

List of Marine Mammal Species and Subspecies

Introduction

The [Committee on Taxonomy](#), chaired by Patricia Rosel, produced the first official Society for Marine Mammalogy list of marine mammal species and subspecies in 2010. Consensus on some issues has not been possible; this is reflected in the footnotes. The Terms of Reference provide information on the Committee's process. The list is updated at least annually.

The current version was updated in June 2023. This list can be cited as follows: "Committee on Taxonomy. 2023. List of marine mammal species and subspecies. Society for Marine Mammalogy, www.marinemammalscience.org, consulted on [date]."

This [list](#) includes living and recently extinct (within historical times) species and subspecies. It is meant to reflect prevailing usage and recent revisions published in the peer-reviewed literature. Classification and scientific names follow Rice (1998), with adjustments reflecting more recent literature. Author(s) and year of description of each taxon follow the Latin (scientific) species name; when these are enclosed in parentheses, the taxon was originally described in a different genus.

The Committee considers and evaluates new, peer-reviewed literature that proposes taxonomic changes. The Committee's focus is on alpha taxonomy (describing and naming taxa) and beta taxonomy primarily at lower levels of the hierarchy (subspecies, species and genera), although it may evaluate issues at higher levels if deemed necessary. Proposals for new, taxonomically distinct taxa require a formal, peer-reviewed study and should provide robust evidence that some subspecies or species criterion was met. For review of species concepts, see Reeves et al. (2004), Orr and Coyne (2004), de Queiroz (2007), Perrin (2009) and Taylor et al. (2017 a,b). Nomenclatural papers that propose new names are to be registered with ZooBank and publications should include required information including designation of holotype or syntype specimen(s), identification of the repository of the specimen(s), and explicit identification of the taxon as new by inclusion of a term such as "ssp. nov.", "new species", etc. See the Committee's [Taxonomic Guide for Authors](#) for more information. The Committee also recommends authors acquaint themselves with the International Code of Zoological Nomenclature (ICZN 1999) and supply the information required under the Code when proposing new species or subspecies. Some examples of recent species or subspecies descriptions and redescrptions providing the necessary information can be seen at: Yamada et al. (2019), Rosel et al. (2021), Costa et al. (2023).

The Committee omits some described species and subspecies because of concern about their biological distinctness; reservations are given in the [narrative](#) below. In addition, published proposals for taxonomically distinct units that do not provide names and instead refer simply to

Commented [Anon1]: This is to be hyperlinked to the new document "Taxonomic guide for Authors."

'un-named subspecies' or 'un-named species' are not included in the official list but are provided [here](#). Authors are encouraged to provide formal descriptions following ICZN rules based on robust data showing an appropriate subspecies or species criterion is met.

Common names are arbitrary and change with time and place; one or two frequently used names in English and/or a range language are given here. Additional English common names and common names in French, Spanish, Russian and other languages are available at www.marinespecies.org/cetacea/. The Committee does not arbitrate common names. In general, we aim to maintain established names currently in use whenever possible, use names suggested by the authors of new species or subspecies descriptions if present, and recognize multiple common names when multiple names are commonly used.

Species are listed in alphabetical order within families.

Corrections and comments should be directed to the Committee on Taxonomy (patricia.rosel@noaa.gov). Divergent opinions by members of the Committee on particular taxonomic questions are given in the footnotes.

List of Marine Mammal Species and Subspecies

Order Carnivora

Family Ursidae

Ursus maritimus Linnaeus 1758. Polar bear

Family Mustelidae

Enhydra lutris (Linnaeus, 1758). Sea otter

- *E. l. kenyoni* Wilson, 1991. Eastern sea otter
- *E. l. lutris* (Linnaeus, 1758). Western sea otter
- *E. l. nereis* (Merriam, 1904). Southern sea otter

Lontra felina (Molina, 1782). Chungungo, marine otter

Neovison macrodon (Prentis, 1903). Sea mink (extinct)

PINNIPEDIA (eared seals, sea lions, walrus, earless seals; 35 species, of which 2 extinct)

Family Otariidae (eared seals and sea lions; 15 species, of which 1 extinct)

Arctocephalus australis (Zimmermann, 1783). South American fur seal

Arctocephalus forsteri (Lesson, 1828). Long-nosed fur seal, New Zealand fur seal

Arctocephalus galapagoensis Heller, 1904. Galapagos fur seal

Arctocephalus gazella (Peters, 1875). Antarctic fur seal

Arctocephalus philippii (Peters, 1866). Juan Fernandez fur seal

- *A. p. philippii* (Peters, 1866). Juan Fernandez fur seal
- *A. p. townsendi* (Merriam, 1897). Guadalupe fur seal

Arctocephalus pusillus (Schreber, 1775). Cape fur seal

- *A. p. pusillus* (Schreber, 1775). Cape fur seal
- *A. p. doriferus* Wood Jones, 1925. Australian fur seal

Arctocephalus tropicalis (Gray, 1872). Subantarctic fur seal

Callorhinus ursinus (Linnaeus, 1758). Northern fur seal

Eumetopias jubatus (Schreber, 1776). Steller sea lion, northern sea lion

- *E. j. jubatus* (Schreber, 1776). Western Steller sea lion
- *E. j. monteriensis* (Gray, 1859). Loughlin's Steller sea lion

Neophoca cinerea (Peron, 1816). Australian sea lion

Otaria byronia (Blainville, 1820). South American sea lion

Phocarctos hookeri (Gray, 1844). New Zealand sea lion, Hooker's sea lion

Zalophus californianus (Lesson, 1828). California sea lion

Zalophus japonicus (Peters, 1866). Japanese sea lion (extinct)

Zalophus wollebaeki Sivertsen, 1953. Galapagos sea lion

Family Odobenidae

Odobenus rosmarus (Linnaeus, 1758). Walrus

- *O. r. divergens* (Illiger, 1815). Pacific walrus
- *O. r. rosmarus* (Linnaeus, 1758). Atlantic walrus

Family Phocidae (earless seals; 19 species, of which 1 extinct)

Cystophora cristata (Erxleben, 1777). Hooded seal

Erignathus barbatus (Erxleben, 1777). Bearded seal

- *E. b. barbatus* (Erxleben, 1777). Atlantic bearded seal
- *E. b. nauticus* (Pallas, 1881). Pacific bearded seal

Halichoerus grypus (Fabricius, 1791). Gray seal

- *H. g. grypus* (Fabricius, 1791). Baltic gray seal
- *H. g. atlantica*. Nehring, 1866. Atlantic gray seal

Histiophoca fasciata (Zimmerman, 1783). Ribbon seal

Hydrurga leptonyx (Blainville, 1820). Leopard seal

Leptonychotes weddellii (Lesson, 1826). Weddell seal

Lobodon carcinophaga (Hombron and Jacquinot, 1842). Crabeater seal

Mirounga leonina (Linnaeus, 1758). Southern elephant seal

Mirounga angustirostris (Gill, 1866). Northern elephant seal

Monachus monachus (Hermann, 1779). Mediterranean monk seal

Neomonachus tropicalis (Gray, 1850). Caribbean monk seal, West Indian monk seal (extinct)

Neomonachus schauinslandi (Matschie, 1905). Hawaiian monk seal

Ommatophoca rossii Gray, 1844. Ross seal

Pagophilus groenlandicus (Erxleben, 1777). Harp seal

Phoca vitulina Linnaeus, 1758. Harbor seal, common seal

- *P. v. vitulina* Linnaeus, 1758. Atlantic harbor seal
- *P. v. mellonae* Doult, 1942. Ungava harbor seal
- *P. v. richardii* (Gray, 1864). Pacific harbor seal

Phoca largha Pallas, 1811. Spotted seal, largha seal

Pusa hispida (Schreber, 1775). Ringed seal

- *P. h. hispida* (Schreber, 1775). Arctic Ringed seal
- *P. h. botnica* (Gmelin, 1788). Baltic ringed seal
- *P. h. ochotensis* (Pallas, 1811). Okhotsk ringed seal
- *P. h. ladogensis* (Nordquist, 1889). Lake Ladoga seal

- *P. h. saimensis* (Nordquist, 1889). Saima seal

Pusa caspica (Gmelin, 1788). Caspian seal

Pusa sibirica (Gmelin, 1788). Baikal seal

Order ARTIODACTYLA¹ (artiodactyls and cetaceans)

Infraorder CETACEA (cetaceans; 94 species, of which 1 possibly extinct)

MYSTICETI (baleen whales, 15 species)

Family Balaenidae (right whales, 4 species)²

Balaena mysticetus Linnaeus, 1758. Bowhead whale, Greenland whale

Eubalaena glacialis (Müller, 1776). North Atlantic right whale

Eubalaena japonica (Lacépède, 1818). North Pacific right whale

Eubalaena australis (Desmoulins, 1822). Southern right whale

Family Neobalaenidae

Caperea marginata (Gray, 1846). Pygmy right whale

Family Eschrichtiidae

Eschrichtius robustus (Lilljeborg, 1861). Gray whale

Family Balaenopteridae (rorquals, 9 species)

Balaenoptera acutorostrata Lacépède, 1804. Common minke whale

- *B. a. acutorostrata* Lacépède, 1804. North Atlantic minke whale
- *B. a. scammoni* Deméré, 1986. North Pacific minke whale

Balaenoptera bonaerensis Burmeister, 1867. Antarctic minke whale

Balaenoptera borealis Lesson, 1828. Sei whale

- *B. b. borealis* Lesson, 1828. Northern sei whale
- *B. b. schlegelii* (Flower, 1865). Southern sei whale

Balaenoptera edeni Anderson, 1879. Bryde's whale

- *B. e. brydei* Olsen, 1913. Bryde's whale
- *B. e. edeni* Anderson, 1879. Eden's whale

Balaenoptera musculus (Linnaeus, 1758). Blue whale

- *B. m. musculus* (Linnaeus, 1758). Northern blue whale
- *B. m. intermedia* Burmeister, 1871. Antarctic blue whale
- *B. m. indica* Blyth, 1859. Northern Indian Ocean blue whale
- *B. m. brevicauda* Ichihara, 1966. Pygmy blue whale

Balaenoptera omurai Wada, Oishi and Yamada, 2003. Omura's whale

Balaenoptera physalus (Linnaeus, 1758). Fin whale

- *B. p. physalus* (Linnaeus, 1758). North Atlantic fin whale
- *B. p. quoyi* (Fischer, 1829). Southern fin whale
- *B. p. velifera* Cope in Scammon, 1869. North Pacific fin whale

Balaenoptera ricei Rosel, Wilcox, Yamada and Mullin, 2021. Rice's whale

Megaptera novaeangliae (Borowski, 1781). Humpback whale

- *M. n. australis* (Lesson, 1828). Southern humpback whale
- *M. n. kuzira* (Gray, 1850). North Pacific humpback whale
- *M. n. novaeangliae* (Borowski, 1781). North Atlantic humpback whale

ODONTOCETI (toothed whales, dolphins and porpoises: 79 species, of which one possibly extinct)

Family Physeteridae

Physeter macrocephalus Linnaeus, 1758. Sperm whale, cachalot

Family Kogiidae

Kogia breviceps (Blainville, 1838). Pygmy sperm whale

Kogia sima (Owen, 1866). Dwarf sperm whale

Family Ziphiidae (beaked whales, 24 species)

Berardius arnuxii Duvernoy, 1851. Arnoux's beaked whale

Berardius bairdii Stejneger, 1883. Baird's beaked whale

Berardius minimus Yamada, Kitamura and Matsuishi, 2019. Sato's beaked whale

Hyperoodon ampullatus (Forster in Kalm, 1770). Northern bottlenose whale
Hyperoodon planifrons Flower, 1882. Southern bottlenose whale
Indopacetus pacificus (Longman, 1926). Longman's beaked whale, tropical bottlenose whale
Mesoplodon bidens (Sowerby, 1804). Sowerby's beaked whale
Mesoplodon bowdoini Andrews, 1908. Andrews' beaked whale
Mesoplodon carlhubbsi Moore, 1963. Hubbs' beaked whale
Mesoplodon eueu Carroll et al. 2021⁴. Ramari's beaked whale
Mesoplodon densirostris (Desmarest, 1817). Blainville's beaked whale
Mesoplodon europaeus (Gervais, 1855). Gervais' beaked whale
Mesoplodon ginkgodens Nishiwaki and Kamiya, 1958. Ginkgo-toothed beaked whale
Mesoplodon grayi von Haast, 1876. Gray's beaked whale
Mesoplodon hectori (Gray, 1871). Hector's beaked whale
Mesoplodon hotaula Deraniyagala, 1963. Deraniyagala's beaked whale
Mesoplodon layardii (Gray, 1865). Strap-toothed beaked whale, Layard's beaked whale
Mesoplodon mirus True, 1913. True's beaked whale
Mesoplodon perrini Dalebout, Mead, Baker, Baker and van Helden, 2002. Perrin's beaked whale
Mesoplodon peruvianus Reyes, Mead and Van Waerebeek, 1991. Pygmy beaked whale
Mesoplodon stejnegeri True, 1885. Stejneger's beaked whale
Mesoplodon traversii (Gray, 1874). Spade-toothed whale
Tasmacetus shepherdi Oliver, 1937. Shepherd's beaked whale, Tasman beaked whale
Ziphius cavirostris G. Cuvier, 1823. Cuvier's beaked whale, goose-beaked whale

Family Platanistidae

Platanista gangetica (Lebeck, 1801). Ganges river dolphin, susu

Platanista minor Owen, 1853. Indus river dolphin, bhulan

Family Iniidae

Inia geoffrensis (Blainville, 1817). Amazon river dolphin

- *I. g. boliviensis* (d'Orbigny, 1834). Bolivian bufeo
- *I. g. geoffrensis* (Blainville, 1817). Common boto

Family Lipotidae

Lipotes vexillifer Miller, 1918. Baiji, Yangtze river dolphin (possibly extinct)

Family Pontoporiidae

Pontoporia blainvillei (Gervais and d'Orbigny, 1844). Franciscana, toninha

Family Monodontidae

Delphinapterus leucas (Pallas, 1776). Beluga, white whale

Monodon monoceros Linnaeus, 1758. Narwhal

Family Delphinidae (38 species)

Cephalorhynchus commersonii (Lacépède, 1804). Commerson's dolphin

- *C. c. commersonii* (Lacépède, 1804). Commerson's dolphin
- *C. c. kerguelenensis* Robineau, Goodall, Pichler and C. S. Baker, 2007. Kerguelen dolphin

Cephalorhynchus eutropia (Gray, 1846). Chilean dolphin

Cephalorhynchus heavisidii (Gray, 1828). Heaviside's dolphin

Cephalorhynchus hectori (Van Beneden, 1881). Hector's dolphin

- *C. h. hectori* (Van Beneden, 1881). South Island Hector's dolphin
- *C. h. maui* A. Baker, Smith and Pichler, 2002. Māui dolphin, North Island Hector's dolphin

Delphinus delphis Linnaeus, 1758. Common dolphin

- *D. d. delphis* Linnaeus, 1758. Common dolphin
- *D. d. bairdii* Dall, 1873. Eastern North Pacific long-beaked common dolphin³
- *D. d. ponticus* Barabash, 1935. Black Sea common dolphin

- *D. d. tropicalis* van Bree, 1971. Indo-Pacific common dolphin

Feresa attenuata Gray, 1874. Pygmy killer whale

Globicephala macrorhynchus Gray, 1846. Short-finned pilot whale

Globicephala melas (Traill, 1809). Long-finned pilot whale

- *G. m. edwardii* (A. Smith, 1834). Southern long-finned pilot whale
- *G. m. melas* (Traill, 1809). North Atlantic long-finned pilot whale

Grampus griseus (G. Cuvier, 1812). Risso's dolphin, grampus

Lagenodelphis hosei Fraser, 1956. Fraser's dolphin

Lagenorhynchus acutus (Gray, 1828). Atlantic white-sided dolphin

Lagenorhynchus albirostris (Gray, 1846). White-beaked dolphin

Lagenorhynchus australis (Peale, 1849). Peale's dolphin

Lagenorhynchus cruciger (Quoy and Gaimard, 1824). Hourglass dolphin

Lagenorhynchus obliquidens Gill, 1865. Pacific white-sided dolphin

Lagenorhynchus obscurus (Gray, 1828). Dusky dolphin

- *L. o. fitzroyi* (Waterhouse, 1838). Fitzroy's dolphin
- *L. o. obscurus* (Gray, 1828). African dusky dolphin
- *L. o. posidonia* (Philippi, 1893). Peruvian/Chilean dusky dolphin

Lissodelphis borealis (Peale, 1849). Northern right-whale dolphin

Lissodelphis peronii (Lacépède, 1804). Southern right-whale dolphin

Orcaella brevirostris (Owen in Gray, 1866). Irrawaddy dolphin, pesut

Orcaella heinsohni Beasley, Robertson and Arnold, 2005. Australian snubfin dolphin

Orcinus orca (Linnaeus, 1758). Killer whale, orca

Peponocephala electra (Gray, 1846). Melon-headed whale

Pseudorca crassidens (Owen, 1846). False killer whale

Sousa teuszii (Kükenthal, 1892). Atlantic humpback dolphin

Sousa chinensis (Osbeck, 1765). Indo-Pacific humpback dolphin

- *S. c. chinensis* (Osbeck, 1765). Chinese humpback dolphin
- *S. c. taiwanensis* Wang, Yang and Hung, 2015. Taiwanese humpback dolphin

Sousa plumbea (G. Cuvier, 1829). Indian Ocean humpback dolphin

Sousa sahalensis Jefferson and Rosenbaum, 2014. Australian humpback dolphin

Sotalia fluviatilis (Gervais and Deville in Gervais, 1853). Tucuxi

Sotalia guianensis (P.J. Van Beneden, 1864). Guiana dolphin, costero

Stenella attenuata (Gray, 1846). Pantropical spotted dolphin

- *S. a. attenuata* (Gray, 1846). Offshore pantropical spotted dolphin
- *S. a. graffmani* (Lönnerberg, 1934). Coastal pantropical spotted dolphin

Stenella clymene (Gray, 1850). Clymene dolphin

Stenella coeruleoalba (Meyen, 1833). Striped dolphin

Stenella frontalis (G. Cuvier, 1829). Atlantic spotted dolphin

Stenella longirostris (Gray, 1828). Spinner dolphin

- *S. l. centroamericana* Perrin, 1990. Central American spinner dolphin
- *S. l. longirostris* (Gray, 1828). Gray's spinner dolphin
- *S. l. orientalis* Perrin, 1990. Eastern spinner dolphin
- *S. l. roseiventris* (Wagner, 1846). Dwarf spinner dolphin

Steno bredanensis (Lesson, 1828). Rough-toothed dolphin

Tursiops aduncus (Ehrenberg, 1833). Indo-Pacific bottlenose dolphin

Tursiops erebennus (Cope, 1865). Tamanend's bottlenose dolphin

Tursiops truncatus (Montagu, 1821). Common bottlenose dolphin

- *T. t. gephyreus* Lahille, 1908. Lahille's bottlenose dolphin
- *T. t. nuuanu* Andrews, 1911. Eastern Tropical Pacific bottlenose dolphin
- *T. t. ponticus* Barabash-Nikiforov, 1940. Black Sea bottlenose dolphin
- *T. t. truncatus* (Montagu, 1821). Common bottlenose dolphin

Family Phocoenidae (porpoises, 7 species)

Neophocaena phocaenoides (G. Cuvier, 1829). Indo-Pacific finless porpoise

Neophocaena asiaeorientalis (Pilleri and Gahr, 1972). Narrow-ridged finless porpoise

- *N. a. asiaeorientalis* (Pilleri and Gahr, 1972). Yangtze finless porpoise
- *N. a. sunameri* Pilleri and Gahr, 1975. East Asian finless porpoise

Phocoena dioptrica Lahille, 1912. Spectacled porpoise

Phocoena phocoena (Linnaeus, 1758). Harbor porpoise

- *P. p. phocoena* (Linnaeus, 1758). Atlantic harbor porpoise
- *P. p. vomerina* (Gill, 1865). Pacific harbor porpoise
- *P. p. relicta* Abel, 1905. Black Sea harbor porpoise

Phocoena sinus Norris and McFarland, 1958. Vaquita, Gulf of California harbor porpoise

Phocoena spinipinnis Burmeister, 1865. Burmeister's porpoise

Phocoenoides dalli (True, 1885). Dall's porpoise

- *P. d. dalli* (True, 1885). *dalli*-type Dall's porpoise
- *P. d. truei* Andrews, 1911. *truei*-type Dall's porpoise

ORDER SIRENIA (sirenians, 5 species, of which 1 extinct)

Family Trichechidae

Trichechus inunguis (Natterer, 1883). Amazonian manatee

Trichechus manatus Linnaeus, 1758. West Indian manatee

- *T. m. latirostris* (Harlan, 1824). Florida manatee
- *T. m. manatus* Linnaeus, 1758. Antillean manatee

Trichechus senegalensis Link, 1795. West African manatee, African manatee

Family Dugongidae

Dugong dugon (Müller, 1776). Dugong

Hydrodamalis gigas (Zimmerman, 1780). Steller's sea cow (extinct)

Footnotes (dissenting opinions):

1 Use of Order Cetartiodactyla (artiodactyls and cetaceans) is favored by some evolutionary mammalogists working with molecular data. Some others, including many marine mammalogists and paleontologists, favor retention of Order Cetacea in the interest of taxonomic stability, despite rendering the retained Order Artiodactyla paraphyletic.

2 (from D. Rice) Baker et al. (2003) hold that there is no evidence that would support the classification of the right whales as more than a single biological species. [The three species are here recognized as phylogenetic species.]

3 (from T. Jefferson) The List should retain the eastern North Pacific (ENP) long-beaked common dolphin as a separate species of *Delphinus*, *D. bairdii* (as in Banks and Brownell 1969). The evidence for species status is published and is considerable, especially the molecular differences. Notwithstanding issues related to poor sampling from areas of potential sympatry further south, the balance of the evidence seems to support a lack of interbreeding throughout a very large region of overlap, along with clear ecological differences. In this view, the error by Heyning and Perrin (1994) was not in splitting out the ENP long-beaked common dolphins as a distinct species, but in assuming that the name *D. capensis* applied there and that all long-beaked populations of *Delphinus* belonged to *D. capensis*.

⁴The full authority is: Carroll, McGowen, McCarthy, Marx, Aguilar, Dalebout, Dreyer, Gaggiotti, Hansen, van Helden, Onoufriou, Baird, Baker, Berrow, Cholewiak, Claridge, Constantine, Davison, Eira, Fordyce, Gatesy, Greg Hofmeyr, Martin, Mead, Mignucci-Giannoni, Morin, Reyes, Rogan, Rosso, Silva, Springer, Steel and Tange Olsen, 2021

Narrative on Taxonomy

Based on molecular and morphological data, the cetaceans fall firmly within the artiodactyl clade with hippopotamuses being the sister taxon to cetaceans (e.g., Geisler and Uhen, 2005, Spaulding et al. 2009) and Montgelard et al. (1997) proposed the taxon Cetartiodactyla, pooling even-toed terrestrial mammals and all cetaceans into a single Order. The Taxonomy Committee followed this convention, with some reservation, when it created the first list of marine mammal species and subspecies in 2009, and the term Cetartiodactyla has been widely used. Recently, Prothero et al. (2022) make a strong argument that the term Cetartiodactyla misrepresents taxonomic relationships as it implies cetaceans and artiodactyls are of equal rank, when, in fact, cetaceans are clearly nested within the Artiodactyla. We agree with Prothero et al. (2022) and revert to the use of Order Artiodactyla to include all cetacean taxa (living and extinct), and provisionally rank Cetacea as an Infraorder. While this change will likely cause some initial confusion, it more accurately reflects the placement of cetaceans in the taxonomic hierarchy. We continue to maintain Mysticeti and Odontoceti provisionally as unranked taxa (recognizing that the classification within Cetartiodactyla remains partially unresolved — e.g., see Spaulding et al. (2009), Price et al. (2005), Agnarsson and May-Collado (2008)).¹

Below the rank of order, we list only families, genera, species and subspecies, omitting superfamilies, subfamilies and taxa of other ranks. Consistent with the use of Cetacea as an un-

ranked unit, we also include the un-ranked taxon Pinnipedia. Morphological (Wyss and Flynn, 1993; Berta and Wyss, 1994) and molecular (Higdon et al. 2007; Fulton and Strobeck, 2010, Nyakatura and Bininda-Emonds 2012) analyses provide strong support for pinniped monophyly and hence inclusion of Pinnipedia as an un-ranked taxonomic unit. However, there is continued debate on this subject as Koretsky et al. (2016) argued the case for a diphyletic origin for pinnipeds.

Pinnipeds

For pinnipeds, we previously followed Berta and Churchill (2012). To avoid issues of paraphyly, these authors proposed that, based on molecular and morphological data, the genus *Arctocephalus* be limited to *Arctocephalus pusillus*, the type species of the genus *Arctocephalus*, and transferred the remaining 'Arctocephalus' species (i.e., *A. australis*, *A. galapagoensis*, *A. gazella*, *A. philippii* and *A. tropicalis*) to *Arctophoca* Peters, 1866. However, Nyakatura and Bininda-Emonds (2012) compiled a new supertree of the Carnivora and concluded that this usage of *Arctophoca* may be premature because of remaining uncertainty about phylogenetic relationships, and we return provisionally to use of *Arctocephalus* for all the southern fur seals.

Three subspecies of *A. australis* were proposed by Berta and Churchill (2012) and formerly listed here: *A. a. australis*, *A. a. forsteri* and *A. a. gracilis*. However, Oliveira and Brownell (2014) synonymized *A. a. gracilis* with *A. a. australis*. The super-tree analysis by Nyakatura and Bininda-Emonds (2012) accords with the phylogenetic analysis of Higdon et al. (2007), suggesting that the New Zealand fur seal should be recognized as a full species, *A. forsteri*. Two subspecies of *A. philippii* are thought to be biologically distinct: *A. p. philippii* and *A. p. townsendi*, although small sample sizes and a small number of genes sampled are concerns. Two subspecies of *Eumetopias* are supported largely on molecular genetic data, which is also the case for recognition of California, Japanese and Galapagos sea lions as separate species. Following a proposal by Gardner and Robbins (1999), the International Code of Zoological Nomenclature (ICZN) placed the name *O. byronia* on its Official List of Specific Names in Zoology. Brunner (2004) also advised use of *Otaria byronia* (Blainville, 1820) over *O. flavescens* (Shaw, 1800) and Webber (2014) provides a summary of why *O. flavescens* is a *nomen dubium* and should not be used under the provisions of the International Code of Zoological Nomenclature (ICZN 1999). However, many South American scientists continue to use *O. flavescens*.

Lindqvist et al. (2009) concluded that a purported third subspecies of the walrus *Odobenus rosmarus laptevi* is not warranted.

Recent molecular genetic analyses indicate that *Phoca vitulina concolor* is paraphyletic and this along with lack of morphological differentiation suggests that the western Atlantic subspecies is not supportable; *P. v. vitulina* is considered here to apply to all Atlantic harbor seals. Within the North Pacific, until the subspecies limits of various populations are assessed, only a single subspecies is recognized, *Phoca vitulina richardii*. Placement of the ringed seal, Caspian seal and Baikal seal has alternated between the genera *Phoca* and *Pusa*. We accept Rice's (1998) use of *Pusa* as the correct classification. Scheel et al. (2014) found the Caribbean and Hawaiian monk seals to be more closely related molecularly and morphologically to each other than either is to the Mediterranean monk seal and created the new genus *Neomonachus* for the two species.

The long-lost holotype skull of the gray seal *Halichoerus grypus* has been rediscovered and shown by DNA analysis to hail from the Baltic rather than from Greenland as previously thought (Olsen et al. 2016). Consequently, the nominate subspecies *H. g. grypus* is the Baltic gray seal, *H. g. macrorhynchus* falls into synonymy, and the authors have resurrected *H. g. atlantica* to apply to the Atlantic subspecies.

Polar Bears and Otters

Derocher and Stirling (1998) argued convincingly that patterns of variation in the polar bear do not support recognition of subspecies.

The use of *Lontra* rather than *Lutra* for the marine otter follows Larivière (1998) in recognizing the otters of North and South America as a monophyletic taxon distinct from the otters of Eurasia.

Baleen Whales

In the mysticete cetaceans, molecular evidence strongly supports the recognition of three separate phylogenetic species of right whales (Rosenbaum et al. 2000; Gaines et al. 2005). In addition, the genus *Eubalaena* (rather than *Balaena* as in Rice, 1998) is retained for the right whales as recommended by the Scientific Committee of the International Whaling Commission (IWC, 2001)².

New fossil evidence suggests that *Caperea marginata* may be a member of the family Cetotheriidae (Fordyce and Marx 2012; Marx and Fordyce 2015; Marx and Fordyce 2016). Neobalaenidae is retained here provisionally.

Jackson et al. (2014) have recognized three subspecies of the humpback whale based on mitochondrial and nuclear DNA relationships and distribution: *Megaptera novaeangliae kuzira* (North Pacific), *M. n. novaeangliae* (North Atlantic) and *M. n. australis* (Southern Hemisphere).

There have been a variety of studies (McDonald et al. 2006, Branch et al. 2007, LeDuc et al. 2007, 2017, Torres-Florez et al. 2014, Buchan et al. 2018, Leslie et al. 2021) that have provided evidence suggesting blue whales in the eastern South Pacific differ from blue whales elsewhere and may represent a separate subspecies but none have provided a formal subspecies description supplying the information required under the International Code of Zoological Nomenclature for proposing new species or subspecies. Khalif (2020) summarizes information available on the population in the eastern South Pacific, designates an identifiable specimen and type location, and provides a subspecies name. However, the subspecies description is incomplete and, importantly, is diagnosed by bibliographic references alone. This is minimally sufficient to make the name available (see Code, Art. 13.1.2), but no attempt seems to have been made to collect morphological or genetic evidence, despite the ready availability of a skull and nearly complete skeleton. This is poor practice and contrary to Recommendation 13A. We therefore regard the name *B. musculus chilensis* a *nomen dubium* and do not recognize it until these faults are remedied. Khalif (2021) also describes a new blue whale subspecies *B. musculus arabica* from the Arabian Sea. This work fails to acknowledge that more than one type of blue whale exists in

northern Indian Ocean making it impossible to link the new blue whale song described by Cerchio et al. (2020) from this region to the blue whale skeleton from Kuwait. The subspecies is diagnosed only by bibliographic references to characterizations of its song and acoustics alone does not constitute sufficient evidence for taxonomic separation. We therefore regard the name *B. musculus arabica* a *nomen dubium* and do not recognize it.

The Bryde's-like whales in the Gulf of Mexico have now been described as a new species of medium-sized balaenopterid, *Balaenoptera ricei*, by Rosel et al. (2021), with the common name Rice's whale. The remaining Bryde's whales are provisionally considered to comprise a single species, *Balaenoptera edeni*, following the usage of Kato and Perrin (2009) and Kershaw et al. (2013). However, Luksenburg et al. (2015) and Wada et al. (2003) accepted two species. Some workers recognize *B. edeni* as including only the small-form coastal Bryde's whales of the western Pacific and Indian Oceans, using *B. brydei* for the globally distributed and larger, more oceanic form (Sasaki et al. 2006). Kato and Perrin (2009) and Kershaw et al. (2013) considered these more likely to be distinct at the subspecific level (although arguably at the species level), and they are included here provisionally as such. *Balaenoptera omurai* was described by Wada et al. (2003). It was previously confounded with the Bryde's whale and has been confirmed as having a separate and ancient lineage (Sasaki et al. 2006).

To further resolve the taxonomy and systematics of all the medium-sized baleen whales (*B. ricei*, *B. edeni edeni*, *B. e. brydei*, and including *B. borealis*) it is critical that a neotype be designated for *B. brydei* and that genetic data be obtained from that designated neotype. In addition, genetic data should also be obtained from the holotype of *B. edeni* to validate the identity of museum specimens as well as samples collected from stranded and biopsied individuals. Finally, a comprehensive phylogenetic analysis using nuclear markers of all taxa in this complex with sufficient samples and range-wide geographic coverage is also needed.

Clarke (2004) proposed recognition of a pygmy form of the fin whale as a subspecies, based on distribution, size and coloration. He resurrected the synonym *patachonica* Burmeister, 1865 to apply to the subspecies: *B. physalus patachonica*. However, Pérez-Alvarez et al. (2021) conducted a phylogenetic analysis of fin whales and found no support for differentiation among Southern Hemisphere fin whales, recommending that the name *patachonica* Burmeister, 1865 be synonymized with *B. physalus quoyi* and the latter refer to all Southern Hemisphere fin whales.

Archer et al. (2019) provided genetic evidence at both mitochondrial and nuclear genetic markers that fin whales in the North Pacific are significantly differentiated from those in the North Atlantic and the Southern Hemisphere. They proposed recognition of the North Pacific fin whale as a separate subspecies, *B. physalus velifera*.

Toothed Whales

In the odontocetes, *Mesoplodon traversii* (spade-toothed whale) was recognized as the senior synonym for *M. bahamondi* (Bahamonde's beaked whale) (van Helden et al. 2002). The first complete specimen was recently described from a stranding on the North Island of New Zealand (Thompson et al. 2012). *Mesoplodon perrini* was described by Dalebout et al. (2002). Dalebout et al. (2014) resurrected *Mesoplodon hotaula* Deraniyagala, 1963, a species closely similar to *M.*

ginkgodens. Using morphological and genomic evidence, Carrol et al. (2021) split *M. mirus*, identifying those in the Southern Hemisphere as *M. eueu*.

Yamada et al. (2019) provided morphological evidence, supported by genetic data (Morin et al. 2018, Kitamura et al. 2013), recognizing a new species of *Berardius* in the North Pacific, *Berardius minimus*.

The South Asian river dolphins (genus *Platanista*) have a long history of taxonomic revision, oscillating between being recognized as two species, *Platanista gangetica* (Lebeck, 1801) and *P. minor* Owen, 1853, and two subspecies of *Platanista gangetica*. The Taxonomy Committee, when it first created the taxonomy list, followed Rice's (1998) treatment of *Platanista* and recognized a single species with two subspecies, *P. g. gangetica* and *P. g. minor*. Recently, Braulik et al. (2014, 2021) have performed a morphological analysis of the two taxa, coupled with an analysis of mitochondrial DNA and recommended species-level status for the two subspecies. Individually, the support provided from these two lines of evidence was relatively weak: a single, but significant, diagnostic difference in the frontal bones of the skull, and five fixed differences and no shared mtDNA haplotypes, but a level of genetic divergence that does not exceed the species threshold identified by Taylor et al. (2017a). The combined evidence for diagnosability in the morphological and genetic lines of evidence, the significant difference in growth curves between the two taxa, and their estimated divergence time of ~0.55 million years, led the majority of committee members to accept the proposed elevation to species. However, the unavailability of samples from the upper reaches of the rivers where the two taxa may have last been in contact impedes a complete understanding of the evolutionary history of the two taxa and this posed some concern for a few members when evaluating the proposal to elevate the subspecies to species.

We recognize one species of *Inia* with two subspecies: *I. geoffrensis geoffrensis* (Blainville, 1817) and *I. g. boliviensis* (d'Orbigny, 1834). *I. g. boliviensis* is found in the Bolivian Amazon basin and overlaps with other *Inia* in all morphological characters (da Silva, 1994; Ruiz-García et al. 2006). However, molecular genetic evidence from mitochondrial DNA (mtDNA) and nuclear introns (Banguera-Hinestroza et al. 2002; Ruiz-García et al. 2008) suggested these two subspecies are on separate evolutionary trajectories and deserve recognition as phylogenetic species. Hollatz et al. (2011) estimated that *I. g. boliviensis* has been reproductively isolated for 3.2 million years. However, these studies used geographically disparate samples, with a significant gap in sampling of *Inia* habitat between the Teotonio Rapids, hypothesized to be the barrier to gene flow for *I. g. boliviensis*, and the samples used to represent *I. g. geoffrensis*. Gravena et al. (2014), with much better sampling of the Madeira River system, including samples from immediately above and below the Teotonio Rapids, found that in fact these rapids did not appear to obstruct gene flow on an evolutionary scale. Thus, the conclusion that the Bolivian *Inia* above the Teotonio Rapids possessed unique mtDNA (a major line of evidence for recognizing species-level distinctness of *I. boliviensis*) was not supported by more extensive sampling (i.e., the initial appearance of separation was an artifact of poor sampling). Therefore, only the subspecies *Inia geoffrensis boliviensis* is retained, although given the newer evidence for a lack of isolation of the dolphins above the Teotonio Rapids (Gravena et al. 2014) and the lack of robust sampling, the strength for subspecies status is weakened. Another new species, *Inia araguaiaensis*, was described by Hrbek et al. (2014) from the Araguaia River, which is not

connected to the Amazon and Siciliano et al. (2016) extended the known range of *I. araguaiaensis* further north to Marajó Bay, Brazil through mtDNA analysis of three stranded specimens. Hrbek et al. (2014) only examined samples from two extremes of the distribution of *Inia*, so is it unclear if the molecular differences observed represented real species-level separation or were due to sampling from two locations separated by a large distance. Diagnostic osteological differences were also reported (Hrbek et al. 2014). However, because this study was based on the examination of very few specimens (only 2 for the new species and only 9 for *I. geoffrensis*) and did not account for effects of sexual dimorphism within the species, the authors' conclusions are not convincing. In light of these arguments, the species here remains unlisted provisionally. Hrbek et al. (2014) did not recognize *I. g. humboldtiana*. Melo et al. (2021) examined acoustic evidence and found some suggestion of vocal differences, but vocalizations are known to be plastic in odontocetes. In addition, there was significant overlap in many of the measured parameters and classification based on the acoustic data exhibited an error rate near 30%, which is quite high for taxonomic decisions. Most recently, Cañizales (2020) and Emin-Lima et al. (2022) provide valuable new morphological data to evaluate aspects of the taxonomy within the genus *Inia*. Cañizales (2020) examined 20 skulls from Venezuela identified as representing *I. g. humboldtiana* and provided some evidence for differences between these samples and those of *I. g. geoffrensis*, but differences were slight, with overlap in several analyses. Emin-Lima et al. (2022) also focused on skull morphology and examined 46 skulls from distant locales within the Amazon basin and identified three morphological groups that largely corresponded with *I. g. geoffrensis*, *I. g. humboldtiana*, and *I. g. boliviensis*. They found no differences between *I. g. geoffrensis* and *I. araguaiaensis*.

Resolution of the taxonomic status of all *Inia* forms requires an integrated approach using multiple lines of evidence, improved sampling throughout the distribution, and a thorough review of all the evidence (morphological, genetic, ecological, etc.). In addition, proposed changes to taxonomy will require a detailed taxonomic treatment, must provide diagnoses, and review relevant nomenclature. Some examples of recent species or subspecies descriptions and redescrptions providing the necessary taxonomic treatment can be seen at: Yamada et al. (2019), Braulik et al. (2021), Rosel et al. (2021), Costa et al. (2023).

Previous editions of this list recognized two globally distributed species of common dolphins: the short-beaked common dolphin *D. delphis* and the long-beaked common dolphin *D. capensis* as proposed by Heyning and Perrin (1994). However, evidence that *D. capensis* thus considered is a polyphyletic taxon has been accumulating for some time. The long-beaked condition is apparently a convergent character state induced by regional ecology. In some regions, long-beaked common dolphins are genetically more closely related to short-beaked common dolphins than to long-beaked common dolphins in other regions (e.g., see Natoli et al. 2006). Cunha et al. (2015) summarized the relevant data and analyses, along with additional molecular data and analysis, and recommended that *Delphinus capensis* not be further used as proposed by Heyning and Perrin (1994). That recommendation is followed here. Cunha et al. (2015) noted that because the sympatric/parapatric long-beaked and short-beaked common dolphins off California in the eastern North Pacific (ENP) appear not to interbreed, perhaps the ENP long-beaked common dolphins might be recognized as a separate species *D. bairdii* Dall, 1873 (as advocated by Banks and Brownell (1969) based on the long-beaked condition). However, the molecular analysis for the ENP (Rosel et al. 1994) did not include common dolphins from the contiguous regions to the

south in the eastern tropical and eastern South Pacific. Pending a more complete global review and revision of the common dolphins, the long-beaked ENP form is considered here provisionally as a subspecies *D. delphis bairdii* following the usage of Hershkovitz (1966)³. *Delphinus capensis* Gray, 1828 from South Africa remains in the synonymy of *Delphinus delphis* Linnaeus, 1758. The long-beaked common dolphin of the Indian Ocean is retained as a subspecies *D. delphis tropicalis*.

Based on a combined analysis of molecular genetic and morphological data, Mendez et al. (2013) proposed recognizing four species of *Sousa* (the humpback dolphins): the previously here-listed *S. teuszii* and *S. chinensis* plus *S. plumbea* and a new un-named species from the waters of northern Australia that was originally proposed by Frère et al. (2008, 2011) based on molecular data. A drawback of the phylogenetic analyses by Mendez et al. (2013) is that there was only one sample from the area of supposed sympatry of *S. plumbea* and *S. chinensis* and very low coverage of the Indo-Malay region (n=5). The two species are listed here provisionally, pending the outcome of further analysis including more samples from those areas. The new species from Australia has been given the name *Sousa sahulensis* (Jefferson and Rosenbaum 2014).

The new subspecies *Sousa chinensis taiwanensis* was described by Wang et al. (2015).

The Burrunan dolphin *Tursiops australis*, described by Charlton-Robb et al. (2011), is not included here; its basis is questionable because of several potential problems: 1) the specimens were compared morphologically only with bottlenose dolphins from Australia; 2) despite the small sample sizes, the series overlapped in all metric characters and separation was possible only with multivariate analysis (which commonly resolves geographical forms within a species, e.g., see Perrin et al. (1999) and Perrin et al. (2011) for *Stenella longirostris* and *Tursiops truncatus*, respectively); 3) comparisons of external morphology and non-metric characters were made only with *T. truncatus*, to the exclusion of *T. aduncus*; and 4) support for important nodes in molecular trees suggesting phylogenetic separation was low. A rigorous re-evaluation of the relevant data and arguments is needed. Recently, Jedensjö et al. (2020) conducted a broader morphological comparison of *Tursiops* skulls from around Australia, including skulls of both *T. truncatus* and *T. aduncus* and their respective holotypes, and did not find support for the Burrunan bottlenose dolphin, *T. australis*, proposed by Charlton-Robb et al. (2011). Skulls previously classified as *T. australis* all fell well within the *T. truncatus* group. In contrast, Moura et al. (2020) placed *T. australis* within a *T. aduncus* clade based on a nuclear genetic phylogeny.

Based on morphological and genetic analyses, Costa et al. (2022) described a new species of *Tursiops* from the western North Atlantic, separating the long-recognized coastal and offshore morphotypes from the western North Atlantic into two species. The offshore morphotype remains *Tursiops truncatus*, while the coastal morphotype found in nearshore coastal waters as well as the bays and estuaries along the U.S. east coast was split out as the new species *T. erebennus* (Cope, 1865). Additional work is needed to identify the full geographic distribution of *T. erebennus* in the Gulf of Mexico and Caribbean.

Costa et al. (2023) evaluated morphological variation among three distinct morphotypes of *T. truncatus* in the eastern Pacific, the southern California/Mexico coastal form, the northern

temperate offshore form, and an eastern tropical Pacific (ETP) offshore form. Cranial morphology and body size separate the eastern tropical Pacific (ETP) offshore form from other Pacific *Tursiops*. The authors resurrected the name *T. t. nuuanu* Andrews, 1911 for this subspecies.

Costa et al. (2016), Wickert et al. (2016), and Hohl et al. (2020) have examined morphological characteristics of *Tursiops* specimens from the western South Atlantic. Costa et al. (2016) recommended subspecies status for the larger coastal form found between southern Brazil and northern Argentina, while both Wickert et al. (2016) and Hohl et al. (2020) have recommended species status. Costa et al. (2021) paired morphological and genetic data from samples collected from both forms in southern Brazil and found strong congruence between morphological and mitochondrial and nuclear divergence; genetic differentiation was also observed in Oliveira et al. (2019). In both genetic studies, however, evidence for shared mitochondrial haplotypes and possibly shared nuclear ancestry was found. We provisionally recognize the subspecies *T. t. gephyreus* Lahille 1908 (Lahille's bottlenose dolphin) for this larger coastal form. Improved geographic sampling and improved objectivity in hypothesis testing is needed to fully resolve the taxonomy of *Tursiops* in this region. In particular, further work is needed to better identify the distribution of the *gephyreus* form and determine its phylogenetic relationship to coastal and offshore *Tursiops* in the western North Atlantic and throughout Caribbean waters. Wang et al. (2021) showed *gephyreus* to be the correct trivial name for this taxon (as long as it continues to be recognized as a subspecies or species).

Recognition of the Black Sea bottlenose dolphin is now well-supported by molecular genetic data (Viaud-Martinez et al. 2008), as is the Black Sea common dolphin (Natoli et al. 2008).

Kinze (2018) proposed that the scientific name for *Tursiops truncatus* should be *Tursiops tursio* as *tursio* has priority over *truncatus*. The committee noted that resurrecting the name *T. tursio* for the bottlenose dolphin would upset long-standing usage and would cause considerable confusion in national and international treaties, agreements, etc. Therefore, the name *T. truncatus* should continue to be used for the common bottlenose dolphin to maintain stability.

The genus *Lagenorhynchus* is widely considered a polyphyletic taxon containing morphologically convergent species (Cipriano 1997, LeDuc et al. 1999, McGowen 2011, Banguera-Hinestroza et al. 2014, Vollmer et al. 2019). Vollmer et al. (2019) provided a detailed review of the relationships among members of the genus *Lagenorhynchus* and their relationship to *Cephalorhynchus* and *Lissodelphis*. Results continue to support the polyphyletic nature of the genus *Lagenorhynchus* and multiple morphological and genetic analyses indicate that *L. albirostris* and *L. acutus* are evolutionarily distinct from the other members of all three genera. Vollmer et al. (2019) recommended revision of the genus *sensu* LeDuc et al. (1999), placing *L. obscurus*, *L. obliquidens*, *L. australis* and *L. cruciger* into the genus *Sagmatias*, *L. acutus* into the genus *Leucopleurus* and leaving *L. albirostris* in a monotypic genus *Lagenorhynchus*. While a majority of committee members supported the changes proposed by Vollmer et al. (2019), a 2/3 majority of voting members was not reached. Primary objection to the changes focused on remaining uncertainties in some relationships and the potential confusion that may be created if the proposed changes require further revision in the near future. At issue are 1) the conflicting support among data sets for a sister-taxa relationship between *L. albirostris* and *L. acutus* (which

would obviate the need for *Leucopleurus*), and 2) evidence that *australis* and *cruciger* should be included in *Cephalorhynchus* (which would necessitate a new genus for *obliquidens* and *obscurus*, as *australis* is the type species for the genus *Sagmatias*). Therefore, the taxonomy list retains all species in *Lagenorhynchus*, recognizing that the current taxonomy does not reflect the evolutionary distinctiveness of *L. albirostris* and *L. acutus*. Next steps in unraveling the taxonomy of these dolphins will need to involve robust datasets that include all *Lagenorhynchus* and *Cephalorhynchus* species. Harlin-Cognato (2010) recognized *L. obscurus posidonia* (Peru/Chile).

It has been noted repeatedly, most recently by Perrin et al. (2013), that the delphinine genera *Stenella* and *Tursiops* are paraphyletic and that at present there is no molecular or morphological basis for satisfactory resolution of phylogenetic relationships in the subfamily. A possible solution would be to return all the species in *Tursiops*, *Sousa*, and *Stenella* to *Delphinus*, the genus in which they were first described, and place *Lagenodelphis hosei* there as well. However, considering that this would obscure the clear close relationship of the present *Sousa* and *Tursiops* species, the status quo is maintained here provisionally, pending the outcome of more definitive morphological and molecular studies. Eventually a more natural classification will emerge.

Perrin et al. (1999) established the subspecies *Stenella longirostris roseiventris*.

The Irrawaddy dolphin was split into *O. brevirostris* and *O. heinsohni*, the Australian snubfin dolphin (Beasley et al. 2005).

Wang et al. (2008) and Jefferson and Wang (2011) established *Neophocaena asiaorientalis* as a full species distinct from the *N. phocaenoides*, with two subspecies. Zhou et al. (2018) examined genomic DNA sequence data and concluded that there was significant genetic differentiation between the two subspecies of *N. asiaorientalis*, including evidence for genetic adaptation to the freshwater environment of the Yangtze River. The authors proposed the two subspecies of *N. asiaorientalis* be elevated to species-level, the Yangtze finless porpoise, *N. asiaorientalis* Pilleri and Gühr 1927, and the East Asian finless porpoise, *N. sunameri* Pilleri and Gühr 1972. However, there were no samples in this study from near the mouth of the Yangtze River where the marine and river subspecies could possibly be sympatric and where genetic interchange could occur. While the results of the study are consistent with recently diverged taxa, the lack of samples in the potential area of sympatry make it difficult to rule out an isolation by distance effect.

Viaud-Martinez et al. (2007) concluded based on morphological and molecular genetic evidence that *Phocoena phocoena relicta* is a distinct subspecies.

We list the baiji *Lipotes vexillifer* as “possibly extinct” in conformance with the IUCN Red List, although extinction seems a certainty.

Manatees and Dugongs

In the Sirenia, subspecies of the dugong are not currently recognized (Domning, 1996; see <http://sirendom.org/biblio> for update to 1996 publication). However, no in-depth study has been undertaken to address the issue of subspecies.

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