

Lessons Learned

Mitigating depredation by cetaceans

REPORT OF THE WORKSHOP ON INTERACTIONS BETWEEN CETACEANS AND LONGLINE FISHERIES

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Fisheries Depredation by Killer and Sperm Whales
Behavioural Insights, Behavioural Solutions

October 2-5, 2006
Pender Island, BC
Hosted by the Vancouver Aquarium

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Symposium on Fisheries Depredation by Killer and Sperm Whales: Behavioural Insights, Behavioural Solutions

October 2-5, 2006, British Columbia, Canada

Thank you
A special thank you to all those who attended the Fisheries Depredation Symposium at Poets Cove on Pender Island. It was a very successful meeting by any measure. We sincerely appreciate the willingness with which participants shared their experiences and perspective on this challenging issue.

Warm Regards,
Lance Barrett-Lennard, on behalf of the Program and Organizing Committees

Principal Findings and Advice
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Outcome

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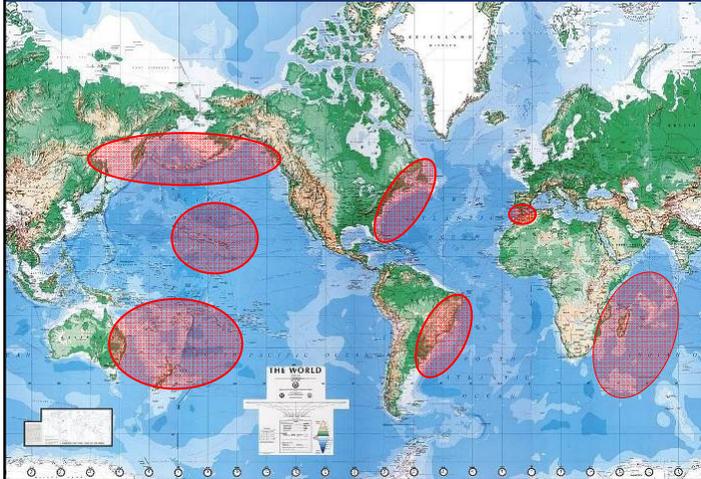
vancouveraquarium.

Also: Marine Mammal Advisory Committee, TEC report, Seychelles Workshop, Geoff McPherson, published studies...

Perspectives

- Depredation is a global issue
 - Widespread, appears to be increasing
- Behavioral insights
 - How and when does depredation take place?
 - How do whales detect vessels/gear?
- Potential mitigation approaches
 - What has been tried?
 - What worked or showed promise?
 - What did not work?
- How does this help us with the FKW TRT?

Examples of regions where depredation is known to occur



Behavioral Insights

- Depredation is a learned behavior
- Can involve natural prey or new prey species
- Food rewards are a powerful 'training tool' (catch, bait, offal)
- If fishing provides predictable food source, cetaceans can 'specialize'
- Social species: individuals learn from each other
- Cetaceans are intelligent and adaptable



Behavioral Insights

- Detection of vessels or gear through acoustic and/or visual cues
- Cetaceans learn which sounds are associated with available food (e.g. hydraulics)
- Depredation often occurs during haul
- Animals may take bait or catch



General Strategies



- Reduce encounters between vessels and cetaceans- *avoidance*
- Reduce probability of cetacean depredation when encounters happen- *deterrence*
- Reduce probability of harm to animal when depredation occurs- *protection*

Summary of methods tried to discourage whale depredation on demersal longline catches in AK

METHOD	RESULT	COMMENT
Seal Bombs	Not effective	Occasionally a startled response but whales did not leave area.
Decoy Boats	Not effective	Did not confuse whales.
Blank Sets	Not effective	Whales immediately returned to vessel with live, blackcod on lines.
Dummy Buoys	Some effect	Whales occasionally lost interest and left the area.
Combined Hauling	Not effective	Whales would move between vessels.
Stop Operations	Some effect	Occasionally helped.
Night Fishing	Not effective	No apparent difference in behavior.
Short Movements	Not effective	Movements < 60 nmiles
Long Movements	Some effect	Movements > 60 nmiles; vessels would out run whales.
Change of Target Species	Very effective	Switch to Pacific cod.
Shooting	Not effective	Whales still in area.
Explosives	Unknown	Not adequately tested.
Electrical Current	Not effective	No other information.
Trap Gear	Very effective	Depredation did not occur.
Tangle Imitators	Not effective	Did not confuse whales.
Acoustic Harassment	Unknown	Not adequately tested.
Bang Pipe	Not effective	No apparent difference in behavior.

Source: 2006 Vancouver Depredation Workshop, Abstract by M. Dahlheim

Potential Strategies – Avoidance

Reduce encounters between vessels and cetaceans

- Avoid positive reinforcement ('feeding' via discards, offal, ...)
- Reduce detection profile of gear (shorter mainline, shorter soak duration)
- Reduce acoustic profile of vessel (animals may detect noise from 30-40 miles away)
- Avoid sets when animals detected in area (visually or acoustically); move sufficiently far to 'lose' them
- Single long-term fix may be elusive because animals can adapt; short-term strategies may work if applied consistently by vessels
- Success of each approach appears to vary by fishery, cetacean species, region

Potential Strategies – Deterrence

Reduce probability of cetacean depredation when animals are present during set

- Acoustic deterrents, including echolocation jammers, have had limited success because animals appear to adapt quickly
- Mechanical deterrents or catch 'protectors' have been successful on demersal longlines, but may be cumbersome or impractical
- Electro-magnetic deterrents questionable
- Make catch less available during soak or haul. Need to know when depredation is initiated by cetaceans

NOT EFFECTIVE:

- Shooting and explosives
- Chemical deterrents (no sense of smell)

Potential Strategies – Protection

Reduce probability of harm to animal when depredation occurs

- Modify hooks to prevent hooking
- Use weak hooks that allow cetaceans to pull free
- Develop de-hooking techniques (but animals large and active)



Potential problem:

- Animals are still being rewarded (in the form of food) for their depredation behavior; may cause depredation to increase over time

Insights from an intrepid fisheries biologist (G. McPherson)

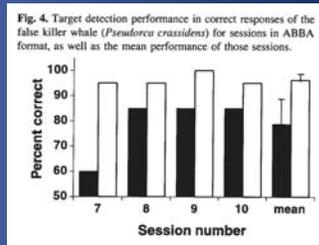
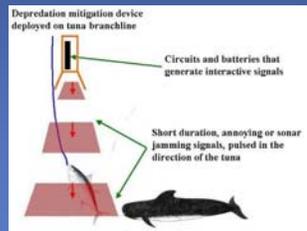
- Australian longline fleets in the Coral Sea experience high rates of depredation by false killer whales and pilot whales
- In cooperation with the fishing fleet, a number of mitigation measures have been designed, tested, modified, and conclusions drawn about their effectiveness for reducing depredation and their feasibility for use by commercial fleets

Insights from an intrepid fisheries biologist (G. McPherson)

- Echolocation discrimination plays key role in depredation behavior
 - Field recordings of echolocation behavior on a floating fish indicate whale echolocation on target to distance < 1m
 - Fish with ingested hooks (Nishida et al 2001) or fish entangled in gear (McPherson et al 2002) had lower incidence of depredation

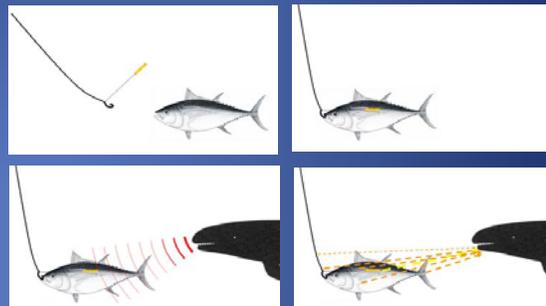
Insights from an intrepid fisheries biologist (G. McPherson)

- 'Jamming' pinger
 - Field trials halted following significant gear loss
 - Experimental trials proved the device somewhat effective, but with decreased effectiveness over time and at moderate distance from the target (Mooney et al 2009)



Insights from an intrepid fisheries biologist (G. McPherson)

- Acoustically reflective streamers
 - Somewhat effective but not feasible for deployment on all hooks
- Streamers with reflective spheres, cones, and cylinders
 - Not field tested, but designed for quick attachment to gear or left on branch lines



Insights from an intrepid fisheries biologist (G. McPherson)

- Modified acoustic-sensing RDF buoys provide capability to avoid whales if vocalizations are heard
 - Easily deployed, gear readily available
 - False killer whale whistles easily distinguishable for automatic classification

- Not widely field tested

Some Proposed Solutions...

Method	Result	Effective with which Fisheries or Depredators
Avoidance		
Retain offal	Somewhat effective	Pelagic Fisheries
Passive acoustic monitoring	Effective	Potential for all
Hydrophones on RDF buoys	Effective	Species with stereotyped vocalizations
Visual detection	Somewhat effective	Fisheries setting/hauling during day
Deterrence		
Passive acoustic reflectors	May be effective	Potential for all
"Seismic" emitters	Untested	
Broadcast Pingers	May be effective	Net fisheries
Jamming pingers	Limited effectiveness	None tested

Some Proposed Solutions...

Method	Result	Effective with which Fisheries or Depredators
<i>Protection</i>		
Protection nets	May be effective	Demersal longlines
Net sleeve	Very effective	Demersal longlines
Weak hooks	May be effective	
Modified hooks	May be effective	

- Other methods have been proposed and attempted with mixed results.
- What will be appropriate for consideration for the Hawaii deep-set fishery and false killer whales??



Questions?