Marine Mammal Health and Stranding Response Program

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Chair, Marine Mammal Commission

May 19th 2022

Veterinarian
The Marine Mammal Center 1994-2019

Commissioner
Marine Mammal Commission 2011-2022

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

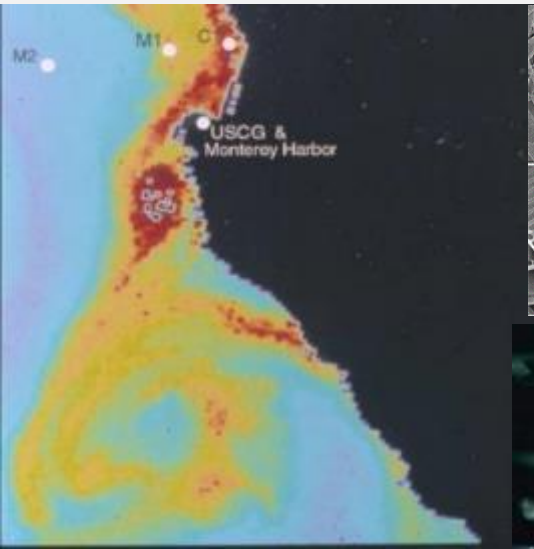
- Vision:
  - Biomonitoring program to detect
    - ocean changes impacting marine mammals
    - efficacy of mitigation measures to conserve marine mammals

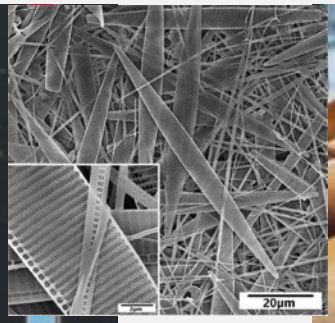
Health Changes Detected by the Stranding Network & MMHSRP

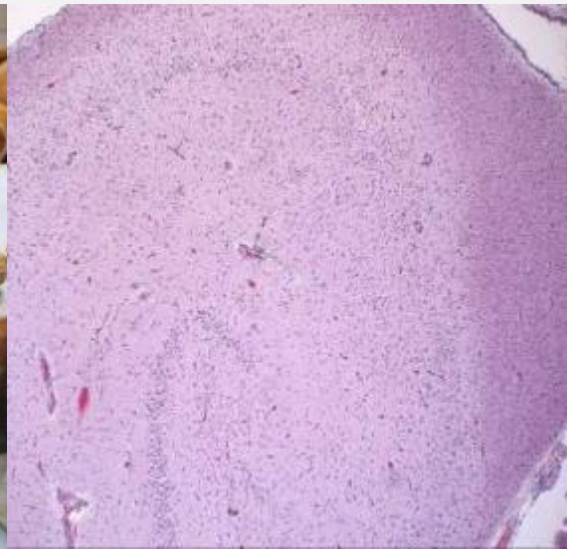
- Trauma
  - Vessel strikes
  - Entanglements
  - Plastics in stomach
- Infectious diseases
  - Viral epidemics
  - Leptospirosis
- Malnutrition
  - Prey loss due to overfishing, pollution
- Toxicoses
  - Oil damage post spills
  - Harmful algal bloom poisoning
- Degenerative diseases
  - Cancer

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

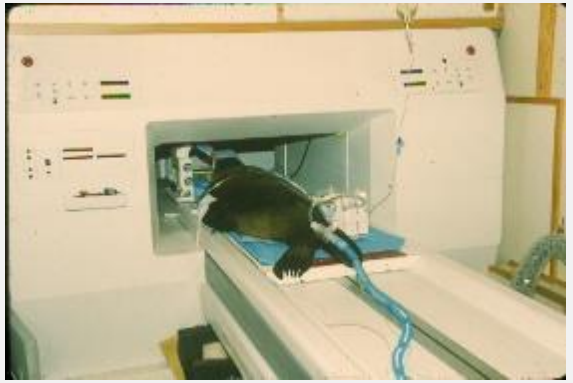




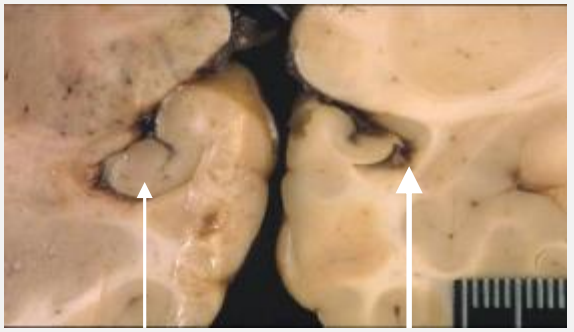


Sub-lethal Effects Detected

- 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.

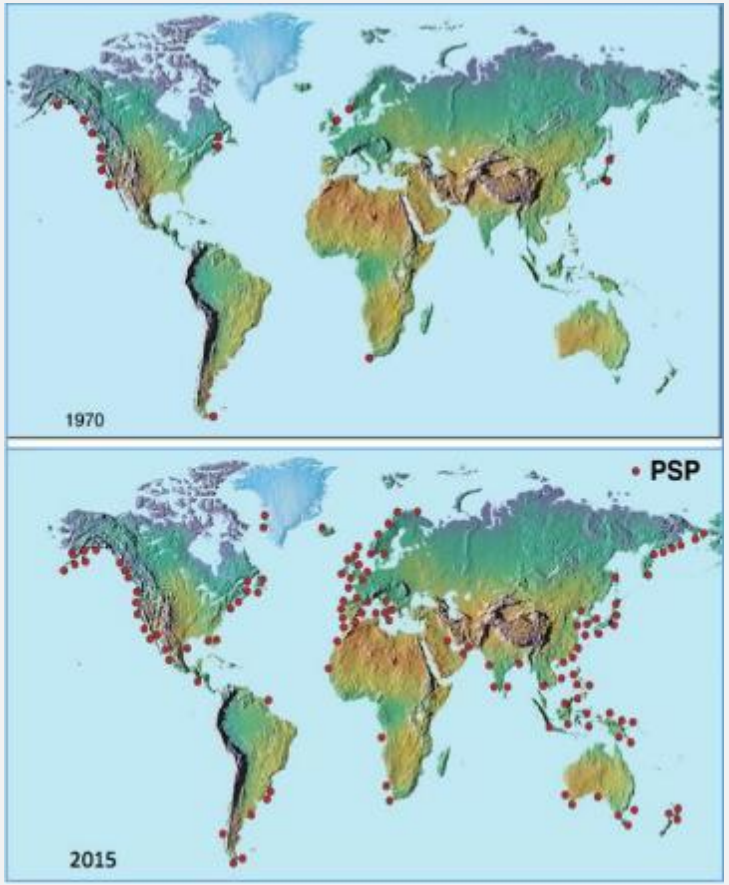


Normal hippocampus

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

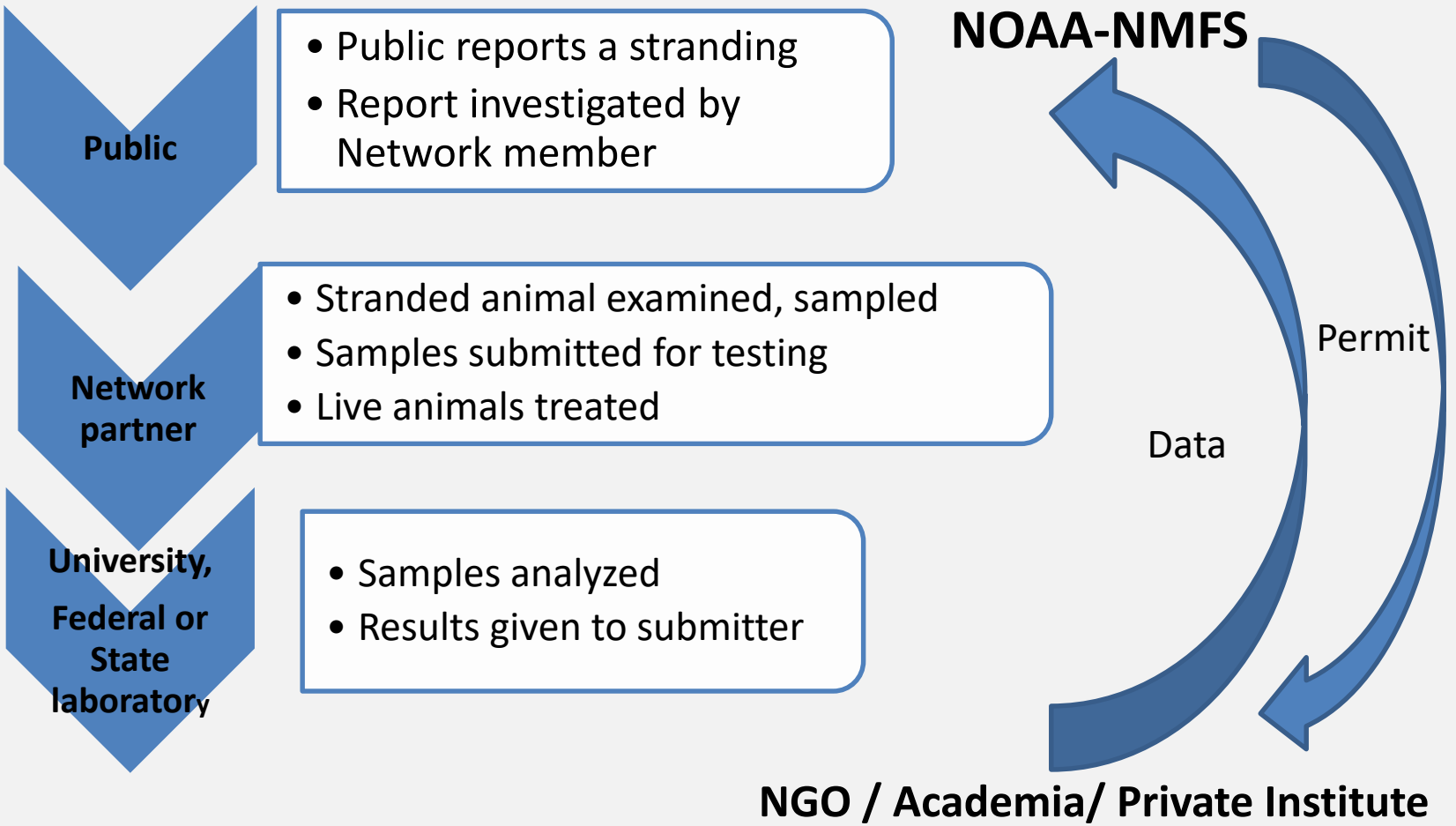
Trauma

- 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



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