Entanglements of Steller sea lions, *Eumetopias jubatus*, in marine debris

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**ABSTRACT**

Entanglement in marine debris is a contributing factor in Steller sea lion (*Eumetopias jubatus*) injury and mortality. Surveys of SSL hauls-outs were conducted from 2000-2007 in Southeast Alaska and northern British Columbia. Objectives were to 1) determine sources of marine debris entangling or ingested by SSLs; 2) estimate the incidence of SSL entanglement and gear ingestion; 3) determine the incidence of SSL entanglement or ingestion varies by age or sex, and 4) estimate population level effects. We recorded 386 individuals as being either entangled in marine debris or having ingested fishing gear. We documented 48.5% (n = 190) of SSLs with entangling debris around their necks, while 50% (n = 194) had interacted with sport and commercial fisheries and had ingested fishing gear. Packing bands were the most common neck entangling material (35%), followed by rubber bands (26%), rope (7%), and monofilament line (7%). Entanglement incidence was 0.26% (SD = 0.0064, n = 69 sites) (Fig. 4). Juveniles were the most frequently entangled age class, although all age classes and both sexes were affected (Fig. 5). Entanglement incidence was 0.26% (SD = 0.0064, n = 69 sites) (Fig. 4). Juveniles were the most frequently entangled age class, although all age classes and both sexes were affected (Fig. 5).

**RESULTS**

- There were two main entanglement types: 1) Neck entanglements (49%, n = 190); and 2) Ingested fishing gear (50%, n = 194) (Figs. 2 & 3).
- The most common neck entanglements included plastic packing bands and rubber bands (Figs. 1 & 2).
- The most commonly ingested fishing gear included salmon fishing gear (i.e., hooks) and longline gear (Figs. 1 & 3).
- Entanglement incidence was 0.26% (SD = 0.0064, n = 69 sites) (Fig. 4).
- Juveniles were the most frequently entangled age class, although all age classes and both sexes were affected (Fig. 5).

**SOURCES OF NECK ENTANGLEMENTS**

- **PACKING BANDS**: containers/bouys/ball boxes
- **RUBBER BANDS**: Sport and commercial crab pot gear/fisher's gear
- **NET/ROPE**: Gillnetting or parking for salmon; travelers (e.g. pollock)
- **TIRES/LOOPS OF LINE**: Garbage/litter lost or discarded

**INGESTED FISHING GEAR**

- **HOOK & LINE & FLASHERS**: Sport and commercial salmon fishing (rolling, mooching)
- **GANGION (hook & line)**: Commercial longliners

**SOURCES OF INGESTED FISHING GEAR**

- **LONGLINE/GILLNET**: Commercial salmon fishing
- **SPINNER/SPOON**: Sport fishing

**METHODS**

Entanglement data were collected by boat or shore at haul-outs and rookeries in Southeast Alaska and northern British Columbia from 2000-2007. Data collected included: Date, location, count, sex, age class, behavior, entanglement type, and entanglement material.

**THE PROBLEM: ENTANGLED STELLER SEA LIONS**

1. Determine sources of marine debris entangling or ingested by Steller sea lions (SSLs)
2. Estimate the incidence of SSL entanglement and gear ingestion
3. Determine if the incidence of SSL entanglement or ingestion varies by age or sex

**OBJECTIVES**

- Educate others about the impact of marine debris on marine mammals
- Secure gear onboard
- Wipe with industry
- Support biodegradable fishing gear
- Educate others
- Recycle monofilament line

**SOLUTIONS TO REDUCE ENTANGLEMENTS**

- **“Lose the Loop!”** Simple procedures such as cutting entangling loops of synthetic material and eliminating the use of packing bands can prevent entanglements.
- **“Go bendable!”** Use biodegradable fishing gear
- **Secure gear onboard**
- **“Support biodegradable fishing gear”**
- **Educate others**
- **Coastal cleanup**

**CONCLUSIONS**

- Entanglements of SSLs are a greater problem than previously recognized
- Most of the identifiable entangling/ingested debris appears to be fishery-based
- Entanglement incidence is underestimated because 1) the likelihood of observing all entangled individuals is poor; 2) sea lions may die at sea as a result of their entanglement without first being observed on land; and 3) external evidence of entanglement may not exist or may be lost over time
- Additional effort should be made to document SSL entanglements during ongoing research projects

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**PAPER**


**VIDEO AVAILABLE**

Entanglement of Steller sea lions (*Eumetopias jubatus*) in marine debris: Identifying causes and finding solutions. 11-minute educational video that describes how sea lions become entangled, the most common sources of entangling debris, and possible solutions — see http://www.multimedia.adfg.alaska.gov or lauris.jemison@alaska.gov for DVD.