Net Knowledge: A Review of Cetacean Bycatch in Trawl Fisheries

Erika Zollett University of New Hampshire Ocean Process and Analysis Laboratory Institute for the Study of Earth, Oceans and Space erika.zollett@unh.edu

Review Paper

- Funded by the Northeast Fisheries Science Center
- Cetacean bycatch likely exceeds PBR in
 Northwest Atlantic
- Beginning work on mitigation research



Scott Hill, NOAA NMFS, Alaska Fisheries Science Center, National Marine Mammal Laboratory

Outline

- Characteristics of bycatch
- Overview of recent research
 - Gear modifications
 - Acoustics



Photo by Pingguo He

• Lessons from past/current research

Characteristics of Cetacean Bycatch

Who?

Healthy animals Small groups



Photo by Tracey Smith

Why?

Spatial and temporal overlap Concentrated food resource New niche



Photo by Pingguo He

Characteristics of Cetacean Bycatch

When?

Night and day Trawling characteristics



Where?

Gear depth Spatial and temporal overlap



Photos by Pingguo He

Caveat

- Characteristics of bycatch and mitigation strategies likely differ between:
 - Geographic regions
 - Species
 - Fisheries



Photo by Tracey Smith





Photo by Keith Rittmaster NC Maritime Museum



Photo by Tracey Smith

Gibson and Isakssen (1998)

- Full scale marine mammal exclusion device (MMED) in front of cod end
- Acts as a sieve-fish pass through, larger objects diverted to an escape hatch
- Tested in a flume tank
 - 100% exclusion of dummy seals from cod end
 - 50% successfully ejected (flippers became entangled)

CETASEL (CETAcean SELectivity) Project (1994-1997)

- Captive tests of a barrier grid
 - All bottlenose dolphins (n=3) passed through parallel ropes and mesh
- Excluder panel tested at sea:
 - Incomplete results; unknown if bycatch reduced
 - Panel appeared technically feasible



Sea Mammal Research Unit, University of St. Andrews

Prior to exclusion device:

• 2000-2002: On average 90 commons/yr

With exclusion device:

- 2002: No dolphins taken
 - No handling difficulties
 - Some fish escaped
- 2003: 2 dolphins caught
- 2004: 400+ animals caught
 - Peak in December and closer to shore



Northridge, S. 2003. Further development of a dolphin exclusion device. Final Report to DEFRA, Project MF0735.

Sea Mammal Research Unit, University of St. Andrews



Northridge et al. (2005). Investigations into Dolphin Bycatch in a Pelagic Trawl Fishery. ICES CM/X.19

Mitigation-Acoustics

CETASEL Project

- Sound activation can alter the behavior of a captive harbor porpoise
 - Increase swimming speed, respiration, and surfacing rates, and decrease swimming depth
 - Unknown of reactions in wild to sound on gear or if habituation would occur
 - Unknown if observed behaviors would benefit cetaceans

Mitigation-Acoustics

Sea Mammal Research Unit, University of St. Andrews

- 2001: Pingers around mouth of trawl net
- 2003: Pingers in rear of trawl
- No reduction in bycatch
- Loud noises associated with trawlers may mask pinger sounds



NOAA Fisheries, Northeast Regional Office

Mitigation-Acoustics

Ceurstemont and Rihan (ICES Poster)

- Acoustic deterrent system: to warn dolphins from entering trawl net
- Silent until echolocation detected
- Work in captivity to distinguish trawl noise from echolocation
- Planned experiments in wild

Lessons learned

- Exclusion devices can:
 - Alter behavior inside nets
 - Reduce cetacean bycatch
 - Be improved
- Acoustic devices:
 - Do not appear to reduce cetacean bycatch
 - Habituation may occur



Northridge et al. (2005). Investigations into Dolphin Bycatch in a Pelagic Trawl Fishery. ICES CM/X.19

- May act as a "beacon," exclude animals, or cause injury
- Scientists and managers should consider:
 - Multiple mitigation methods
 - Success may differ depending on species, fishery, location
- Field tests are necessary

Lessons learned

To be successful, mitigation strategies must:

- Have longevity under commercial fishing conditions
- Be safe to handle and easy to use/store



• Be practical and affordable

Photo by Pingguo He

- Not compromise catch of target species
- Involve fishers in the development

Adapted from Dawson 1994

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