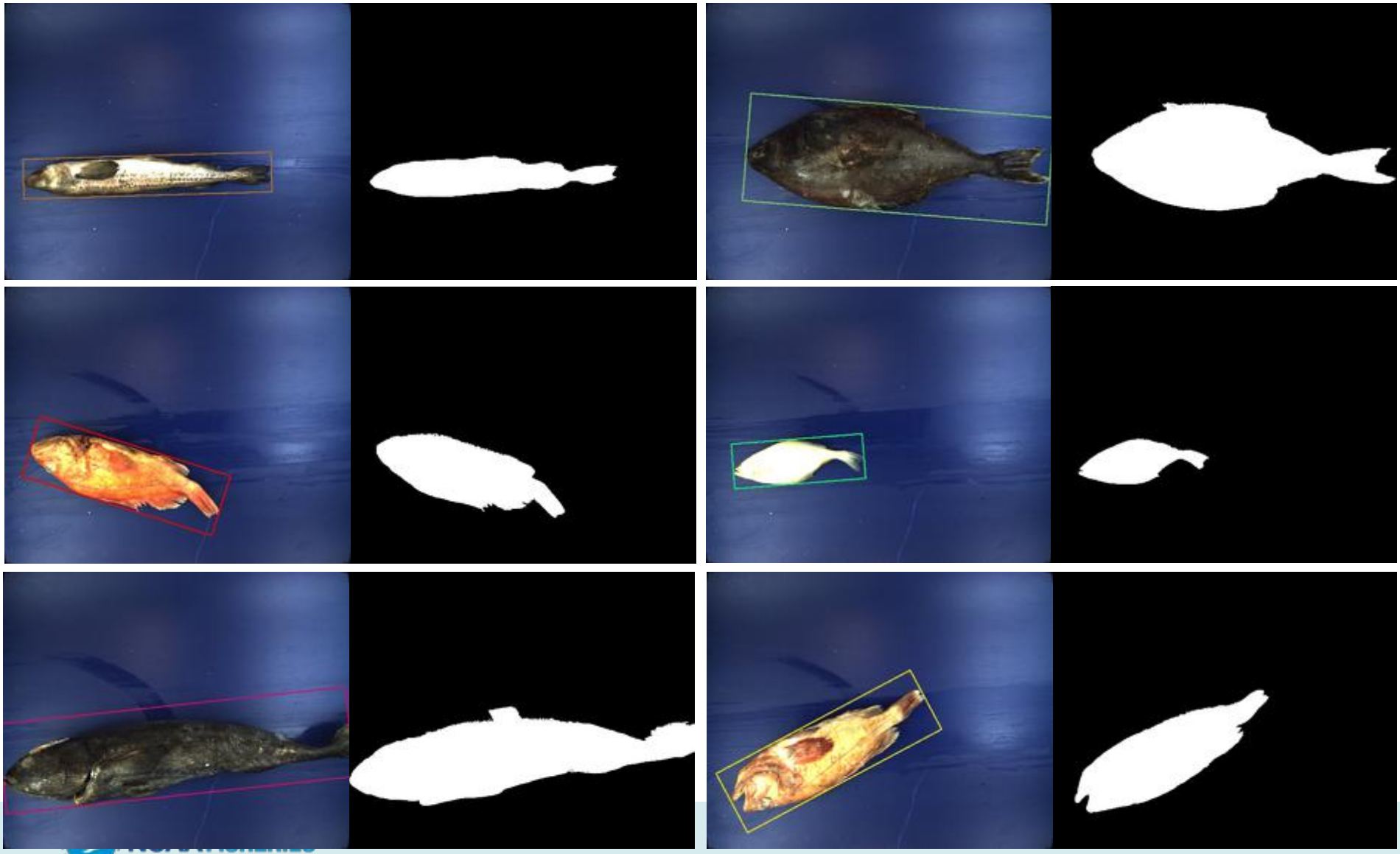
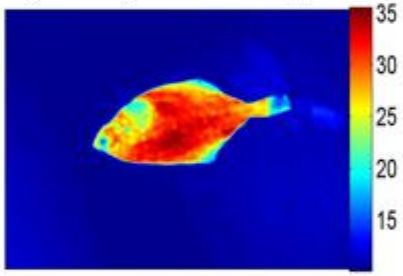


Image Processing

original fish image

background/foreground membership probability



fish extracted and length estimated

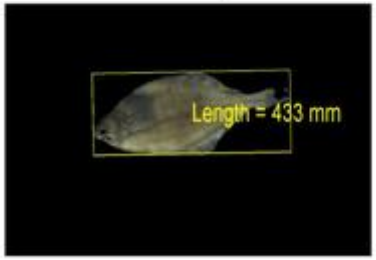


Image Processing (AFSC MACE)

Beta test version

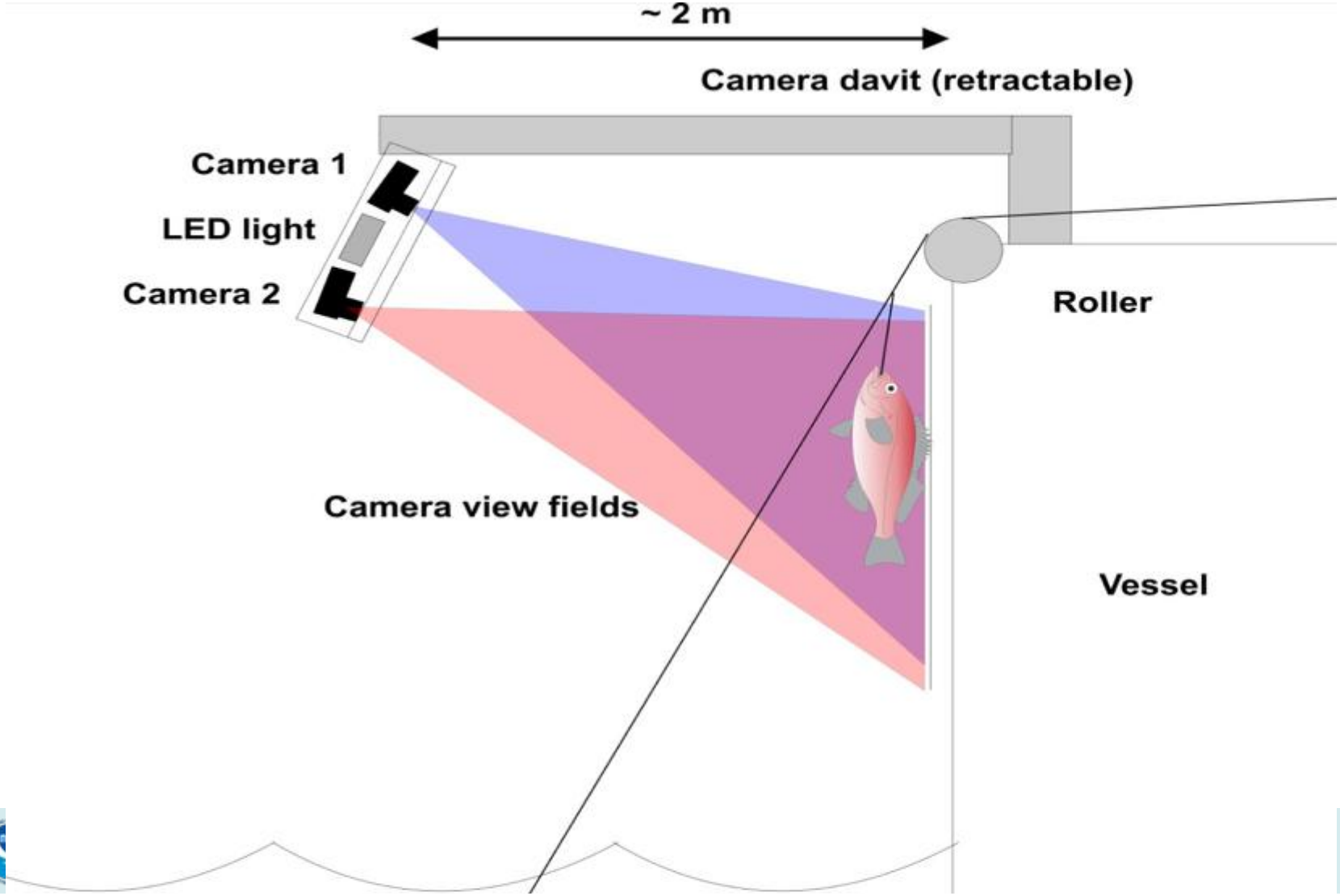
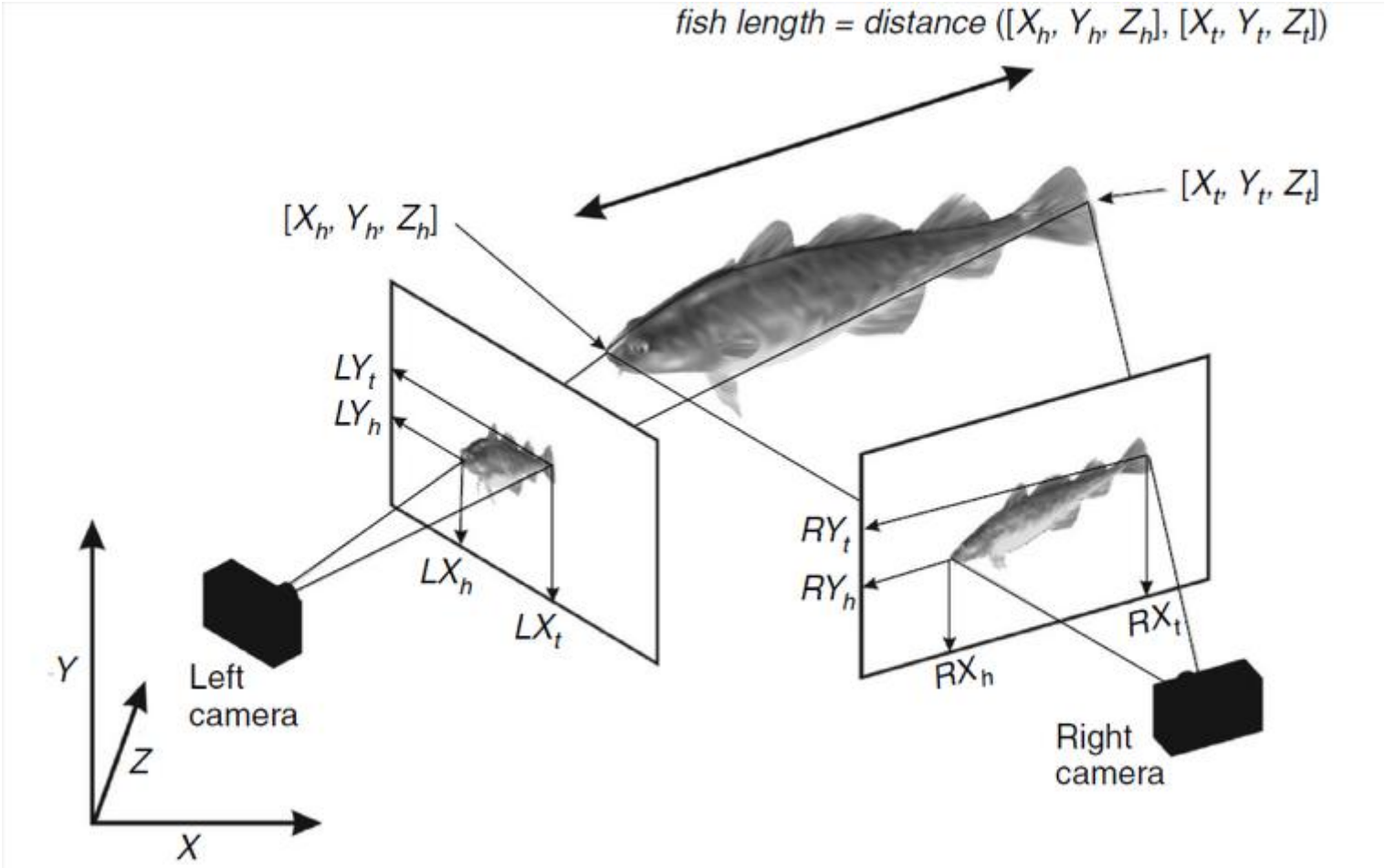


Image Processing (Williams et al. 2010)



Ongoing and Future EM Work

Non Field

- Continue hardware improvements
- Improve application for image processing
- Develop quantitative approach to species identification
  - UWEE Information Processing Lab

Ongoing and Future EM Work

Field Studies

- Cooperative research fixed gear industry
    - Deploy camera based EM
    - Integration of Sensor data and Elogbooks

- Cooperative stereo camera research PVOA

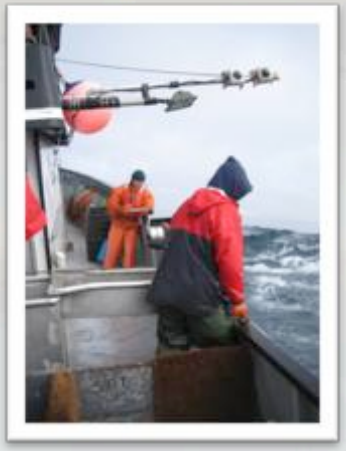
- Camera chute system being deployed to factory trawler

- EM Workgroup

2014 Observer Program

Changes to support sustainable fisheries






Questions?