An innovative approach to live capture and disentangle Steller sea lions in Alaska

Kimberly Raum-Suryan[1], Lauri Jemison[2], Kate Savage[3], Justin Jenniges[2], Michael Rehberg[2], Martin Haulena[4], Kimberlee Beckmen[2], Greg Snedgen[2], Dennis McAllister[2]
[1]Sea Gypsy Research, Newport, OR; [2]Alaska Department of Fish and Game, Juneau, Anchorage, & Fairbanks, AK; [3]National Marine Fisheries Service, Juneau, AK; [4]Vancouver Aquarium, Vancouver, British Columbia.

The Problem? - Entangled sea lions

Solution - Improved chemical immobilization to disentangle

Abstract (revised)

Marine debris is a global issue affecting numerous species in the world's oceans, including pinnipeds. Entangling debris may cause respiratory distress, lacerations, and infection, with eventual death possible through strangulation, starvation, or drowning. Additionally, ingested hooks cause injury and possible mortality. Pinnipeds likely become entangled in marine debris during an interaction with a particular fishery or simply through curiosity. In Southeast Alaska, from 2000-2015, we photo-documented ~345 live Steller sea lions (SSLs) that were entangled in marine debris (e.g., plastic packing bands, rubber bands), most with debris encircling and embedded in their necks. We additionally documented ~ 400 SSLs that had interacted with fisheries, as evidenced by fishing lures hanging from the animal's mouth, indicating an ingested hook. Historically, we did not have the ability to safely capture SSLs to remove entanglements. However, recent development of a drug combination that allows for sedation without respiratory compromise has enabled targeted captures of SSLs with neck entanglements or ingested hooks. Our objectives were to dart specific, compromised SSLs, capture and remove entangling/ingested materials, and attach flipper tags and/or satellite tags to monitor post-capture survival. From 2013-2015, we (Alaska Department of Fish and Game, National Marine Fisheries Service, Vancouver Aquarium) successfully chemically immobilized six entangled SSLs; entanglement/gear was removed from five and satellite tags attached to three. These were the first successful captures using this innovative approach in Alaska. Although this approach is promising, we will continue to educate the public about the effects of marine debris. Moreover, resolving SSL-fishery interactions that result in injury to SSLs and impact fishermen through loss of gear, money, and time, is a challenge that requires further attention. Currently there are no legally approved, non-harmful deterrents available to fishermen, leaving them to suffer losses without compensation or a clear means to reduce these interactions.

Methods

Selection of target animal


Entanglement is likely life-threatening


Target males (not females with pups)


Animal is positioned conducive to darting


Appropriate weather conditions (relatively calm seas, light wind, etc.)

Dart projector and drugs

- Dan-Inject JM Special CO_2 -dart projector
- Barrel: 11 or 13 mm bore
- Dart: 3, 5, 10 cc (for ~4yr, ~7yr, ≥12 yr old males)
- Dart capped with a stabilizer dyed black
- Unbarbed needle (2.0 x 40 mm or 2.0 x 30mm)
- Sedation: medetomidine, butorphanol, midazolam
- Reversal: atipamezole and naltrexone
- Antibiotics: oxytetracycline

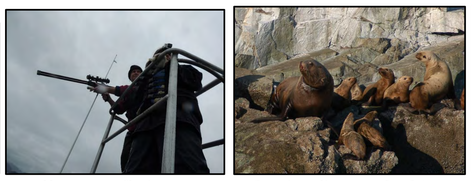
Darting


Estimate weight of animal


Prepare darts


Approach via skiff (or land, depending on animal position)


Use range finder to determine distance to animal


Darting distance 3 - 21m (CO_2 charges used: 2 - 12 bars pressure)


If animal enters water, all personnel closely track movement of animal

Procedure

Capture and disentanglement steps

- Successfully dart sea lion
- Observe/wait for drug to take effect
- Approach slowly
- Remove entanglement
- Give supplemental oxygen (land only)
- Monitor temp., respiration (land only)
- Attach flipper tags
- Apply temporary dye mark
- Glue satellite transmitter to fur (land only)
- Collect whisker, hair, skin samples
- Collect morphometrics (land only)
- Take photos
- Administer reversal drug & antibiotic
- Release
- SMILE - SUCCESS!!!

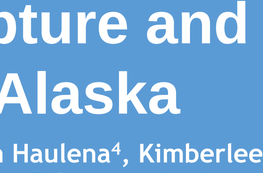

Is darting successful?

Yes


Did animal remain on land?

Yes


Observe closely; Wait 12-20 min


Remove flasher/lure

OR :


Remove neck entanglement

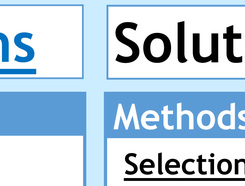

Administer oxygen; monitor respiration & temperature


Attach flipper tags; apply temporary dye mark


Attach transmitter; collect whisker, hair, skin samples


Measure; give reversal & antibiotic; RELEASE!

No


Follow/Observe/Wait 12-20 min

Use capture pole to bring sea lion alongside boat

Cut packing band from neck

Frayed packing band removed


Attach flipper tags, collect hair & whisker

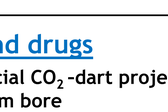

Apply temporary dye mark; Give reversal drug & antibiotic; RELEASE!

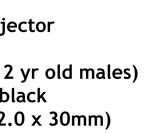
DISENTANGLED!

2013

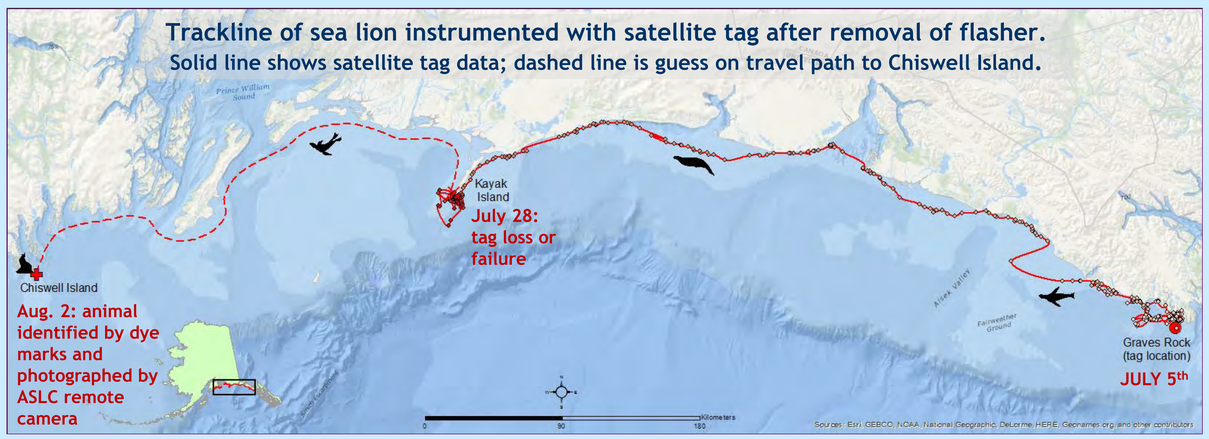
2014

2015





2016.....



Discussion/Future Direction

- "LOSE THE LOOP!" - Plastics kill! Prevention, education, and awareness are key to reducing entanglements in marine debris.
- There are currently no effective legally approved, non-harmful methods of sea lion deterrents available to fishermen. Survival of sea lions that ingest fishing gear may be increased by modifying gear to include a weak link between hook and lure. We hope to test this by removing lures/flashers from sea lions and attaching transmitters to track survival.
- We continue to search for a more sustainable and permanent solution to reduce sea lion-fishery interactions.

Acknowledgements: Special thanks to Aleria Jensen & Teri Rowles (NMFS) for making this work possible. Thank you to Elizabeth Hogan and World Animal Protection for their amazing support. We thank Tom Gage, John Skinner, Betsy Van Burgh, Neil Barten, Jeff Jemison, Chad Rice, and Elizabeth Hogan for their help in the field. Thanks to Bob, Ann, and Treva Widness of *M/V* Sumdum for outstanding vessel support and sea lion observations; Wendy Szaniszlo and Jamie King for inspiration to pursue disentanglements; Glacier Bay National Park for steadfast support; Alaska SeaLife Center for photo confirmation; and Jason Graham for graphics. Research was conducted under Permit No. 932-1905-01/MA-009526-1 to the NMFS Office of Protected Resources' Marine Mammal Health and Stranding Response Program and ADF&G ACUC Assurance 2013-30.