

JAMES D. DARLING, PH.D.

Zoologist

Pacific Wildlife Foundation

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Whale Trust

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Ongoing Projects - 2014

Function of the Humpback Whale Song

This is a long-term project that currently involves comparisons of song across the North Pacific (Philippines, Japan, Hawaii and Mexico), song playback experiments (Hawaii), and the study of male behavior on the breeding ground (Hawaii).

Social Organization in Gray Whales

This is part of a long-term project with current focus on sex composition, relatedness and social structure of whales in the summer resident population off Vancouver Island, based on sightings histories and genetics.

Ancient Northwest Coast Ecosystems

This is new project in collaboration with Tla-o-qui-aht First Nation and other scientists using ancient whale bones from a traditional whaling site to reveal pre-industrial whale populations and food webs through genetics and stable isotope studies.

Important Cetacean Areas

This is a PWLF project involving the definition and mapping of areas important to cetaceans in BC and SE Alaska (<http://pwlf.org/ica/index.html>).

Most Recent Publications:

Darling, J.D., J.M. Acebes and M. Yamaguchi. 2014. Similarity yet a range of difference between humpback whale songs recorded in Philippines, Japan and Hawaii in 2006. *Aquatic Biology* 21: 93-107.

- D'Intino, A.M., J.D. Darling, J. Urban R. and T.R. Frasier. 2013. Lack of nuclear differentiation suggests reproductive connectivity between the 'southern feeding group' and the larger population of eastern North Pacific gray whales, despite previous detection of mitochondrial differences. *J. Cetacean Res. Manage.* 13(2): 97-104.
- Darling, J. D., M. E. Jones, and C. P. Nicklin. 2012. Humpback whale (*Megaptera novaeangliae*) singers in Hawaii are attracted to playback of similar song. *Journal Acoustic Society of America* 132 (5): 2955-2958.
- Frasier, T. R., S. M. Koroscil, B. N. White and J. D. Darling. 2011. Assessment of population substructure in relation to summer feeding ground use in the eastern North Pacific gray whale. *Endangered Species Research* 14: 39-48.
- Darling, J. D. 2009. Hawaii's Humpbacks - Unveiling the Mysteries. Granville Island Press, Vancouver B.C. 240pp.
- Acebes, J. V., J. D. Darling, and M. Yamaguchi. 2007. Status and distribution of humpback whales (*Megaptera novaeangliae*) in northern Luzon, Philippines. *Journal of Cetacean Management* 9(1): 37-43.
- Darling, J.D., M. E. Jones and C. P. Nicklin. 2006. Humpback whale songs: Do they organize males during the breeding season? *Behaviour* 143: 1051-1101.

BACKGROUND

EDUCATION

University of Victoria	Zoology	B.Sc.	1972
University of Victoria	Zoology	M.Sc.	1978
University of California Santa Cruz	Biology	Ph.D.	1983

Professional Affiliation: Society for Marine Mammalogy (1985 - present)

WORK EXPERIENCE

Research Zoologist (1975 – present)
Pacific WildLife Foundation and Whale Trust

Responsible for the design, fieldwork, analysis and reporting of a variety of research projects on whales in British Columbia, Hawaii, S.E. Alaska, Japan, French Polynesia and Gabon – Central Africa. Most studies investigated abundance, distribution, behaviour or ecology of gray and humpback whales.

Research Director (1991-1997)

Clayoquot Biosphere Project, Tofino, B.C.

Responsible for the development and oversight of community based marine and forest ecosystem research projects, including establishment and management of wilderness research stations. This program included a wide variety of projects ranging from natural history studies of temperate coastal ecosystem, to investigation of the status of wildlife resources in the traditional territory of the Hesquiat First Nation (based on traditional and scientific knowledge), to a study of basking sharks based on photo-identification of individuals.

Alderman, Municipality of Tofino, B.C. (1988-1990)

Elected position on town council dealing with a wide variety of municipal issues including environmental, economic and development concerns.

Associate Producer, *Island of Whales* Documentary Film (1988-89)

Developed original concept, and assisted in writing and production of this hour film that explores whales and coastal habitat around Vancouver Island BC. It won the Canadian Gemini Award for best documentary of the year.

Instructor, Marine Mammalogy (1984 and 1986)

Bamfield Marine Station, Vancouver Island, Canada

Co-taught an upper division course on the evolution, biology, ecology and behaviour of marine mammals.

SELECTED PROJECTS

Project Title: **The function of the humpback whale song, 1997 - present**

Funding Agency: National Geographic Society and Whale Trust

Based in Hawaii, this is a long-term investigation into the song and mating system of humpback whales. It has included genetic studies, photogrammetry, focal follows, acoustic analysis and playback experiments, and has provided new insight into humpback whale communication and social behaviour. This has been my primary project for the last ten years.

***Project Title:* Independent Scientific Review Panel (ISRP) on the Impacts of Sakhalin II Phase 2 on Western North Pacific Gray Whales and Related Biodiversity, 2004-2005**

Funding Agency: International Union for the Conservation of Nature (IUCN)

As a member of the ISRP reviewed the impacts of major oil and gas development on the only known feeding grounds of the critically endangered western gray whale population off Sakhalin Island, Russia. The panel reviewed the full range of potential impacts including vessel collisions, noise, oil spills, and ecological effects of physical changes in habitat from pipeline and platform construction, and proposed mitigation measures.

***Project Title:* Humpback whale distribution and behaviour in Gabon, Central Africa, 1999-2004**

Funding Agency: National Geographic Society and ECOFAC (European Union)

This research provided the first description of the humpback whale population off Central Africa since the end of whaling in 1950s. The whales live in the midst of an intensive industrial/oil development. A portion of the study involved recording humpback whale songs with hydrophones installed on oil platforms. This study led to comparison of humpback songs between Gabon and Brazil, indicating that the two populations of whales are in contact.

***Project Title:* Gray whale prey species and habitat utilization, 1991-96**

Funding Agency: West Coast Whale Research Foundation and Clayoquot Biosphere Project

This was a five-year study on gray whale prey and habitat use off Vancouver Island, as a follow up to the 1989 Nestucca oil spill. Prey species and corresponding habitat and whale behaviour were identified. Among other things, it concluded that a variety of prey species, leading to a high natural variability in the distribution and behaviour of the whales, makes identification of the impacts from human activities (below the lethal level) difficult.

***Project Title:* Distribution and behaviour of humpbacks whales in Japan, 1988-91**

Funding Agency: West Coast Whale Research Foundation and World Wildlife Fund-Japan

This research involved the re-discovery of humpback whales in Ogasawara and Okinawa waters, and the first study of living large whales in Japan. It included two Japanese graduate students, one who went on to his Ph.D. and has continued to study living whales. This study also led to the first whale watching in Japan, which has since become a significant industry and a factor in whale conservation.

Project Title: Traditional wildlife resources at Hesquiat, Vancouver Is. 1990

Funding Agency: Hesquiat First Nation and Ecotrust

A study incorporating traditional and scientific knowledge was conducted on the status of marine and terrestrial resources in Hesquiat traditional territory along the west coast of Vancouver Island. This was used as a basis for treaty negotiations.

SCIENTIFIC PUBLICATIONS

Principle Author

Darling, J.D. 2015. Low frequency, ca. 40 Hz, pulse trains recorded in the humpback whale assembly in Hawaii. *Journal Acoustic Society of America* 138 (5).

Darling, J.D., J.M. Acebes and M. Yamaguchi. 2014. Similarity yet a range of differences between humpback whale songs recorded in Philippines, Japan and Hawaii in 2006. *Aquatic Biology* 21:93-107.

Darling, J. D., M. E. Jones, and C. P. Nicklin. 2012. Humpback whale (*Megaptera novaeangliae*) singers in Hawaii are attracted to playback of similar song. *Journal Acoustic Society of America* 132 (5): 2955-2958.

Darling, J.D., M. E. Jones and C. P. Nicklin. 2006. Humpback whale songs: Do they organize males during the breeding season? *Behaviour* 143, 1051-1101.

Darling, J.D. and R.S. Sousa-Lima. 2005. Songs indicate interaction between humpback whale (*Megaptera novaeangliae*) populations in the western and eastern South Atlantic ocean. *Marine Mammal Science*, 21(3): 557-566.

Darling, J.D. 2002. Song. In: *Encyclopedia of Marine Mammals*, Eds. W.F. Perrin, B. Wursig and J.G.M. Thewissen. Academic Press, pp. 1124-1126.

Darling, J.D. and M. Berube. 2001. Interactions of singing humpback whales with other males. *Marine Mammal Science*, 17(3): 570-584.

Darling, J.D., K. E. Keogh and T.M. Steeves. 1998. Gray whale (*Eschrichtius robustus*) habitat utilization and prey species off Vancouver Island, B.C. *Marine Mammal Science*, 14(4): 692-720

Darling, J.D. J. Calambokidis, K.C. Balcomb, P. Bloedel, K. Flynn, A. Mochizuki, K. Mori, F. Sato, H. Suganuma and M. Yamaguchi. 1996. Movement of a humpback whale from Japan to B.C. and return. *Marine Mammal Science* 12(2): 281-287.

- Darling, J.D. and K.E. Keogh. 1994. Observations of basking sharks (*Cetorhinus maximus*) in Clayoquot Sound, British Columbia. Canadian Field Naturalist 108(2): 199-210.
- Darling, J.D. and K. Mori. 1993. Recent observations of humpback whales (*Megaptera novaeangliae*) in Japanese waters, Ogasawara and Okinawa. Canadian Journal of Zoology 71: 325-333.
- Darling, J.D. and S. Cerchio. 1993. Movement of a humpback whale (*Megaptera novaeangliae*) between Japan and Hawaii. Marine Mammal Science 9(1): 84-91.
- Darling, J.D., and H. Morowitz. 1986. Census of "Hawaiian" humpback whales (*Megaptera novaeangliae*) by individual identification. Canadian Journal of Zoology 64:105-111.
- Darling, J.D., and D.J. McSweeney. 1985. Observations on the migrations of North Pacific humpback whales (*Megaptera novaeangliae*). Canadian Journal of Zoology 63: 308-314.
- Darling, J.D. 1984. Gray whales off Vancouver Island, British Columbia. In: The Gray Whale *Eschrichtius robustus*. Ed. by: Jones, M.L., S.L. Swartz. and S. Leatherwood. Academic Press, New York. pp. 267-287.
- Darling, J.D., and C.M. Jurasz. 1983. Migratory destinations of North Pacific humpback whales (*Megaptera novaeangliae*). In: Communication and Behavior of Whales. Ed. by R. Payne. AAAS Selected Symposia Series. Westview Press, Boulder, CO. pp. 359-368.
- Darling, J.D., K.M. Gibson, and G.K. Silber. 1983. Observations on the abundance and behavior of humpback whales (*Megaptera novaeangliae*) off West Maui, Hawaii, 1977-79. In: Communication and Behavior of Whales. Ed. by R. Payne. AAAS Selected Symposia Series. Westview Press, Boulder, CO. pp. 359-368.

Collaborations

- D'Intino, A.M., J.D. Darling, J. Urban R. and T.R. Frasier. 2013. Lack of nuclear differentiation suggests reproductive connectivity between the 'southern feeding group' and the larger population of eastern North Pacific gray whales, despite previous detection of mitochondrial differences. J. Cetacean Res. Manage. 13(2): 97-104.

- Frasier, T. R., S. M. Koroscil, B. N. White and J. D. Darling. 2011. Assessment of population substructure in relation to summer feeding ground use in the eastern North Pacific gray whale. *Endangered Species Research* 14: 39-48.
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- Mizroch, S.A., L.M. Herman, J.M. Straley, D.A. Glockner-Ferrari, C. Jurasz, J. Darling, S. Cerchio, C.M. Gabriele, D.R. Salden, and O. von Ziegeler. 2004. Estimating the adult survival rate of central North Pacific humpback whales (*Megaptera novaeangliae*). *Journal of Mammalogy*, 85(5):963-972
- Calambokidis, J., J.D. Darling, V. Deeke, P. Gerrin, M. Gosho, W. Megill, C.M. Tombach, D. Goley, C. Toropova, and B. Gisborne. 2002. Abundance, range and movements of a feeding aggregation of gray whales (*Eschritius robustus*) from California to southeast Alaska in 1998. *Journal of Cetacean Research and Management* 4(3): 267-271
- Gabriele, C.M., J.M. Straley, S.A. Mizroch, C.S. Baker, A.S. Craig, L.M. Herman, D. Glockner-Ferarri, M.J. Ferrari, S. Cerchio, O. von Ziegeler, J. Darling, D. McSweeney, T. J. Quinn II, and J. Jacobsen. 2001. Estimating the mortality rate of humpback whale calves in the central North Pacific Ocean. *Canadian Journal of Zoology*. 79: 589-600.
- Steeves, T.E., J.D. Darling, P.E. Rosel, C.M. Schaeff and R.C. Fleischer. 2001. Preliminary analysis of mitochondrial DNA variation in a southern feeding group of eastern North Pacific gray whales. *Conservation Genetics* 2: 379-384
- Calambokidis, J., G.H. Steiger, K. Rasmussen, J. Urban, K.C. Balcomb, P. Ladron de Guevara, M. Salinas, J.K. Jacobsen, C.S. Baker, L.M. Herman, S. Cerchio, J. Darling. 2000. Migratory destinations of humpback whales that feed off California, Oregon and Washington. *Marine Ecology Progress Series* 192:295-304.
- Calambokidis, J. G.H. Seiger, J.R. Evenson, K.R. Flynn, K.C. Balcomb, D.E. Claridge, P. Bloedel, J.M. Straley, C.S. Baker, O. von Ziegeler, M.E. Dalheim, J.M. Waite, J.D. Darling, G. Ellis, and G.A. Green. 1996. Interchange and isolation of humpback whales off California and other North Pacific feeding grounds. *Marine Mammal Science* 12(2):215-226.
- Rowntree, V., J. Darling, G. Silber and M. Ferrari. 1980. Rare sighting of a right whale (*Eubalaena glacialis*) in Hawaii. *Canadian Journal of Zoology*. 58(2): 309-312.
- Hatler, D.F. and J.D. Darling. 1974. Recent observations of the gray whale in British Columbia. *Canadian Field Naturalist* 88: 449-459.

TECHNICAL REPORTS

- Darling, J.D. 2001. Characterization of behavior of humpback whales in Hawaiian waters. Unpublished report. Hawaiian Islands Humpback Whale National Marine Sanctuary. 55pp.
- Darling, J.D. 1992. Management for a living Hesquiat Harbour. Compilation of existing knowledge and preliminary assessment of resources and habitat. Unpublished report prepared for The Hesquiat First Nation and Conservation International/Ecotrust. 188 pp.
- Darling, J.D. 1991. Humpback whales in Japanese waters Ogasawara and Okinawa. Fluke Identification Catalog 1987-1990. Available: World Wide Fund for Nature-Japan or West Coast Whale Research Foundation, Vancouver. 56 pp.
- Darling, J.D. and K. Keogh. 1990. Clayoquot Sound Biological Diversity Study Literature Review. Unpublished report. Steering Committee for Sustainable Development, Tofino, B.C. 87 pp.
- Darling, J.D. 1989. Survey for Nestucca Oil in Sediments of Selected Gray Whale Feeding Sites. Contract: DFO/PBS-041-Part 1. Unpublished report. Department of Fisheries and Oceans, Nanaimo, B.C. 11 pp.
- Darling, J.D. 1989. Monitoring of Potential Changes in Migratory or Feeding Behaviour of Gray Whales Due to the Nestucca Oil Spill. Unpublished report. Contract: DFO/PBS-041-Part 2. Department of Fisheries and Oceans, Nanaimo, B.C. 11 pp.
- Darling, J.D. 1988. Whale Watching in Ogasawara, Japan. Unpublished report. Ogasawara Village Government. Ogasawara, Japan. 33 pp.
- Darling, J.D. 1986. Robson Bight Ecological Reserve Management Plan. An assessment of the impacts of human activities on the killer whales of Robson Bight Ecological Reserve with management guidelines. Ecological Reserves Program. Ministry of Environment and Parks, Victoria B.C. 83 pp.
- Darling, J.D. 1983. Migration, abundance and behavior of Hawaiian humpback whales (*Megaptera novaeangliae*). Ph.D. thesis. University of California Santa Cruz. 147 pp.
- Darling, J.D. 1978. Aspects of the behavior and ecology of the Vancouver Island gray whales, *Eschrichtius robustus* Cope. M.Sc. thesis. University of Victoria, B.C. 200 pp.

- Darling, J.D. 1978. Abundance and behavior of gray whales that spend the summer off the west coast of Vancouver Island. SC/30/Doc. 37. Presented to the I.W.C. Scientific Committee, June 1978.
- Darling, J.D. 1973. The Pacific gray whale (*Eschrichtius glaucus* Cope). A bibliography and literature review. Unpublished report. National and Historic Parks Branch, Western Region. Calgary, Alberta. 193 pp.
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POPULAR BOOKS

- Darling, J.D. 2009. Hawaii's Humpbacks Unveiling the Mysteries. Granville Island Press, Vancouver B.C. 240pp.
- Darling, J.D. 1999. Gray Whales. Colin Baxter Photography, Grantown-on-Spy, Scotland. 72pp.
- Darling, J.D. 1995. Seiners of the Sea. In: J.D. Darling, C.F. Nicklin, K.S. Norris, H. Whitehead & B. Wursig, Whales, Dolphins and Porpoises. National Geographic Society: Washington, DC. pp. 87-137.
- Darling, J.D. 1990. With the Whales. Northword Press. Minocqua, Wisconsin. 158 pp.
- Darling, J.D. 1987. Wild Whales - Humpback, Gray and Killer Whales. SummerWild Productions, Vancouver. 96 pp.

POPULAR ARTICLES (Sample)

- Darling, J.D. 1994. Seeing Ghosts - Gray Whales in the Orient. *Ocean Realm Magazine*. Jan. 1994:18-19.
- Darling, J.D. 1991. Rediscovering Japan's humpback whales. *Whalewatcher*. Journal of the American Cetacean Society 25(2): 3-11.
- Darling, J.D. 1988. Whales An Era of Discovery. *National Geographic Magazine*. December 1988: 872-909.

Darling, J.D. 1984. Humpbacks - giants not so gentle. *Oceans Magazine* 2: 3-10.

Darling, J.D. 1977. The Vancouver Island gray whales. *Waters - Journal Vancouver Aquarium* 2: 5-19.