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
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
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

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

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

- Power Supply
- Camera Housing
- Water Hose
- Collapsible legs for easy storage
- Basket

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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

Length = 433 mm
Image Processing (AFSC MACE)
Beta test version
Image Processing (Williams et al. 2010)

fish length = distance ([X_h, Y_h, Z_h], [X_t, Y_t, Z_t])
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?