

Philip K Hamilton
Senior Scientist
Anderson Cabot Centre for Ocean Life
New England Aquarium
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Employment

Senior Scientist - New England Aquarium, Boston, MA.

Interim chair of the Kraus Marine Mammal Program. Responsible for overseeing staff of ten, managing the North Atlantic Right Whale Catalog, procuring grants and contracts, writing timely grant and contract reports, lead field research expeditions, collect genetic samples, respond to entangled whales, and export data on behalf of the North Atlantic Right Whale Consortium. 2021 to present (other titles from 1988 to 2021).

Research Assistant – University of Vermont, Burlington, VT.

Dog handler for carnivore research study using trained, scat-sniffing dogs to determine the presence of carnivores throughout Vermont. Summer, 2002.

Project Leader - New England Aquarium, Boston, MA.

Responsible for directing the field team in the Bay of Fundy including overseeing the budget, field station requirements, coordinating a team of five to eight researchers, and serving as liaison to the press in addition to the responsibilities mentioned above. 1993 - 1997.

Staff Scientist - Center for Coastal Studies, Provincetown, MA.

Coordinated right whale photo-identification and subsequent population analysis. Tasks included data collection and analysis, field photography, small boat operation and maintenance, black and white print development as well as assisting with live strandings, disentanglements and necropsies. 1986 - 1989.

Professional Affiliation and Qualifications

Board member North Atlantic Right Whale Consortium
PADI Open Water certified
First Aid/CPR/AED
Marine STCW certified

Field Experience

Right Whale Field Experience: 37 years
Photography: 5 yrs aerial, 37 yrs vessel
Small Boat Handling: 35 Years
Fecal Sampling: 20 Years
Biopsy Sampling: 30 Years
Atlantic Large Whale Disentanglement Network - Level 3 responder – 17 years

Education

University of Massachusetts, Boston, MA 02125
Master of Science
June 2002

State University of New York at Binghamton, Binghamton, New York 13901
Bachelor of Arts in Environmental Studies with a concentration in Biology
June 1986
Awarded Merit scholarship, Graduated with Honors

University of New Hampshire, Durham, New Hampshire 03828
1982 - 1983, Dean's List.

Peer-reviewed Publications

Pirotta E, Schick RS, Hamilton PK, Harris CM, Hewitt J, Knowlton AR, Kraus SD, Meyer-Gutbrod E, Moore MJ, Pettis HM, Photopoulou T, Rolland RM, Tyack PL, Thomas L. 2023. Estimating the effects of stressors on the health, survival and reproduction of a critically endangered, long-lived species. *Oikos*. <http://dx.doi.org/10.1111/oik.09801>

Franklin KJ, Taggart CT, Cole TVN, Cholewiak DM, Duley P, Crowe L, Hamilton PK, Knowlton AR, and Johnson HD. 2022. Using sonobuoys and visual surveys to characterize North Atlantic right whale (*Eubalaena glacialis*) acoustic ecology in the Gulf of St. Lawrence. *Endangered Species Research* 49: 159–174 <https://doi.org/10.3354/esr01208>

Knowlton AR, Clark JS, Hamilton PK, Kraus SD, Pettis HM, Rolland RM, Schick RS. 2022. Fishing gear entanglement threatens recovery of critically endangered North Atlantic right whales. *Conservation Science and Practice*, 4(8), e12736. <https://doi.org/10.1111/csp2.12736>

Bishop AL, Crowe LM, Hamilton PK, Meyer-Gutbrod EL 2022. Maternal lineage and habitat use patterns explain variation in the fecundity of a critically endangered baleen whale. *Front. Mar. Sci.* 9: 880910. <https://doi.org/10.3389/fmars.2022.880910>

Khan C, Blount D, Parham J, Holmberg J, Hamilton P, Charlton C, Christiansen F, Johnston D, Rayment W, Dawson S, Vermeulen E, Rowntree V, Groch K, Levenson J, Bogucki R. 2022. Artificial Intelligence for Right Whale Photo Identification: From Data Science Competition to Worldwide Collaboration. *Journal of Mammalogy (Special Issue)*. <https://doi.org/10.1007/s42991-022-00253-3>

Stewart JD, Durban JW, Europe H, Fearnbach H, Hamilton PK, Knowlton AR, Lynn MS, Miller CA, Perryman WL, Tao BWH, Moore MJ. 2022. Larger females have more calves: the influence of maternal body length on fecundity in North Atlantic right whales. *Marine Ecology Progress Series*. 689: 179–189. <https://doi.org/10.3354/meps14040>

Hamilton PK, Frasier BA, Conger LA, George RC, Jackson KA, Frasier TR. 2022. Case studies of North Atlantic right whale (*Eubalaena glacialis*) calves: genetic identifications challenge our assumptions of physical development and mother-calf associations and separation times. *Journal of Mammalogy*. <https://doi.org/10.1007/s42991-021-00177-4>

Hamilton PK and Knowlton AR. 2021. The power of knowing the individual- the North Atlantic Right Whale Catalogs. In *Right Whales at Risk*. Special issue of *Whalewatcher*. Corkeron. P. ed. 18-23. <https://acs.memberclicks.net/assets/Whalewatchers/Whalewatcher-2021-final.pdf>

Crowe LM, Brown MW, Corkeron, PJ, Hamilton PK, Ramp C, Ratelle S, Vanderlaan ASM, Cole TVN. 2021. In plane sight: a mark-recapture analysis of North Atlantic right whales in the Gulf of St. Lawrence. *Endangered Species Research*. 46:227–251. <https://doi.org/10.3354/esr01156>

Moore M, Rowles T, Fauquier D, Baker J, Biedron I, Durban J, Hamilton P, Henry A, Knowlton A, McLellan W, Miller C, Pace R, Pettis H, Rolland R, Schick R, Sharp S, Smith C, Thomas L, van der Hoop J, Ziccardi M. 2021. Assessing North Atlantic right whale health: A review of threats, and development of tools critical for conservation of the species. *Disease of Aquatic Organisms*. 143: 205–226. <https://doi.org/10.3354/dao03578>

Martins MCI, Miller C, Hamilton P, Robbins J, Zitterbart D, Moore M. 2020. Respiration cycle duration and seawater flux through open blowholes of Humpback (*Megaptera novaeangliae*) and North Atlantic Right (*Eubalaena glacialis*) whales. *Mar Mamm Sci*. <http://dx.doi.org/10.1111/mms.12703>

Hamilton, P. and M. Marx. 2019. Bill Watkin's impact on the North Atlantic Right Whale Catalog. Pp. 27-29 In: Connett Brophy, C. (Ed.) *The Voices of Marine Mammals: William E. Schevill and William A. Watkins: Pioneers in Bioacoustics*. New Bedford Whaling Museum, New Bedford, Mass. 124 p

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Hamilton PK and Kraus SD. 2019. Frequent encounters with the seafloor increase right whales' risk of entanglement in fishing groundlines. *Endang Species Res* 39: 235–246.

<https://doi.org/10.3354/esr00963>

Sharp SM, McLellan WA, Rotstein DS, Costidis AM, Barco SG, Durham K, Pitchford TD, Jackson KA, Daoust PY, Wimmer T, Couture EL, Bourque L, Frasier T, Frasier B, Fauquier D, Rowles TK, Hamilton PK, Pettis H, Moore MJ . 2019. Gross and histopathologic diagnoses from North Atlantic right whale (*Eubalena glacialis*) mortalities between 2003 and 2018. *Dis Aquat Org* 135:1-31. <https://doi.org/10.3354/dao03376>

Davies KTA, Brown MW, Hamilton PK, Knowlton AR, Taggart CT, Vanderlaan ASM. 2019. Variation in North Atlantic right whales (*Eubalaena glacialis*) occurrence in the Bay of Fundy, Canada, over three decades. *Endang Species Res* 39:159-171.

<https://doi.org/10.3354/esr00951>

Gowan TA, Ortega-Ortiz JG, Hostetler JA, Hamilton PK, Knowlton AR, Jackson KA, George RC, Taylor CR, Naessig PJ. 2019. Temporal and demographic variation in partial migration of the North Atlantic right whale. *Scientific Reports* 9:353. <http://doi.org/10.1038/s41598-018-36723-3>

Corkeron P, Hamilton P, Bannister J, Best P, Charlton C, Groch K, Findlay K, Rowntree V, Vermeulen E, and Pace R. 2018. The recovery of North Atlantic right whales, *Eubalaena glacialis*, has been constrained by human-caused mortality. *R. Soc. open sci.* 5: 180892.

<http://dx.doi.org/10.1098/rsos.180892>

Pettis, H.M., Rolland, R.M., Hamilton, P.K., Knowlton, A.R., Burgess, E.A., and Kraus, S.D. 2017. Body condition changes from natural factors and fishing gear entanglements in North Atlantic right whales (*Eubalaena glacialis*). *Endangered Species Research*. Vol. 32: 237–249.

<https://doi.org/10.3354/esr00800>

Rolland, R.M., Schick, R.S., Pettis, H.M., Knowlton, A.R., Hamilton, P.K., Clark, J.S and Kraus, S.D. 2016. Health of North Atlantic right whales (*Eubalaena glacialis*) over three decades: from individual health to demographic and population health trends. *Marine Ecology Progress Series*. Vol. 542: 265–282. <https://doi.org/10.3354/meps11547>

Schick RS, Kraus SD, Rolland RM, Knowlton AR, Hamilton PK, Pettis HM, Thomas L, Harwood J, Clark JS. 2016. Effects of model formulation on estimates of health in individual right whales (*Eubalaena glacialis*). Pages 977-985 in A. N. Popper and A. Hawkins, editors. *Effects of Noise on Aquatic Life II*. Springer Press.

Oedekoven, C., Fleishman, E., Hamilton, P., Clark, J.S., and Schick, R.S. 2015. Expert elicitation of seasonal abundance of North Atlantic right whales *Eubalaena glacialis* in the mid-Atlantic. *Endangered Species Research*. Vol. 29: 51–58.

Barratclough, A., Jepson, P.D., Hamilton, P.K., Miller, C.A., Wilson, K., and Moore, M.J. 2014. How much does a swimming, emaciated, entangled right whale weigh? Calculating the weight of right whales (*Eubalaena glacialis*) at sea, to facilitate accurate dosing of sedatives, to enable disentanglement from fishing gear. *Marine Mammal Science* 30: 1589–1599.

Frasier, T.R., Gillet, R.M., Hamilton, P.K., Brown, M.W., Kraus, S.D., White, B.N. 2013. Postcopulatory selection for dissimilar gametes maintains heterozygosity in the endangered North Atlantic right whale. *Ecology and Evolution* 3: 3483-3494.

Schick, R.S., Kraus, S.D., Rolland, R.M., Knowlton, A.R., Hamilton, P.K., Pettis, H.M., Kenney,

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- Fortune, S.M., Trites, A.W., Mayo, C.A, Rosen, D.A., and Hamilton, P.K. 2013. Energetic requirements of North Atlantic right whales and the implications for species recovery. Mar. Ecol. Prog. Ser. Vol. 478: 253–272.
- Knowlton, A.R., Hamilton, P.K., Marx, M.K., Pettis, H.P., and Kraus, S.D. 2012. Monitoring North Atlantic right whale (*Eubalanea glacialis*) entanglement rates: A 30 yr retrospective. Mar. Ecol. Prog. Ser. 466: 293–302.
- Silva, M.A., Steiner, L., Cascão, I., Cruz, M.J., Prieto, R., Cole, T., Hamilton, P.K., and Baumgartner, M. 2012. Winter sighting of a known western North Atlantic right whale in the Azores. J. Cetacean Res. Manage. 12(1): 65–69.
- Hamilton, P.K. and Cooper, L.A. 2010. Changes in North Atlantic right whale (*Eubalanea glacialis*) cow-calf association times and use of the calving ground: 1993-2005. Mar. Mammal Sci. 26: 896–916.
- Frasier, T.R., Hamilton, P.K., Brown, M.W., Kraus, S.D., White, B.N. 2010. Reciprocal exchange and subsequent adoption of calves by two North Atlantic right whales. Aquatic Mammals. 36(2): 115-120.
- Frasier, T.R., Hamilton, P.K., Brown, M.W., Kraus, S.D., White, B.N. 2009. Sources and rates of errors in methods of individual identification in the North Atlantic right whale. Journal of Mammalogy. 90(5):1246–1255.
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- Frasier, T.R., Hamilton, P.K., Brown, M.W., Conger, L.A., Knowlton, A.R., Marx, M.K., Slay, C.K., Kraus, S.D., White, B.N. 2007. Patterns of male reproductive success in a highly promiscuous whale species: the endangered North Atlantic right whale. Molecular Ecology. 16: 5277-5293.
- Hamilton, P.K., Knowlton, A.R., Marx, M.K. 2007. Right Whales Tell Their Own Stories: The Photo-Identification Catalog. In Kraus, SD and Rolland, RM (eds). The Urban Whale: North Atlantic Right Whales at the Crossroads. Harvard University Press. 514 pp.
- Parks, S.E., M.W. Brown, L. A. Conger, P. K. Hamilton, A. R. Knowlton, S. D. Kraus, C. K. Slay & P. L. Tyack. 2007. Occurrence, composition and potential functions of North Atlantic right whale (*Eubalanea glacialis*) surface active groups. Marine Mammal Science. 23(4): 868–887.
- Rolland, R.M., Hamilton, P.K., Marx, M.K., Pettis, H.M., Angel, C.A., and Moore, M.J. 2007. External perspectives on right whale health. In Kraus, SD and Rolland, RM (eds). The Urban Whale: North Atlantic Right Whales at the Crossroads. Harvard University Press. 514 pp.
- Frasier, T.R., Rastogi, T., Brown, M.W., Hamilton, P.K., Kraus, S.D., White, B.N. 2006. Characterization of tetranucleotide microsatellite loci and development and validation of multiplex reactions for the study of right whale species (genus *Eubalanea*). Molecular Ecology Notes 6:1025-1029.

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- Hamilton, P.K. and Marx, M.K. 2005. Skin Lesions on North Atlantic Right Whales: Categories, Prevalence and Change in Occurrence in the 1990s. *Disease of Aquatic Organisms* 68(1): 71-82.
- Kraus, S.D., Brown, M.W., Caswell, H., Clark, C.W., Fujiwara, M., Hamilton, P.K., Kenney, R.D., Knowlton, A.R., Landry, S., Mayo, C.A., McLellan, W.A., Moore, M.J., Nowacek, D.P., Pabst, D.A., Read, A.J., and Rolland, R.M. 2005. North Atlantic Right Whales in Crisis. *Science* 309: 561-562.
- Parks, S.E., Hamilton, P.K., Kraus, S.D., and Tyack, P.L. 2005. The 'Gunshot' sound produced by male North Atlantic right whales (*Eubalaena glacialis*) and its potential function in reproductive advertisement. *Mar. Mamm. Sci.* 21(3): 458-475.
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- Rosenbaum, H.C., Brownell Jr., R.L., Brown, M.W., Schaeff, C., Portway, V., White, B.N., Malik, S., Pastene, L.A., Patenaude, N.J., Baker, C.S., Goto, M., Best, P.B., Clapham, P.J., Hamilton, P., Moore, M., Payne, R., Rowntree, V., Tynan, C.T., Bannister, J.L., and DeSalle, R. 2000. Worldwide genetic differentiation of *Eubalaena*: questioning the number of right whale species. *Molecular Ecology.* 9: 1793-1802.
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- Moore, M.J., Berrow, S.D., Jensen, B.J., Carr, P., Sears, R., Rowntree, V., Payne, R., Hamilton, P.K. 1999. Large whale sightings on the South Georgia whaling grounds (1979-1997). 1999. *Mar. Mammal Sci.* 15(4): 1287-1302.
- Schaeff, C.M. and Hamilton, P.K. 1999. Genetic basis and evolutionary significance of ventral skin color markings in North Atlantic right whales (*Eubalaena glacialis*). *Mar. Mammal Sci.* 15(3): 701-711.
- Hamilton, P.K., Knowlton, A.R., Marx, M.K., Kraus, S.D. 1998. Age structure and longevity in North Atlantic right whales (*Eubalaena glacialis*) and their relation to reproduction. *Mar. Ecol. Prog. Ser.* 171: 285-292.

Hamilton, P.K., Stone, G.S., Martin, S.M.. 1997. A deep humpback whale (*Megaptera novaeangliae*) dive near Bermuda. Bull. Mar. Sci. 61(2): 491-494.

Hamilton, P.K., Marx, M.K., Kraus, S.D. 1995. Weaning in North Atlantic right whales. Mar. Mamm. Sci. 11(3): 386-390.

Hamilton, P.K. and Mayo, C.A. 1990. Population characteristics of right whales, *Eubalaena glacialis*, observed in Cape Cod and Massachusetts Bays, 1978-1986. Rep. Int. Whal. Commn. (Special Issue 12): 203-208.

Other publications

Quinn CA, Hamilton PK, Kraus SD, Slay CK 2000. An assessment of wounds caused by the attachment of remote sensing tags to North Atlantic right whales (*Eubalaena Glacialis*): 1988 – 1997. 33 p. <https://doi.org/10.1575/1912/29702>

Kraus SD, Quinn CA, Slay CK 2000. A workshop on the effects of tagging on North Atlantic right whales. 16 p. <https://doi.org/10.1575/1912/29703>

Hamilton, P. K. "North Atlantic Right Whale Catalog: Getting to Know a Population Whale by Whale" October 2005. <http://www.neaq.org/rwcatalog/> (October 01, 2005).

Hamilton, P.K. 2003. The scientific process and human nature. Connect. 16(5): 7-9.

Hamilton, P.K. 2002. Associations among North Atlantic right whales. Master's Thesis, University of Massachusetts, Boston. 101 p.

Hamilton, P.K. and Martin, S.M. 1999. A catalog of identified right whales from the Western North Atlantic: 1935 to 1997. New England Aquarium, Boston, MA.

Hamilton, P.K. 1995. A right whale up the Delaware River. Whale Watcher: Journal of the American Cetacean Society. 29(1): 8-9.

Selected Research Funding

- Co-lead on \$6 million, four-year international study with Canadian researchers to assess how genetic factors are hampering the critically endangered North Atlantic right whale. \$2.3 million awarded from Genome Canada
- Five year contract with annual option to renew from the National Marine Fisheries Service to manage the North Atlantic Right Whale Catalog. 2018 to 2023. \$2,614,371
- Three year contract with annual option to renew from the National Marine Fisheries Service to manage the North Atlantic Right Whale Catalog. 2015 to 2018. \$1,389,970
- Institute of Museum and Library Services 2014-2015. \$29,550
- National Science Foundation funded project to develop a database structure and software to manage digital images and all related data for the North Atlantic Right Whale Catalog. 2003-2005. \$359,205
- Various small grants for Catalog and right whale research projects. 1997-2001. \$98,500
 - o Digitizing the right whale photo-catalog. 1998 - \$20,000
 - o Analyzing photographic record for scars on right whales. 1997 - \$18,300
 - o Matching all photographs in and around Massachusetts. 1998 - \$15,000
 - o Digitizing right whale photo-catalog. 1998- \$5,000
 - o Matching all photographs in and around Massachusetts' waters. 1997 - \$14,200
 - o Digitizing the right whale photo-catalog. 1998 - \$10,000
 - o Analyzing right whale associations. 2001 - \$16,000