Cetacean strandings in San Diego County, California, USA: 1851-2008

Kerri Danil[1], Susan J. Chivers[1], Mike D. Henshaw[1], Janet L. Thieleking[1], Risa Daniels[2], Judy A. St. Leger[3]

[1] Southwest Fisheries Science Center, [2] Navy Marine Mammal Foundation, [3] Sea World San Diego

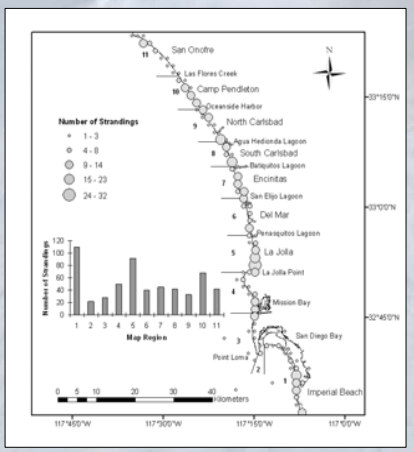
Abstract

There were 717 cetacean strandings recorded in San Diego County, California, USA between 1851 and 2008. These strandings comprised 18 odontocete and 6 mysticete species. Common dolphins (both the short-beaked (*Delphinus delphis*) and long-beaked common dolphin (*Delphinus capensis*)) were the most commonly stranded cetacean (43.2%), followed by bottlenose dolphins (*Tursiops truncatus*) (16.5%), gray whales (*Eschrictius robustus*) (11.0%), and Pacific white-sided dolphins (*Lagenorhyncus obliquidens*) (7.0%). A higher number of strandings was observed in the La Jolla and Coronado/Imperial Beach areas, which likely reflects the influence of coastal protrusions in those regions. Strandings of bottlenose dolphin neonates suggests their calving season extends from May to September. Strandings of common dolphin species peaked in the early- to mid- 1970s and in the late-1990s to 2008, coincident with cool oceanographic regimes. In addition, extralimital strandings of harbour porpoises and temporal changes in stranding rates of Dall's porpoises (*Phocoenoides dalli*) and short-finned pilot whales (*Globicephala macrorhynchus*) may have been associated with changes in oceanographic conditions. Evidence of human interaction in strandings included entanglements, boat strikes, shootings, and harpooning. Overall, the stranding record largely reflected the species composition of the Southern California Bight and provided confirmation for presence of cryptic species not previously recorded by aerial and ship surveys.

Methods

Strandings along the approximately 80 miles (125 km) of beaches in San Diego County were documented by scientific personnel (NOAA Fisheries, Sea World, Naval Ocean Systems Center, Scripps Institution of Oceanography, San Diego Natural History Museum) (n=698), historical photos (n=2), and newspaper articles (n=17).

Results and Discussion



A significantly higher number of strandings occurred in map regions one, five, and ten. Coastal protrusions and coastal eddies in regions one and five likely contribute to the increased strandings in those areas.

Strandings of the two common dolphin species occurred the most frequently (43.2%), followed by bottlenose dolphins (16.5%), gray whales (11.1%), and Pacific white-sided dolphins (7.0%).

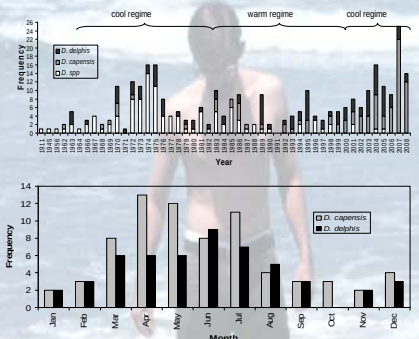
Species	Alive	Dead	Total
Balaenoptera		4	4
Balaenoptera acutorostrata		3	3
Balaenoptera musculus		4	4
Balaenoptera physalus		6	6
Delphinus capensis	7	88	95
Delphinus delphis	21	81	102
Delphinus sp.	52	61	113
Eschrichtius robustus	3	77	80
Eubalaena japonica		1	1
Globicephala macrorhynchus	3	17	20
Grampus griseus	3	5	8
Kogia breviceps	10	5	15
Lagenorhynchus obliquidens	9	41	50
Lissodelphis borealis	4	9	13
Megaptera novaeangliae	1	3	4
Mesoplodon carlhubbsi	2	1	3
Mesoplodon ginkgodens	0	1	1
Mesoplodon perrini	0	4	4
Mesoplodon stejnegeri	1	0	1
Phocoena phocoena	0	2	2
Phocoenoides dalli	6	13	19
Physeter macrocephalus	0	2	2
Stenella coeruleoalba	1	4	5
Tursiops truncatus	12	106	118
Ziphius cavirostris	5	9	14
unid dolphin or porpoise	6	15	21
unidentified large whale	1	3	4
unidentified cetacean	0	2	2
unidentified whale	3	0	3
Total	150	567	717

North Pacific right whale, February 1851: This is the first published stranding record for the mainland USA. This stranding occurred during the assumed migratory period (February-May) off this coast, determined from previous sightings (Brownell et al. 2001).

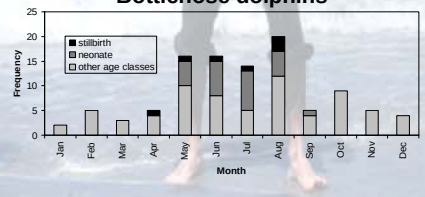
Pygmy sperm whale, 1949-1999: The San Diego County stranding record represents the only published information available in southern California for this species.

Harbor porpoise, 2005-2006: Extralimital strandings may reflect anomalous oceanographic conditions or an expansion of their range to the south.

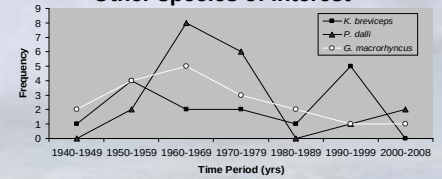
Common dolphins



Bottlenose dolphins



Other species of interest



- **Peaks in common dolphin strandings coincident with cool oceanographic regimes and seasons of the year may be related to changes in common dolphin distribution or increased mortalities due to domoic acid toxicity.**
- **Anchovies have been implicated as the primary vector for domoic acid toxicity in long-beaked common dolphins (Berman & Fahy 2003) and are known to be more prevalent during cool water regimes (Chavez et al. 2003).**
- **Domoic acid concentrations typically increase during spring and summer off California (Langlois 2007, Schnetzer et al. 2007).**
- **Bottlenose dolphins occur year-round off San Diego and appear to have a calving season from May through September.**
- **Preliminary genetic analyses assigned 74.2% (n = 62) of stranded bottlenose dolphins to the coastal stock. Additional research is needed to resolve the 25.8% that are undetermined due to new or shared haplotypes with the offshore stock.**
- **The decrease in short-finned pilot whale strandings reflects the movement of this species out of the Southern California Bight (SCB) following the strong El Niño event of 1982-1983.**
- **The cool to warm oceanographic regime shift of the late 1970s in the North Pacific may have prompted a northward movement of Dall's porpoises that resulted in their absence off San Diego County from 1980-1997.**
- **San Diego County stranding records reflected the species composition of the SCB and were better at detecting the presence of cryptic species missed during aerial and ship surveys.**

Conclusions

This review demonstrates the value of stranding networks in monitoring cetacean species and highlights the importance of stranding records for documenting extralimital sightings, cryptic species, and revealing changes in distribution or mortality due to changes in oceanographic conditions.

Acknowledgements

We thank the many past stranding responders who made this study possible. Thank you Erika Nilson for compiling live stranding data, Joe Cordaro for providing SW region data for comparison, and Eric Archer for providing updated *Tursiops* stock designations. Thanks to San Diego Natural History Museum and Scripps Institution of Oceanography for providing access to their archives.

References

Berman M, Fahy K (2003) Domoic acid and dolphins; a deadly combination. Fifteenth Biennial Conference on the Biology of Marine Mammals, Greensboro, NC
Brownell RL, Clapham PJ, Miyashita T, Kasuya T (2001) Conservation status of North Pacific right whales. J Cetacean Res Manag (Special Issue) 2:269-286
Chavez FP, Ryan J, Lluch-Cota SE, Niquen C M (2003) From anchovies to sardines and back: multidecadal change in the Pacific Ocean. Science 299:217-221
Langlois GW (2007) Yearly Marine Biotoxin Monitoring Reports, since 2001. California Department of Health Services. [Available from: http://ww2.cdph.ca.gov/HealthInfo/environhealth/water/Pages/Shellfishreports.aspx]
Schnetzer A, Miller PE, Schaffner RA, Stauffer BA, Jones BH, Weisberg SB, DiGiacomo PM, Berelson WM, Caron DA (2007) Blooms of *Pseudo-nitzschia* and domoic acid in the San Pedro Channel and Los Angeles harbor areas of the Southern California Bight, 2003-2004. Harmful Algae 6:372-387