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## Dall's Porpoise

*Phocoenoides dalli*

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Dall's porpoise is one of the better-known species in the family Phocoenidae. Largely because many individuals have been killed in fisheries recently, much has been learned of the biology of this species throughout its range in the North Pacific Ocean (Houck and Jefferson, 1999).

### I. Characters and Taxonomic Relationships

Typical of the porpoise family, Dall's porpoise has a stocky body with a short, wide-based, triangular dorsal fin (Fig. 1). The dorsal fin is slightly falcate at the tip, but the entire fin may



Figure 1 A Dall's porpoise swims just below the surface on a calm day in Monterey Bay, California. Because of their normally high-speed swimming, clear views such as this are somewhat uncommon.

be canted forward in large adult males. The tail stock is deepened, especially in adult males. There is an extremely short, poorly defined beak. The flippers and flukes are small, and the fluke blades may also be canted forward.

The color pattern is diagnostic. "Dall's" are largely dark gray to black with a large, ventrally continuous white patch that extends up about halfway on each flank. In addition, there is light gray to white frosting or trim on the upper part of the dorsal fin and on the trailing edge of the flukes. Some other light patches may exist, particularly around the base of the tail stock.

There are two major color morphs: one with a flank patch that extends forward to about the level of the dorsal fin (*dalli* type) and the other with a flank patch extending to about the level of the flippers (*truei* type). These forms were variously called separate species and subspecies in the past, but most recent work suggests that they are in fact color variants, with little or no other phenotypic difference. However, genetic analyses have confirmed that they do appear to form separate populations (Escorza, 1998).

Dall's porpoises reach maximum known lengths and weights of about 239 cm and 200 kg. Males grow longer and heavier than females, and adult males have secondary sexual characteristics (mentioned earlier). There is a great deal of geographical variation; size, shape, and coloration differences have been documented among different areas of the species' range.

The SKULL of the Dall's porpoise is larger than that of most other phocoenids and may reach 340 mm. The rostrum is wide at the base and relatively short (Fig. 2). There are prominent "maxillary shields" that make an angle of about 130° with the rostrum axis. The TEETH are extremely small, the smallest of any species of cetacean. They often do not rise above the level of the gums and are considered by many to be rudimentary.

Recent studies of mtDNA suggest that the previous classification of Dall's porpoise and the spectacled porpoise (*Phocoena dioptrica*) in the same subfamily was erroneous (Rosel *et al.*, 1995). These two species do not appear to be closely related, and their similarities may be the result of CONVERGENT EVOLUTION.

### II. Distribution and Ecology

This species is found only in the North Pacific Ocean and adjacent seas (Bering Sea, Okhotsk Sea, and Sea of Japan),

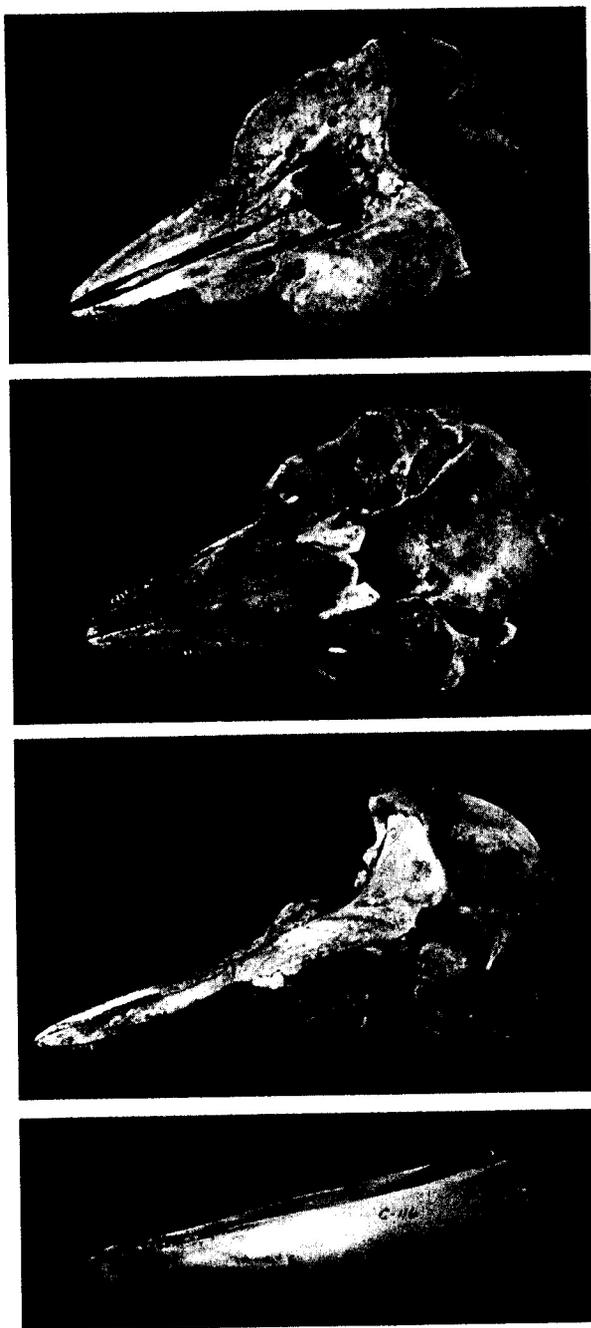


Figure 2 Dorsal, ventral, and lateral views of the cranium, and a lateral view of the mandible, of a Dall's porpoise from central California.

from about 32°–35°N (southern California and southern Japan) in the south to about 63°N (central Bering Sea) in the north. Up to 10 different populations and stocks are recognized, based on studies of morphology, genetics, and ecological parameters (see Amano and Miyazaki, 1992; Escorza, 1998). Sex-biased dispersal and migration patterns have been elucidated from molecular genetic analyses (Escorza, 1998).

This is an oceanic species that is found in deep offshore waters but also in deeper nearshore and inshore waters along the west coast of North America. There are seasonal inshore-offshore and north-south movements in both the eastern and western Pacific (Forney and Barlow, 1998), but in most areas these are very poorly defined.

Prey species include a wide variety of fishes and cephalopods. The most common prey items include small schooling fishes (such as herring, anchovies, mackerels, and sauries), mesopelagic fishes (such as myctophids and deep-sea smelts), and squids. KRILL, decapods, and shrimps have been found in some stomachs, but these are not considered to be common prey items. Amano and Miyazaki (1992) found that the skulls of porpoises grew to larger sizes in areas with higher productivity, suggesting that food availability affects growth.

Dall's porpoises in some areas appear to feed preferentially at night on vertically migrating fish and squid associated with the deep scattering layer. They are thought to be probably deep divers and capable of feeding at great depths.

### III. Behavior and Life History

Small groups are most common, although large aggregations of several hundreds to about 1000 have been reported on occasion. Groups of over 20–30 porpoises are rather uncommon. Very little is known of the group structure of this species except that group composition is probably quite fluid.

These are very fast-swimming and active porpoises. They are often seen moving very quickly, slicing along the surface, creating a sloppy, V-shaped splash. These are called roostertail splashes (Fig. 3). Dall's porpoises are willing and capable bow riders and will converge on the bow of a fast-moving boat from all around. They have even been seen to "snout ride" on bow waves pushed forward by the heads of large whales.

Growth and reproductive parameters have been estimated for several populations in the central and western Pacific. Length at birth is about 100 cm. Estimates of length and age



Figure 3 Most often when Dall's porpoises are seen at sea, they are swimming very fast and "roostertailing," as this porpoise is doing while riding the bow wave of a vessel in Southeast Alaska.

at sexual maturity range from about 172 to 187 cm and 4 to 7 years for females and from 175 to 196 cm and 3.5 to 8 years for males (Houck and Jefferson, 1999; Ferrero and Walker, 1999). Gestation lasts about 10–12 months, and the length of lactation is not well known (but is most likely shorter than 1 year). The calving season is in the summer for all populations that have been studied to date, although some calves may be born outside the main season.

An intergeneric hybrid between a Dall's porpoise and a harbor porpoise (*Phocoena phocoena*) has been described (Baird *et al.*, 1998). Free-ranging animals resembling the confirmed hybrid are regularly observed around Vancouver Island, British Columbia, suggesting that such hybridization events may not be all that rare.

#### IV. Interactions with Humans

A number of threats to Dall's porpoise populations have been identified, including environmental POLLUTION and habitat alteration. However, the most serious threats are the various fisheries kills of this species. These include directed kills in Japanese waters and INCIDENTAL CATCHES in various fisheries (most prominently oceanic drift net fisheries) throughout the range. The most heavily impacted populations have been those in the central and western North Pacific.

Small numbers of Dall's porpoises have been kept in captivity in oceanaria and research institutes in the United States and Japan, but most individuals have not survived long. They are not currently sought after for captive display.

#### See Also the Following Articles

Bow-Riding ☉ Geographic Variation ☉ North Pacific Marine Mammals ☉ Porpoises, Overview

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## Delphinids, Overview

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The family Delphinidae is one of three extant (with Phocoenidae and Monodontidae) families in the cetacean superfamily Delphinoidea (which also includes three extinct families, Kentriodontidae, Odobenocetopsidae, and Albireonidae).

The popularity of oceanic dolphins (family Delphinidae) is arguably among the highest for wild animals, both for the general public and for scientists conducting research. However, despite this, they are very poorly understood compared to most terrestrial mammals of similar size. For most species of delphinids, basic aspects of their evolution, physiology, ecology, behavior, and population structure are virtually unknown. For the biologist, this presents real challenges and opportunities for dolphin research, not just to understand individual species, but also toward a better understanding of how they fit into marine ecosystems.

#### I. Taxonomic Overview

Delphinids likely arose in the mid- to late Miocene (11–12 mya) from kentriodontid-like ancestors and quickly radiated into many different morphological and ecological types. This early radiation produced precursors of many modern forms; many of the early delphinid fossils can be assigned to extant genera, particularly *Tursiops*. Today the Delphinidae is the most speciose family of marine mammals, with 34–36 recognized extant species arranged into 17–19 genera. At present, there is much uncertainty about the evolutionary relationships among the species of delphinids. Of the many recent classifications that have been proposed, two are depicted here. One represents a more traditional view of dolphin taxonomy (Table Ia) and the other a recent provisional classification based on molecular phylogenetic analyses (Table Ib). It should be mentioned that the latter classification is considered tentative and is based on analysis of a single gene. A more highly resolved representation of systematic relationships among delphinid species is not currently available. Also, there will no doubt be additional revisions proposed in the future, especially involving the apparently paraphyletic genera *Stenella* and *Tursiops*. In part, this changing nature of delphinid taxonomy is due to the new molecular and analytical tools currently available to researchers, but it also reflects the uncertainties about evolutionary relationships that have long been recognized by morphological systematists but have yet to be addressed.

#### II. Morphology

Dolphins have the typical morphological characteristics of toothed whales, such as spindle-shaped bodies, single external blowholes, telescoping of the skull such that the maxillary bones overlap the frontals in the supraorbital region, left-skewed cra-