5.1.2 Development and testing of EM in plants and how it will answer research questions

Project Title: Develop and Test Image Analysis Tools to Monitor Salmon Bycatch Recording by Alaska Groundfish Processors

EM Development Stage: PROOF OF CONCEPT

Project Abstract: Alaska fish processing plants are responsible for reporting all catch and bycatch components on state fish tickets. However, the lack of independent checks on the sampling and accounting process leading to these statistics has restricted their use for managing bycatches of prohibited species (e.g., salmon, halibut, crab). Electronic monitoring of delivered catches and catch sorting processes could be used to assure compliance, providing sufficient confidence in the validity of these reported values to allow their use for bycatch management. This potential would require development and testing of EM tools and processes. Automated detection and identification tools would greatly increase the efficiency and scope of the monitoring process. Initial tests during the 2018 GOA rockfish fishery indicated feasibility for such monitoring processes and tools. We propose expanding EM testing to other fisheries, particularly those targeting pollock.

Project Activities:

1) In January of 2019, more than 400 sequences of salmon in unsorted pollock catches were collected from camera systems installed for the existing rockfish fishery project at one Kodiak plant. Large numbers were achieved by repeatedly adding marked salmon from previous deliveries into the catch flow.
2) In May and June 2019, we conducted the second year of an SK-funded project to develop EM monitoring for salmon in rockfish deliveries by Kodiak trawlers. A major emphasis this year was to collect enough video of salmon passages to train automated salmon detectors for each plant. Check-in stations were also added, where salmon were placed by the sorting crew for automated recording and species identification. The combination of these two recordings and comparison with plant reports should allow monitoring and validation of plants' sorting and recording processes.
3) Annotated salmon sequences will be provided to collaborators with the AFSC EM Innovation project at the University of Washington Electrical and Computer Engineering Department to trial development and estimate efficiency of a salmon detection algorithms.
4) A proposal, including development of automated salmon detectors, was funded by the NOAA Fisheries Catch Shares Program. This will test a broader range of delivery situations at additional plants in the Gulf of Alaska and Bering Sea and further algorithm improvements.
5) In May/June 2020, we plan a third year of the Kodiak project, focusing on a trial monitoring with the automated tools being developed from this year's annotated videos.

Expected Project Outcomes:

1) Collect sufficient EM imagery of salmon in pre-sorted Pollock and rockfish catches to develop automated tools to detect salmon passage.
2) Modify camera chute technology to identify species of salmon (Chinook, non-chinook) passed though check-in sites by sorting personnel.
3) Develop processing methods for collected information to confirm whether the proportion of detected salmon correctly handled by sorting staff (e.g., exposure to identifying tool)

approaches 100% and comparison of machine identifications to those reported on fish tickets.
4) Report capabilities and limitations of monitoring technologies to decision-makers to facilitate choices for appropriate applications and combination with observer sampling.
5) Determine implementation standards and procedures for remote monitoring to ensure accurate accounting of PSC.