

Patrick James O'Malley Miller

Professor and Senior Research Fellow
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Research Interests: My research focuses on ecology and behaviour of marine mammals, and the advancement of methodological techniques including ocean and tagging instrumentation. Specific research interests include: acoustic communication and social behaviour, diving physiology and ecology, foraging behaviour, the role of top predators in the marine ecosystem, and effects of anthropogenic disturbance.

Nationality: USA **Birthdate:** April 21, 1965 **Languages:** English, Italian, Japanese

Education:

PhD in Biological Oceanography, Joint degree from the Woods Hole Oceanographic Institution, Woods Hole, MA and the Massachusetts Institute of Technology, Cambridge, MA. September 2000. Thesis: "Maintaining contact: design and use of acoustic signals in killer whales, *Orcinus orca*". Advisor: Peter L. Tyack

Bachelor of Science in Zoology, University of Washington, Seattle; with distinction, 1994

Bachelor of Science in Foreign Service, Georgetown University, Washington, DC; Japanese/Asian Studies Certificate. Study Abroad: Sophia University, Tokyo, 1988.

Work Experience:

School of Biology, Sea Mammal Research Unit, University of St. Andrews, April 2006 - present. Senior Research Fellow and Lecturer (appointed June 2007) promoted to Reader (August, 2013) and currently **Professor** (from 2016) studying: acoustic communication, marine ecology sensory ecology, diving and foraging in marine mammals, buoyancy and body condition, effects of anthropogenic disturbance.

Atmosphere and Ocean Research Institute, University of Tokyo, Tokyo, Japan, June– Sept 2006; Oct–Nov 2011; Sept–Dec 2015; Oct 2021–Apr 22. Visiting Professorships. Behavioural ecology of marine top predators using the bio-logging method.

Chuo Trust & Banking, New York Branch. 1989–1991. Assistant VP, loan officer.

Fellowships and Prizes:

Kobe Prize for advances in Marine Biology, 2013. Awarded in recognition of fundamental advances in our understanding of the sperm whale. (¥ 1 million)

Royal Society International (USA) Fellow, October 2002 – April 2006. Research fellowship to study the ecological influence of sound on deep-diving mammals at the Sea Mammal Research Unit, University of Saint Andrews, Scotland.

PhD Supervision:

Current: Alec Burslem: The role of lipid store body condition in the behaviour and reproduction of sperm whales. Successfully supervised 4 MPhil and 7 PhD's

Relevant Research Grants:

On-board calculation and telemetry of the body condition of individual marine mammals. \$348k US Office of Naval Research (ONR) 01/08/17 → ongoing (co-PIs Fedak, Lovell)

Behavioural response studies of acoustically-sensitive species in Norway. £253k US Office of Naval Research. 01/07/15 → 31/03/16 (co-PIs: Hooker, Tyack)

Interpreting the biological significance of behaviour associated with 3S experimental sonar exposures. £163k ONR. 01/09/14 → 31/12/17.

Behavioral Ecology of cetaceans : the relationship of body condition with behavior and reproductive status, Strategic Environmental R & D Program (SERDP project RC-2337) £1,457k, 01/03/13 → 31/01/18. (co-PI: Ailsa Hall).

Relevant Peer Review Publications (co-authors under my supervision listed in *italics*):

>100 peer-reviewed publications. Google Scholar citations 6962; h-index 46.

- Miller**, P.J.O., *Isojunno*, S., *Siegal*, E., Lam, F.P.A., Kvadsheim, P., Curé, C. 2022. Behavioral responses to predatory sounds predict sensitivity of cetaceans to anthropogenic noise within a soundscape of fear. Proceedings of the National Academy of Sciences: Vol. 119 (13) e2114932119 <https://doi.org/10.1073/pnas.2114932119>
- Aoki, K. *Isojunno* S., *Bellot* C., *Iwata* T., *Kershaw*, J. *Akiyama* Y., *Martin-Lopez* LM, Ramp C., *Biuw* M., *Swift* R., *Wensveen* P., *Pomeroy* P., *Narazaki* T., *Hall* A., *Sato* K., **Miller** PJO. 2020. Aerial photogrammetry and tag-derived tissue density reveal patterns of lipid-store body condition of humpback whales on their feeding grounds. Proc. R. Soc. B .288: 20202307 <http://doi.org/10.1098/rspb.2020.2307>
- Kershaw*, J.L., Ramp, C.A., *Sears*, R., *Plourde*, S., *Brosset*, P., **Miller**, P.J.O. *Hall*, A.J. 2020. Declining reproductive success in the Gulf of St Lawrence's humpback whales (*Megaptera novaeangliae*) reflects ecosystem shifts on their feeding grounds. Global Change Biology 27, 1027-1041 <https://doi.org/10.1111/gcb.15466>
- Benti*, B., **Miller**, P.J.O., *Biuw*, M., *Curé*, C. 2020. Indication that the behavioural responses of humpback whales to killer whale sounds are influenced by trophic relationships. Mar Ecol Prog Ser. DOI: <https://doi.org/10.3354/meps13592>
- Isojunno*, S., *Wensveen*, P.J., *Lam*, F.P.A., *Kvadsheim*, P.H., *von Benda-Beckmann*, A.M., *Martín-López*, L.M., *Kleivane*, L., *Siegal*, E.M., **Miller**, P.J.O. 2020. When the noise goes on: received sound energy predicts sperm whale responses to both intermittent and continuous navy sonar. J Exp Biol 223: jeb219741 doi:10.1242/jeb.219741
- Fahlman*, A., *Sato*, K, **Miller**, P. 2020. Improving estimates of diving lung volume in air-breathing vertebrates. J. Exp Biol 223 jeb216846
- Wensveen*, P.J., *Isojunno*, S., *Hansen*, R.R., *von Benda-Beckmann*, A.M., *Kleivane*, L., *van IJsselmuide*, S., *Lam*, F.P.A., *Kvadsheim*, P.H., *DeRuiter*, S.L., *Curé*, C., *Narazaki*, T., *Tyack*, P.L., **Miller**, P.J.O. 2019. Northern bottlenose whales in a pristine environment respond strongly to close and distant navy sonar signals. Proc. Roy. Soc. B 286: 20182592. <http://dx.doi.org/10.1098/rspb.2018.2592>
- Kershaw*, J.L., *Brownlow*, A., *Ramp*, C.A., **Miller**, P.J.O., *Hall*, A.J. 2019. Assessing cetacean body condition: is total lipid content in blubber biopsies a useful monitoring tool? Aquatic Conservation: Marine and Freshwater Ecosystems 29: 271-282.
- Hooker*, S.K., *Aguilar De Soto*, N., *Baird*, R.W., *Carroll*, E.L., *Claridge*, D., *Feyrer*, L., **Miller**, P.J.O., *Onoufriou*, A., *Schorr*, G., *Siegal*, E., *Whitehead*, H. 2019. Future directions in research on beaked whales. Frontiers in Marine Science 5 DOI=10.3389/fmars.2018.00514.
- Isojunno*, S., **Miller**, P.J.O. 2018. Movement and biosonar behavior during prey encounters indicate that male sperm whales switch foraging strategy with depth. Frontiers in Ecology and Evolution. 28 November 2018, <https://doi.org/10.3389/fevo.2018.00200>
- Miller**, P., *Narazaki*, T., *Isojunno*, S., *Aoki*, K., *Smout*, S., *Sato*, K. 2016. Body density and diving gas volume of the northern bottlenose whale (*Hyperoodon ampullatus*). J. Exp. Biol. 219, 2458-2468.

Roos, M.M.H., Wu, G.-M., **Miller**, P.J.O. 2016. The significance of respiration timing in the energetics estimates of free-ranging killer whales (*Orcinus orca*). J. Exp. Biol. 219, 2066-2077. Cover. Featured in Inside JEB.