

# Morbidity and Mortality in Marine Mammals Along the Oregon and Southern Washington Coasts 2006-2015

Oregon State University Hatfield Marine Science Center

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## Abstract

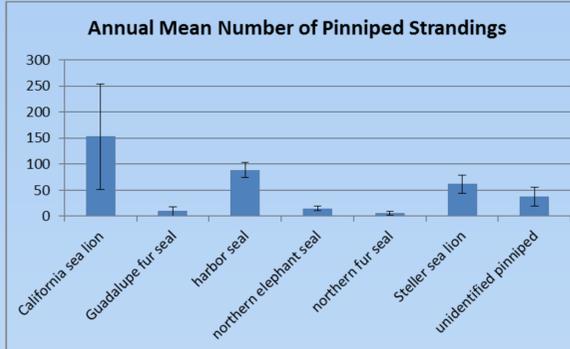
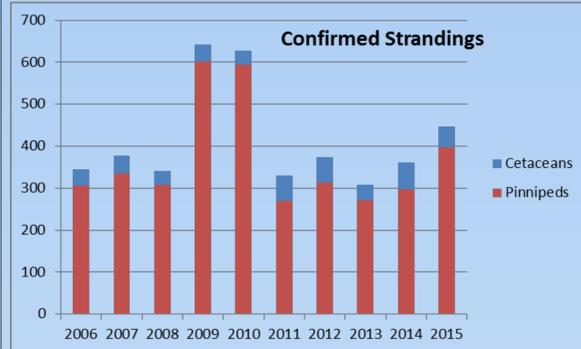
The Oregon Marine Mammal Stranding Network responds to approximately 400 strandings annually, from the California border through Long Beach Peninsula, WA. Whenever possible, thorough necropsies are conducted to determine causes of mortality and to monitor for exposure to disease, biotoxins, and contaminants. The five most commonly stranded species are California sea lions (*Zalophus californianus*), harbor seals (*Phoca vitulina*), Steller sea lions (*Eumetopias jubatus*), harbor porpoises (*Phocoena phocoena*), and northern elephant seals (*Mirounga angustirostris*), with occasional records of northern and Guadalupe fur seals (*Callorhinus ursinus* and *Arctocephalus townsendi*), gray whales (*Eschrichtius robustus*), Dall's porpoises (*Phocoenoides dalli*), Pacific white-sided dolphins (*Lagenorhynchus obliquidens*), striped dolphins (*Stenella coeruleoalba*), sea otters (*Enhydra lutris*), humpback whales (*Megaptera novaeangliae*), sperm whales (*Physeter macrocephalus*), killer whales (*Orcinus orca*), and Cuvier's beaked whales (*Ziphius cavirostris*).

Here we summarize results from necropsies conducted January 2006 - December 2015, on 1160 carcasses, in a variety of settings: in the field, at Portland State University, at the Hatfield Marine Science Center in Newport, and at Oregon State University's Veterinary Diagnostic Laboratory (VDL). Formalin-fixed tissues were analyzed by the VDL for histopathology in a majority of cases, and ancillary testing for microbes was also performed on carcasses brought to the VDL. Pneumonia was responsible for 174 mortalities, the most common cause of death. Trauma was found in 641 cases, generally due to fishery interactions, gunshot wounds, and predation. Leptospirosis was diagnosed in 84 California sea lions, typically adult and sub-adult males. Protozoal meningoencephalitis affected 36 animals of 7 species. 8 types of cancer were found in 29 animals, representing 6 species. 20 California sea lions had urogenital carcinomas. 3 porpoises were diagnosed with pulmonary Cryptococcosis. 6 striped dolphins and 1 Pacific white-sided dolphin succumbed to brucellosis, manifested as severe lymphocytic meningitis. Lastly, 25 bacterial organisms were cultured from 111 carcasses of 10 species.

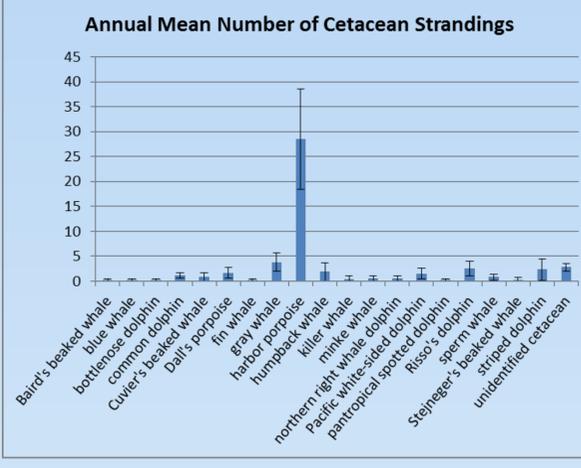
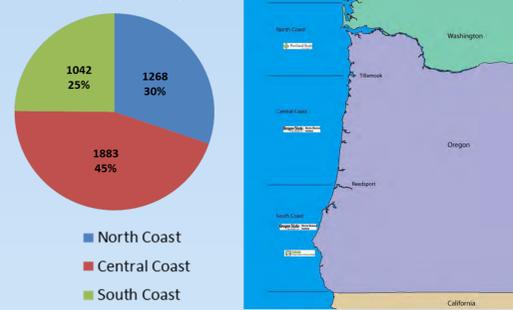
We would like to acknowledge the Veterinary Diagnostic Laboratory at OSU for diagnostic services, as well as the Seaside Aquarium, the Oregon State Police, the Oregon Department of Parks and Recreation, the Oregon Department of Fish and Wildlife, the Washington Department of Fish and Wildlife, and the many dedicated citizen volunteers who help with stranding response. Major funding for this project is provided through the John H. Prescott Marine Mammal Rescue Assistance Grant Program.

## Summary of Strandings 2006 – 2015

n = 4148

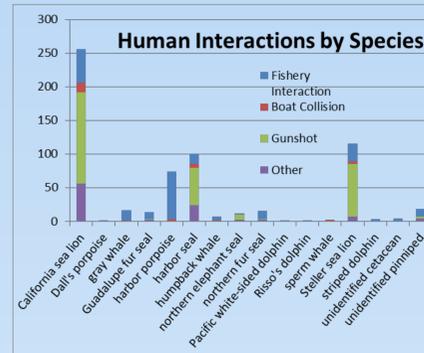
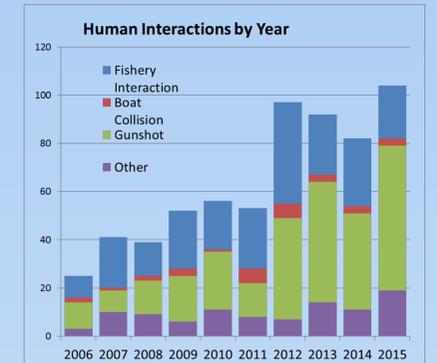
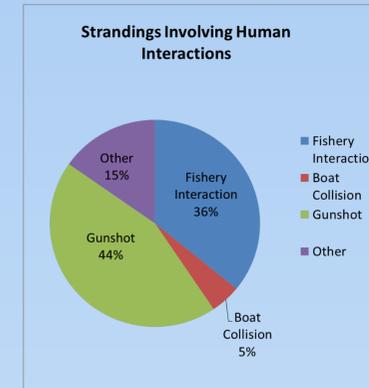


### Strandings by Region

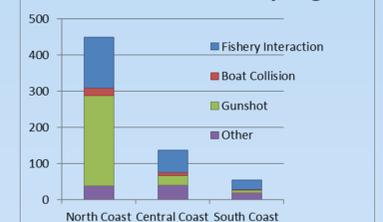


## Trauma Involving Human Interactions

n = 641 15% of all strandings



### Human Interactions by Region

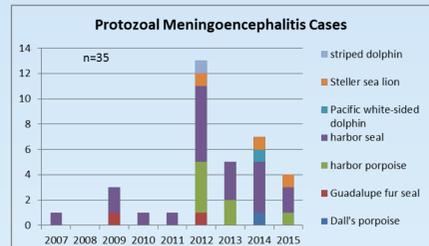


## Bacteriology

25 bacterial organisms were identified from 111 carcasses of 10 species

| Organism  | bottlenose dolphin | California sea lion | harbor porpoise | harbor seal | northern elephant seal | northern fur seal | Pacific white-sided dolphin | Steller sea lion | striped dolphin | Total |
|---|--------------------|---------------------|-----------------|-------------|------------------------|-------------------|-----------------------------|------------------|-----------------|-------|
| <i>Actinobacillus</i> sp.                           |                    | 1                   |                 |             |                        |                   |                             | 1                |                 | 2     |
| <i>Actinomyces</i> sp.                              |                    | 1                   |                 |             |                        |                   |                             |                  |                 | 1     |
| <i>Aeromonas caviae</i>                             |                    | 1                   |                 |             |                        |                   |                             |                  |                 | 1     |
| <i>Aeromonas hydrophila</i>                         |                    |                     |                 | 1           |                        |                   |                             |                  |                 | 1     |
| <i>Aeromonas</i> spp.                               |                    | 3                   |                 | 1           |                        |                   | 1                           |                  |                 | 5     |
| <i>Arcanobacterium phocae</i>                       |                    |                     |                 | 1           | 1                      |                   | 1                           |                  |                 | 3     |
| <i>Bacillus</i> spp.                                |                    | 1                   |                 |             |                        |                   |                             |                  |                 | 1     |
| <i>Bacteroides fragilis</i>                         |                    | 1                   |                 |             |                        |                   |                             |                  |                 | 1     |
| <i>Brucella</i> sp.                                 |                    |                     |                 |             |                        |                   | 1                           |                  | 6               | 7     |
| <i>Clostridium</i> spp.                             |                    | 2                   |                 | 1           |                        |                   |                             |                  |                 | 3     |
| <i>Edwardsiella tarda</i>                           |                    |                     |                 |             | 1                      |                   |                             |                  |                 | 1     |
| <i>Enterobacter</i> sp.                             |                    | 5                   |                 |             |                        |                   |                             |                  |                 | 5     |
| <i>Escherichia coli</i>                             |                    | 5                   |                 | 2           | 1                      |                   |                             |                  |                 | 8     |
| <i>Klebsiella</i> sp.                               |                    | 2                   |                 |             |                        |                   |                             |                  |                 | 2     |
| <i>Leptospira interrogans</i>                       |                    | 39                  |                 | 2           | 3                      | 1                 | 1                           |                  | 2               | 48    |
| <i>Mycoplasma</i> spp.                              |                    | 1                   |                 |             |                        |                   |                             |                  |                 | 1     |
| <i>Pasteurella</i> sp.                              |                    | 3                   |                 | 2           |                        |                   |                             |                  |                 | 5     |
| <i>Proteus</i> spp.                                 |                    | 1                   |                 | 1           |                        |                   |                             |                  |                 | 2     |
| <i>Pseudomonas</i> spp.                             |                    | 1                   |                 |             |                        |                   |                             |                  |                 | 1     |
| <i>Salmonella</i> spp.                              |                    | 2                   |                 |             |                        |                   |                             |                  |                 | 2     |
| <i>Shewanella putrefaciens</i>                      |                    | 1                   |                 |             |                        |                   |                             |                  |                 | 1     |
| <i>Staphylococcus aureus</i>                        |                    | 1                   |                 |             |                        |                   | 1                           |                  |                 | 2     |
| <i>Streptococcus phocae</i>                         |                    | 6                   |                 |             |                        |                   |                             | 1                |                 | 7     |
| <i>Streptococcus</i> spp. ( <i>beta hemolytic</i> ) |                    | 20                  |                 | 2           | 1                      |                   |                             | 1                |                 | 24    |
| <i>Vibrio</i> spp.                                  |                    |                     | 2               |             |                        |                   |                             |                  |                 | 2     |

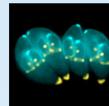
## Protozoal Meningoencephalitis



Severe brain infections were caused by *Toxoplasma gondii* and *Sarcocystis neurona*

## Pneumonia

- 174 cases. Lung worm and bacterial infections were the most common causes.
- Disseminated protozoal infection (*Toxoplasma gondii*) caused pneumonia in 6 harbor porpoises.



**Pulmonary cryptococcosis** (*Cryptococcus gattii*) was diagnosed in 3 cases: 2 harbor porpoises (2008) and 1 Dall's porpoise (2007).

## Neurobrucellosis

*Brucella* sp. was isolated from the brains of 7 dolphins from 2 separate spates of strandings: December 5-12, 2012 and February 19-22, 2014. All had severe lymphoplasmacytic meningoencephalitis.



## Leptospirosis



84 of 208 (40%) tested California sea lions were diagnosed by histopathology, immunohistochemistry, and/or PCR of kidney tissue. Many of these occurred during major outbreaks in 2009 and 2010. 45 of these also had severe bronchopneumonia, often with a *Streptococcus* sp. agent.

Other species positive for *Leptospira* by PCR include:

- harbor porpoise
- harbor seal
- northern elephant seal
- northern fur seal
- Steller sea lion

