Marine Mammal Health and Stranding Response Program

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Goals of the Stranding Network

• Title IV MMPA:
  – Data on health and health trends in marine mammals
  – Correlate health data with environmental parameters
  – Coordinate effective responses to unusual mortality events

• Network members:
  – Enhance animal welfare
  – Science on biology and life history of marine mammals
  – Determine causes of stranding, disease & die-offs
  – Treat wounds and diseases to release stranded animals after rehabilitation

• Vision:
  – Biomonitoring program to detect
    • ocean changes impacting marine mammals
    • efficacy of mitigation measures to conserve marine mammals
Health Changes Detected by the Stranding Network & MMHSRP

- **Trauma**
  - Vessel strikes
  - Entanglements
  - Plastics in stomach

- **Infectious diseases**
  - Viral epidemics
  - Leptospirosis

- **Malnutrition**
  - Prey loss due to overfishing, pollution

- **Toxicoses**
  - Oil damage post spills
  - Harmful algal bloom poisoning

- **Degenerative diseases**
  - Cancer
Domoic Acid Poisoning of Sea Lions

- Domoic acid toxicosis first diagnosed in marine mammals in 1998, causes seizures, death
- In 1998 sea lions ate anchovies and sardines containing domoic acid
- Good correlations among bloom, toxin levels in water and prey, strandings, histological lesions and prey in sea lions
- Mortality in sea lions before toxin detected in mussels as ate “bait balls”
- Fishery closures to protect human health
Sub-lethal Effects Detected

- Abortion
- Brain damage – hippocampal atrophy
- Loss of sense of smell
- Memory loss

**Chronic effects due to low level exposure are relevant to human health:** humans may be exposed when seafood is contaminated at levels below threshold triggering fishery closures.

- Normal hippocampus
- Hippocampal atrophy
Harmful Alga Blooms are Increasing Globally

- Domoic acid
  - Blooms extending along west coast USA to Alaska
- Saxitoxin (paralytic shellfish poisoning)
  - Mortality of humpback whales New England
  - Sea otters in Alaska
- Brevetoxin
  - Repeated mortality events in manatees, bottlenose dolphins in Florida
- Ciguatoxin
  - Monk seals in Hawaiian waters
Cancer in 20% adult dead stranded California sea lions

- 17% of adult California sea lions examined post mortem have cancer
- Highest prevalence of cancer in any U.S. wildlife species
- Reproductive tract carcinoma
- Death due to cancer spread
- Herpesvirus in cancer tissues
- Sea lions with cancer have significantly higher levels of DDTs and PCBs
- DDT contamination of California coast persists due to underwater dumping
• Diagnosis of cause of the trauma identifies frequency, location of human induced trauma

• Diagnosis made by independent veterinarians, pathologists, biologists

• Long term data allows evaluation of the efficacy mitigation measures such as vessel speed reduction, fishery closures, fishing gear modifications
Stranding Network as a Biomonitoring Program

• Entire U.S coastline covered by partners permitted under the MMPA to respond to stranded marine mammals

• Partnerships with academia, veterinary schools, state and other federal laboratories vital in disease diagnosis and therapeutics development

• Capacity varies regionally

• Regional differences due to varied extent of partnerships, training, interests beyond welfare response

• Regional differences in ratio of federal/private funding
Stranding Network is a Public-Private Partnership

- Public reports a stranding
- Report investigated by Network member

- Stranded animal examined, sampled
- Samples submitted for testing
- Live animals treated

- Samples analyzed
- Results given to submitter

NOAA-NMFS

NGO / Academia/ Private Institute

University, Federal or State laboratory

Network partner

Public

Permit

Data
Future Directions

• **Invest in further fulfilling mandates of Title IV of the MMPA**
  – *Data on health and health trends in marine mammals*
  – *Correlate health data with environmental parameters*
  – *Coordinate effective responses to unusual mortality events*

• **Develop diagnostic capacity for areas without local academic or laboratory support**
  – Integrate marine mammal health assessments with terrestrial wildlife health programs

• **Integrate stranding and health data with environmental variables**
  – Understand and potentially mitigate impacts of ocean changes on marine mammal health

• **Identify impacts of climate change on marine mammals**

• **Increase real-time access to data on causes of stranding**
  – Enhance utility for guiding mitigation measures