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**Best Practices for the Collection of Longline Data to
Facilitate Research and Analysis to Reduce Bycatch of
Protected Species**

**Report of a workshop held at the
International Fisheries Observer Conference
Sydney, Australia, November 8, 2004**

Prepared by:
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**U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service**

**NOAA Technical Memorandum NMFS-OPR-35
March 2007**

The full report (101 pp) is available at
<http://www.fakr.noaa.gov/protectedresources/seabirds/llreport0307.pdf>

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List of Acronyms

AFMA	Australian Fisheries Management Authority (Australia)
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources (Australia)
CCSBT	Commission for the Conservation of Southern Bluefin Tuna (Australia)
CSFOP	Commercial Shark Fishery Observer Program (U.S.)
DFO	Department of Fisheries and Oceans (Canada)
ESA	Endangered Species Act (U.S.)
FAO	Food and Agriculture Organization of the United Nations (Italy)
FFA	(South Pacific) Forum Fisheries Agency (Solomon's Island)
GIS	Geographic Information System
GPS	Geographic Positioning System
IATTC	Inter-American Tropical Tuna Commission (U.S.)
ICCAT	International Commission for the Conservation of Atlantic Tunas (Spain)
INIDEP	Instituto Nacional de Investigación y Desarrollo Pesquero (Argentina)
IOTC	Indian Ocean Tuna Commission (Seychelles)
ISMP	Integrated Scientific Monitoring Program (Australia)
LORAN	Long-range navigational system
MAFF	Ministry of Agriculture, Forestry, and Fisheries (East Timor)
MARPOL	International Convention for the Prevention of Pollution From Ships
MMPA	Marine Mammal Protection Act (U.S.)
NEFOP	Northeast Fisheries Observer Program (U.S.)
NMFS	National Marine Fisheries Service, also NOAA Fisheries Service (U.S.)
NOAA	National Oceanic and Atmospheric Administration (U.S.)
NPFMC	North Pacific Fisheries Management Council (U.S.)
NPGOP	North Pacific Groundfish Observer Program (U.S.)
NZMOF	New Zealand Ministry of Fisheries (New Zealand)
PBR	Potential Biological Removal
PIRO	Pacific Islands Regional Office (U.S.)
RADAR	Radio Detection And Ranging
RFMO	Regional Fisheries Management Organization
SEFSC POP	Southeast Fisheries Science Center, Pelagic Observer Program (U.S.)
SLP	Sea Level Pressure
SPC	Secretariat of the Pacific Community (New Caledonia)
SST	Sea Surface Temperature
TDR	Time Depth Recorder
TRP/TRT	Take Reduction Plan/Take Reduction Team
U.S./USA	United States of America
UTC	Coordinated Universal Time
VMS	Vessel Monitoring System
WCGOP	West Coast Groundfish Observer Program (U.S.)
WCPFC	Western Central Pacific Fisheries Commission (Federated States of Micronesia)

EXECUTIVE SUMMARY

Workshops focusing specifically on the reduction of sea turtle, marine mammal, and seabird incidental catch (i.e., bycatch) in longline fisheries have recommended the need for standardized data collection procedures employed by fisheries observers onboard commercial longline fishing vessels (Anon. 2003; Donoghue et al. 2003; Food and Agriculture Organization (FAO) 1998/1999a/1999b; FAO and BirdLife International 2004; Inter-American Tropical Tuna Commission (IATTC) 2004; Long and Schroeder 2004). However, these reports lack sufficient detail regarding what these standardized data collections should be.

The development and implementation of data collection standards for longline fishery observer programs is challenging at many levels. First, there is the lack of detail in the recommendations regarding what data collections need to be standardized. Second, observer programs worldwide have diverse objectives that may make standardization seem unfeasible or unwarranted. For example, if bycatch monitoring is not the primary objective of a given observer program, increasing observer data collection responsibilities regarding seabirds, sea turtles, and marine mammals may be seen as infringing on the ability of an observer to collect data for a program's primary objectives. Finally, instituting the use of consistent data fields at the observer program level may impact long-term data series, add to database management costs, and increase time required for observer training. Despite these challenges, there are benefits to standardizing certain aspects of observer data collection procedures for longline fisheries. Information collected consistently could improve global assessments of the impacts of longline fisheries on bycatch species, and facilitate research to develop gear modifications or changes in fishing practices to reduce bycatch.

To facilitate research and analysis of factors influencing bycatch of marine mammals, sea turtles, and seabirds in longline fisheries, a workshop was organized to develop "best practices" in observer data collections. The workshop was held in conjunction with the International Fisheries Observer Conference, November 8-11, 2004, in Sydney, Australia.

The objectives of the workshop were to:

- Share information on current data collection practices and methodologies (i.e., why are certain variables collected, which variables are collected, and how are they collected by observer programs worldwide).
- Solicit information from data users on variables that are **critical, preferred, optimal, or not important** to facilitate research and analysis to reduce bycatch of protected species.
- Identify data not being gathered systematically that might facilitate research and analysis to reduce bycatch of protected species.
- Coordinate with observer program staff to understand data collection limitations.
- Recommend best practices for observer data collection in longline fisheries that would facilitate research and analysis to reduce bycatch of protected species, in the form of a prioritized list of variables and consistent procedures.
- Establish a network to continue to develop, refine, and implement best practices.

Prior to the workshop, two web-based surveys were developed and distributed to observer program managers and data users worldwide. The objectives of the survey were to ensure broad input from researchers and observer program staff who may not be able to attend the workshop, and to provide a base of information from which to focus discussions during the workshop. At the workshop, participants discussed the results of the surveys and need to develop best practices for observer data collections.

Critical and **preferred** variables were identified, based on the responses provided by data users in the pre-workshop survey and discussions by workshop participants. The list of variables represents “best practices” that should be included in the collection of longline data by fisheries observers (Table 1). The workshop participants generally agreed with the list of variables identified as **critical** or **preferred** by data users in the pre-workshop survey, but in some cases other variables were added to the list based on further discussions at the workshop.

Table 1: Best Practices--Recommended minimum variables to be collected in all longline fisheries.

Gear Type Fished	Category	Variables
All	Temporal	Date gear was deployed Start time of gear deployment End time of gear deployment Date gear was retrieved Start time of gear retrieval End time of gear retrieval
Pelagic	Spatial	Latitude at beginning of gear deployment Longitude at beginning of gear deployment Latitude at end of gear deployment Longitude at end of gear deployment Latitude at beginning of gear retrieval Longitude at beginning of gear retrieval Latitude at end of gear retrieval Longitude at end of gear retrieval
Demersal ^a		Latitude at beginning of either gear deployment or retrieval Longitude at beginning of either gear deployment or retrieval Latitude at end of either gear deployment or retrieval Longitude at end of either gear deployment or retrieval
Pelagic	Physical and Environmental	Sea surface temperature Depth fished at beginning of gear deployment ^b Depth fished at end of gear deployment ^b Depth of bottom at beginning of gear deployment Depth of bottom at end of gear deployment
Demersal		Sea surface temperature Depth fished at beginning of gear deployment ^{b,c} Depth fished at end of gear deployment ^{b,c} Depth of bottom at beginning of gear deployment Depth of bottom at end of gear deployment

Gear Type Fished	Category	Variables
All	Vessel and Fishing	Unique vessel identifier Unique observer identifier Vessel length Total number of hooks deployed Direction of haulback Target species ^d Bait species Bait condition (live/fresh/frozen/thawed, whole/cut) Autobaiter used? (if used, also record bait efficiency) Weight of added weight (if used) Direction of gear retrieval
All	Gear ^e	Groundline/mainline length ^f Branchline/gangion length Distance between branchlines Hook size ^g Hook type
All	Catch	Total catch, actual or estimated (number and/or weight) Catch by species (number and/or weight) Observed effort (total number of hooks observed during retrieval)
All	Mitigation Measure/ Deterrent Device	Presence of any type of deterrent used or required to be used, and how it was used
All	Bycatch	Species identification Number of each species captured Type of interaction (hooking/entanglement) Disposition (dead/alive) Description of condition/viability of the animal upon release (if released alive)

^a Demersal gear fished on the bottom is stationary, thus collecting data on either where gear is deployed or retrieved is sufficient.

^b In some observer programs, fishing depth is derived from the sum of the floatline/dropline length and the branchline/gangion length.

^c For demersal gear, depth fished should also be collected if it is different than bottom depth.

^d Target species may be derived in some programs from the catch composition.

^e Although $\geq 50\%$ data users responding to the pre-workshop survey identified these 5 gear variables as critical or preferred, workshop attendees were reluctant to identify specific gear variables for inclusion as best practices, instead noting these will vary by fishery depending on bycatch species and regulatory measures in place. Emphasis was instead placed on standardized definitions of terms and data collection methods.

^f Groundline/mainline length is rarely an exact measurement, due to the length of the line. Instead it is either derived (by multiplying distance between floats by number of floats), estimated by the observer, or reported by the vessel.

^g Hook size is often reported by the vessel or provided by the manufacturer rather than measured by the observer.

Optimal data specific to bycatch species was identified by data users in the pre-workshop survey and workshop participants. They recommended the following variables and material be collected when possible:

- Collection of whole carcasses (seabirds) or parts/biopsies (sea turtles and marine mammals)
- Photographs and species identification forms
- Age (as derived from collection of teeth or other samples)
- Sex (observed, or blood sample/biopsy dart if cannot be observed)
- Size of animal (type of measurements vary by species, and may be limited to an estimate of total length if animal is not boarded)
- Time and location of capture of bycatch species within the set (although there may be constraints on the precision of these variables)

- Systematic sightings of protected species around gear during gear deployment/retrieval
- Tags (presence/absence, attached prior to release)
- Evidence of depredation on catch (by marine mammals or other species), including species of fish damaged, description of type of damage, photographs of damaged fish, and number of fish damaged.

Data variables considered **not important** for data collection were not discussed in detail at the workshop, as there were very few responses in this category. The lack of responses indicating a particular variable was not important made interpretation of the survey results difficult and subject to potential bias.

When incorporating these best practices into observer data collections, workshop participants recommended that each program should:

- Establish a process for periodically reviewing and prioritizing data needs, in coordination with data users. Priorities may be set according to fishery-specific data needs, but should incorporate broader priorities where possible.
- Clearly communicate data collection priorities to all stakeholders.
- Establish and disseminate metadata for observer databases that describe each variable collected, how it is collected and when data collection methodologies change, why it is collected (long-term operational vs. short-term research project), and the level of precision of measurements.
- Identify which variables are or can be derived from other variables; consider eliminating collection of variables that can be derived from other variables.
- Ensure the use of standard and objective definitions and data collection methodologies.
- Clarify when data are “reported” (by the vessel) as opposed to “measured independently” (by the observer).
- Strive to meet data collection needs while keeping observer health and safety a priority.
- Keep informed regarding current bycatch reduction research and emerging data needs to support research.

Workshop conveners and participants believe that the workshop was a success, but was only a first step toward implementing best practices in observer programs globally. Workshop participants recommended that next steps should include:

- Dissemination of the results of this workshop to all observer programs and data users, and to Regional Fisheries Management Organizations (RFMOs).
- A follow-up assessment of how well recommended variables are being incorporated into observer program data collections, including those programs that may not have been represented in the initial survey or at the workshop, as well as programs that are involved in bycatch reduction research.
- The establishment of a longline working group, or use of new or existing listservs, as a vehicle for sharing information and further developing best practices in sampling design, data collection methodologies, and observer training.
- Development of best practices for observer data collection to facilitate research and analysis to reduce bycatch of protected species for other gear types (such as purse seine, trawl, and gillnet).

In conclusion, workshop participants recognized that decisions regarding the incorporation of these best practices would necessarily be made at the program level, but that these decisions should be informed by consideration of data needs to facilitate bycatch assessments and research on protected species bycatch on a global scale.