Hawaii Longline Fishery Electronic Monitoring Project:

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Summary

In early 2009, the Western Pacific Regional Fishery Management Council (Council) partnered with the Hawaii Longline Association and Archipelago Marine Research Ltd. to conduct a pilot study exploring the use of electronic monitoring (EM) in the shallow and deep set components of the Hawaiian pelagic longline fishery.[1]

- One of the first ever EM studies on pelagic longline fishery
- 4 camera systems were installed on 2 shallow-set vessels and 1 deep-set vessel
- Vessels were equipped with GPS receivers, hydraulic pressure sensors, winch sensors, satellite modems, and system control boxes.
- Systems were powered continuously to record sensor data (e.g. location, time, speed, hydraulic and winch activity, system events, etc.) at a 10-second frequency
- Image data was recorded when hydraulic pressure or winch rotations exceeded a preset threshold, indicating activation of fishing gear.
- Vessel data were recorded onto a 500GB hard drive which was estimated to last four to five weeks of normal pelagic longline operations.
- The satellite modem was used to transmit an hourly synoptic report consisting of vessel speed and location, sensor activity, video triggers and EM system performance data.

Hawaii-based Tuna Longline Fishery: An International Standard

The Hawaii longline fishery is one of the most highly monitored and strictly regulated tuna longline fisheries in the Pacific, achieving 94% compliance with FAO Code of Conduct for Responsible Fishing:[2]

- Managed under the Pacific Pelagic Fishery Ecosystem Plan developed by the Western Pacific FMC
- First in Nation to use VMS
- First to implement many conservation measures including seabird and sea turtle bycatch mitigation
- Limited entry fishery with a maximum of 164 vessels
- Maximum vessel size of 101 feet in length
- Subject to international management and conservation measures under Western and Central Pacific Fisheries Commission (WCPFC) and Inter-American Tropical Tuna Commission (IATTC)
- Lands only fresh fish into Honolulu, approx. $100 M in ex-vessel revenue in 2012.

Hawaii longline deep-set tuna fishery

-130 vessels landing fresh fish (ave. length 70 ft)
-Targets bigeye, retains yellowfin, and other pelagic species
-17-20 days/trip (17,000 sets/yr)
-Set gear during day; haul gear at night

Observer coverage: 20%

- main objective is to monitor protected species interactions

Hawaii longline shallow-set swordfish fishery

-20 vessels seasonally (Dec.- May) landing fresh fish (ave. length 75 ft)
-Targets swordfish, retains yellowfin, bigeye and other pelagic species
-20-30 days/trip (~1500 sets/yr)
-Set gear at night; haul gear during day

Observer coverage: 100%

- main objective is to monitor protected species interactions; sea turtle hard limit

Video images from study:

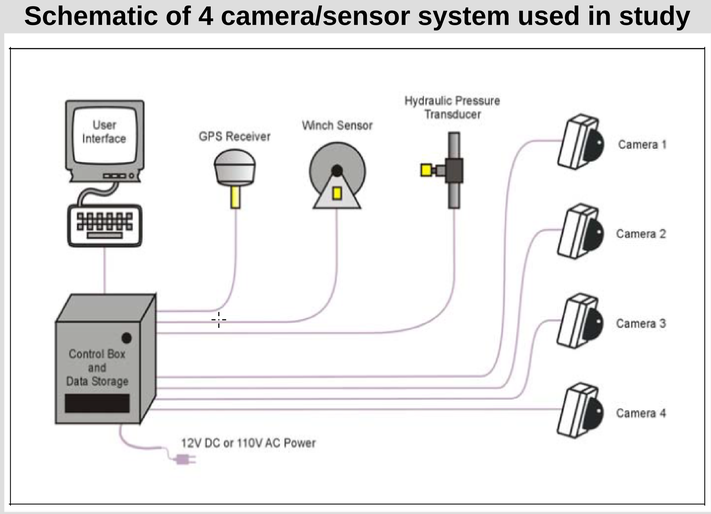
Project Objectives:

• Can electronic monitoring image data provide images of sufficient resolution and clarity to allow an EM image reviewer to accurately record the number of hooks and counts of target and non-target species?

• Can electronic monitoring image data provide images of sufficient resolution and clarity to allow an EM image reviewer to identify interactions with various species of sea turtles, marine mammals, and seabirds as well as detect hooking location and release condition?

• Are results from video monitoring similar to those obtained from on-board observers?

Schematic of 4 camera/sensor system used in study



Summary of Project Results:

-Each vessel completed between 3 and 6 trips, for a combined total of 320 days at sea, 7,600 hrs of sensor data, 3,000 hrs of images corresponding to 159 hauls.
- EM systems provided more accurate data on fishing time, locations
-0.4 % difference between observer data and EM data with regards to number of hooks and retained catch.
-Close agreement between EM and human observers on swordfish species identification, but other billfish (marlin, sailfish, spearfish) were inconsistent.
- EM and observer retained bigeye catch within 2% and 10% for all tunas, but individual species identification varied.
-EM image reviewers estimated less total catch than human observers by 16%, primarily due to differences between monitoring of discarded species suggesting significant portion of discarded catch not visible in camera field of view.
-3 interactions with leatherback turtles were recorded by both EM and human observers
-3 seabird capture events were recorded, one detected by both EM and observer, and two seen by one but not the other.
-No marine mammals detected by either EM or human observers.

Recommendations:

- Improved camera placements; more cameras, structured handling procedures.

Project Results

Main Issues	YES (# hooks; retained catch)	NO (% of discarded catch outside camera view)
1) Did EM systems accurately record hooks, and target and non-target catch?		
2) Did EM systems detect protected species interactions?	YES (but human observers can make more detailed assessments of animal release conditions)	

Acknowledgements

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References

1. McElderry, H., M. Jose Pria, M. Dyas, and R. McVeigh. 2010. A Pilot Study Using EM in the Hawaii Longline Fishery. Project report to the Western Pacific Regional Fishery Management Council.
2. Bartram, P. N. Nakamura, J.J. Kaneko and G. Krasnick. 2008. 2008 Responsible Fisheries Assessment of Hawaii's Pelagic Longline Fisheries. Report prepared for Hawaii Seafood Project 2, National Oceanographic and Atmospheric Administration.