

Theodolite Tracking in Marine Mammal Research: From Roger Payne to the Present

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Supplemental Appendix 1

Questions included in the Web-based survey distributed through the Marine Mammal Research and Conservation Discussion (MARMAM) list-service:

1. In which countries and states (or province/region/prefecture) have you conducted marine mammal research using a theodolite?
2. What year(s) did you conduct marine mammal research using a theodolite?
3. Which marine mammal species (Genus species) have you researched using a theodolite (please list all)?
4. What were the broad topics of study (e.g., effects of boat-based tourism on dolphins)?
5. Have you used other research platforms (e.g., acoustics, video, and/or boat-based) concurrently to complement theodolite methods? If yes, please list.
6. Please list all computer-assisted software used, if any (e.g., *Pythagoras*, *VADAR*, and/or *Mysticetus*).
7. How have data been published or made available to the public (select all that apply)?
 - a. Data not made public
 - b. Peer review journal
 - c. Book or book chapter
 - d. Government or technical report
 - e. Ph.D. dissertation
 - f. M.Sc. thesis
 - g. Undergraduate thesis
 - h. Conference proceedings
 - i. Popular magazine or newspaper
 - j. Online website
 - k. Other (please specify)
8. What type of platforms have you set your theodolite on for marine mammal research (e.g., natural ground on hilltop, hotel building rooftop, or lighthouse)?
9. Under what type of affiliation(s) was research conducted (select all that apply)?
 - a. Academic/University
 - b. Government
 - c. Consulting
 - d. Industry
 - e. Nonprofit
 - f. Other (please specify)

Supplemental Appendix 2

List of aquatic mammal species that have been tracked by theodolite. “a” indicates data obtained from the literature search; “b” indicates data collected from the survey.

Family	Genus species	Common name	Search source	Examples in the literature
Otariidae	<i>Eumetopias jubatus</i>	Steller sea lion	b	Reported via survey
Phocidae	<i>Halichoerus grypus</i>	Grey seal	a, b	Culloch et al., 2016
	<i>Phoca vitulina</i>	Harbor seal	a, b	Koschinski et al., 2003
Mustelidae	<i>Enhydra lutris</i>	Sea otter	b	Reported via survey
Balaenidae	<i>Eubalaena glacialis</i>	North Atlantic right whale	b	Reported via survey
	<i>Eubalaena australis</i>	Southern right whale	a, b	Clark & Clark, 1980; Lundquist et al., 2008
	<i>Balaena mysticetus</i>	Bowhead whale	a, b	Rugh & Cabbage, 1980; Clark et al., 1986; Carroll et al., 1987; Patenaude et al., 2002
Eschrichtiidae	<i>Eschrichtius robustus</i>	Gray whale	a, b	Sumich, 1983; Malme et al., 1987; Ollervides, 1997; Gailey et al., 2005, 2007, 2016; Rodríguez de la Gala-Hernández et al., 2008; Sychenko, 2012; Gailey, 2013
Balaenopteridae	<i>Megaptera novaeangliae</i>	Humpback whale	a, b	Tyack, 1981; Mobley et al., 1988; Baker & Herman, 1989; Best et al., 1995; Frankel & Clark, 1998; Craig et al., 2002; Nordeen, 2002; Morete et al., 2003, 2007, 2008; Scheidat et al., 2004; Schaffar et al., 2009, 2010; Barendse et al., 2010; Boye et al., 2010; Findlay et al., 2011; Parrott et al., 2011; Dunlop et al., 2015; MacKay, 2015
	<i>Balaenoptera acutorostrata</i>	Minke whale	a, b	Nordeen, 2002; Parrott et al., 2011; Culloch et al., 2016
	<i>Balaenoptera edeni</i>	Bryde’s whale	b	Reported via survey
	<i>Balaenoptera physalus</i>	Fin whale	a, b	Nordeen, 2002
	<i>Balaenoptera musculus</i>	Blue whale	b	Reported via survey
Physeteridae	<i>Physeter macrocephalus</i>	Sperm whale	a, b	Richter et al., 2003; Sagnol, 2014; Sagnol et al., 2014a, 2014b
Ziphiidae	<i>Mesoplodon densirostris</i>	Blainville’s beaked whale	b	Reported via survey
Platanistidae	<i>Platanista gangetica</i>	South Asian river dolphin	a	Smith, 1993
Iniidae	<i>Inia geoffrensis</i>	Amazon river dolphin	b	Reported via survey
Monodontidae	<i>Delphinapterus leucas</i>	Beluga whale	a, b	Patenaude et al., 2002; Kendall, 2010

Delphinidae	<i>Cephalorhynchus eutropia</i>	Chilean dolphin	a, b	Ribeiro et al., 2005, 2007
	<i>Cephalorhynchus hectori</i>	Hector's dolphin	a, b	Bejder, 1997; Stone et al., 1997; Bejder et al., 1999; Bejder & Dawson, 2001; Martinez, 2003; Travis, 2008; Rayment et al., 2009
	<i>Steno bredanensis</i>	Rough-toothed dolphin	b	Reported via survey
	<i>Sousa chinensis</i>	Indo-Pacific humpback dolphin	a, b	Jefferson, 2000; Koper, 2011; Piwetz et al., 2012; Soto et al., 2013; Wong et al., 2015; Koper et al., 2016; Hung, 2017; Piwetz, 2018
	<i>Sousa plumbea</i>	Indian Ocean humpback dolphin	b	Reported via survey
	<i>Sotalia guianensis</i>	Guiana dolphin	b	Reported via survey
	<i>Tursiops truncatus</i>	Common bottlenose dolphin	a, b	Würsig, 1978; Würsig & Würsig, 1979; Acevedo, 1991; Klinowska, 1992; Mayo & Goodson, 1992; Goodson & Mayo, 1995; Harzen, 2002; Latusek, 2002; Cox et al., 2003; Hastie et al., 2004; Bejder, 2005; Bailey & Thompson, 2006, 2010; Yazdi, 2007; Galicia, 2008; Piwetz, 2018
	<i>Tursiops aduncus</i>	Indo-Pacific bottlenose dolphin	a, b	Bejder et al., 2006; Matsuda et al., 2011
	<i>Stenella attenuata</i>	Pantropical spotted dolphin	b	Reported via survey
	<i>Stenella frontalis</i>	Atlantic spotted dolphin	b	Reported via survey
	<i>Stenella longirostris</i>	Spinner dolphin	a, b	Würsig et al., 1991; Timmel et al., 2008; Tyne et al., 2015, 2017
	<i>Stenella coeruleoalba</i>	Striped dolphin	b	Reported via survey
	<i>Delphinus delphis</i>	Common dolphin	a, b	Galicia, 2008; Culloch et al., 2016
	<i>Lagenorhynchus acutus</i>	Atlantic white-sided dolphin	b	Reported via survey
	<i>Lagenorhynchus obliquidens</i>	Pacific white-sided dolphin	a, b	Galicia, 2008
	<i>Lagenorhynchus obscurus</i>	Dusky dolphin	a, b	Würsig, 1978; Würsig & Würsig, 1980; Würsig et al., 1991; Barr, 1997; Barr & Slooten, 1999; Yin, 1999; Duprey, 2007; Duprey et al., 2008; Dahood, 2009; Lundquist, 2012; Lundquist et al., 2012, 2013; Piwetz, 2018
	<i>Lagenorhynchus australis</i>	Peale's dolphin	b	Reported via survey
	<i>Grampus griseus</i>	Risso's dolphin	a, b	Galicia, 2008
	<i>Peponocephala electra</i>	Melon-headed whale	b	Reported via survey

	<i>Pseudorca crassidens</i>	False killer whale	a	Galicia, 2008
	<i>Orcinus orca</i>	Killer whale	a, b	Kruse, 1991; Denardo et al., 2001; Jelinski et al., 2002; Williams et al., 2002a, 2002b, 2009; Bain et al., 2006; Williams & Ashe, 2007; Galicia, 2008; Grebner, 2009
	<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	b	Reported via survey
Phocoenidae	<i>Neophocaena phocaenoides</i>	Indo-Pacific finless porpoise	b	Reported via survey
	<i>Phocoena phocoena</i>	Harbor porpoise	a, b	Silber et al., 1994; Goodson & Sturtivant, 1996; Laake et al., 1997; Cox et al., 2001; Culik et al., 2001; Johnston, 2002; Koschinski et al., 2003, 2006; Nielsen et al., 2012; Culloch et al., 2016; Bas et al., 2017
	<i>Phocoena spinipinnis</i>	Burmeister's porpoise	b	Reported via survey
	<i>Phocoenoides dalli</i>	Dall's porpoise	a, b	Jefferson, 1987
Trichechidae	<i>Trichechus inunguis</i>	Amazon manatee	a	Mukhametov et al., 1992

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