

Neophocaena phocaenoides (G. Cuvier, 1829)

English: Finless porpoise

German: Indischer Schweinswal

Spanish: Marsopa lisa

French: Marsouin aptère

Family Phocoenidae

1. Description

The finless porpoise is a small porpoise and lacks a dorsal fin. It is replaced by a ridge with small bumps which runs down the middle of the back. The head is rounded and there is no apparent beak. The colour is uniformly dark- to pale grey and somewhat lighter on the ventral side. Body size reaches 170 cm and mass 70 kg, with maxima of 200 cm and 100 kg (Jefferson and Hung, 2004; Amano, 2009).

2. Distribution

<http://www.iucnredlist.org/apps/redlist/details/14550/0/rangemap>

Distribution of the three subspecies of Neophocaena phocaenoides: coastal waters and some major rivers of the Indian ocean and the Western Pacific (Reeves et al. 2008; © IUCN).

The warm, coastal Indo-Pacific waters, both fresh and marine, are home to the finless porpoise (Jefferson et al. 1993). There are three well-marked regional populations which warrant subspecific rank. Even within these, significant differences in skull morphology have been found among local populations (Rice, 1998 and refs. therein, Amano, 2009):

N. p. phocaenoides inhabits coastal waters along the mainland of southern Asia from the Persian Gulf east to the South China Sea and southern part of the East China Sea; also the coasts of south-eastern Sumatra, Bangka, Belitung, Sarawak, Palawan, the Turtle Islands in the Sulu Sea, and northern Java. The species has not been found in South African waters, or anywhere else in Africa (Rice, 1998 and refs. therein). It penetrates into the Indus River for 60 km, and into the Brahmaputra River for 40 km from the mouth. (Kasuya, 1999). The border between this and the next subspecies seems to be around Taiwan Strait (Amano, 2009).

N. p. sunameri (Pilleri and Gahr, 1975) ranges in coastal waters from the southern East China Sea north to the Liaodong Wan in China, Korea, and Kyushu in Japan, thence along the Pacific coast of Japan from the Setonaikai north to Sendai-wan in northern Honshu (Rice, 1998). They seem to be absent from Sulawesi, Halmahera and Timor, the Philippines, and the northern coast of Australia (Kasuya, 1999). Five local populations are identified in Japanese waters based on skull morphology and mt DNA variability (Amano, 2009). However, no obvious phylogeographical pattern was revealed between Chinese and Japanese waters, including between saline and fresh water populations (Yang et al. 2008a). The border between this and the next subspecies seems to be the mouth of the Yangtse River, but this is uncertain (Amano, 2009).

N. p. asiaorientalis (Pilleri and Gahr, 1972) is found in the lower and middle reaches of the

Chang Jiang (Yangtze River), where it ranges 1,600 km upstream as far as the gorges above Yichang (200m above sea level), and including Poyang Hu and Dongting Hu and their tributaries, the Gan Jiang and the Xiang Jiang (Rice, 1998).

3. Population size

There have been several population abundance estimates, both qualitative and quantitative for the three subspecies over the course of the last decade. From west to east:

In the Persian Gulf waters between Kuwait and Oman, the finless porpoise accounted for only 2% of all cetacean sightings. Estimates of cetacean abundance in the UAE differed significantly between 1986 and 1999 and indicate a population decline of 71%. (Preen, 2004).

In the Gulf of Kachchh, Gujarat State, India Marine Protected Area, a wedge-like extension of the Arabian Sea, 14 finless porpoises were recorded (Singh, 2003).

In the nearshore waters of Bangladesh, 11 finless porpoises were observed at sea during a vessel-based line-transect survey conducted in 2004. From these, a 'Distance' analysis resulted in an abundance estimate of 1,382 (CV=54.8%) animals (Smith et al. 2008b)

In the western Sea of Korea line-transect abundance estimate from surveys conducted in 2003 to 2005 resulted in 36,475 individuals (Park et al. 2006).

In the Inland Sea of Japan, aerial sighting surveys conducted in 2000 yield an abundance of 7,572 individuals, with a low density of 0.506 individuals/km² (CV = 17.3%). Distribution was clumped and restricted to inshore waters or near islands (Shirakihara et al. 2007). Abundance off the Pacific coast of eastern Japan between Sendai Bay (38°23'N) and the mouth of Tokyo Bay (35°13'N) was estimated at 3,387 animals (CV = 32.7%) from a survey conducted in 2000. Two distributional gaps observed at around 35°N and 37°N suggest the possibility of population subdivision (Amano et al. 2003). Further known subpopulations number 3,807 (CV=16%) in Ariake Sound/Tachibana Bay (Shirakihara and Shirakihara 2002); 289 (CV=19%) in Omura Bay (Shirakihara and Shirakihara 2002) and 3,743 (CV=24%) in Ise/Mikawa Bay (Yoshida 2002);

Only two cetacean species are regularly observed in Hong Kong waters and are considered residents: the Indo-Pacific humpback dolphin (*Sousa chinensis*) and the finless porpoise (Jefferson and Hung, 2007). An earlier estimate yielded a minimum 217 (CV= 21-150%) finless porpoises (Jefferson *et al.* 2002)

Abundance estimates of the Yangtze finless porpoise *N. p. asiaeorientalis* from surveys conducted in 2006 and including independent estimates from the two lakes yield a total of approximately 1,800 animals. However, the population continues to decline and its distribution is becoming more fragmented. No animals were sighted e.g. in the 150 km stretch between Yueyang and Shishou, where sightings had previously been common (Zhao et al. 2008). This compares well with an estimate obtained during a visual survey concurrent with acoustic observations in a total of 774 km in the Yangtze River, yielding 588 sighted animals (Akamatsu et al. 2006). However, both values are significantly lower than the previous estimate by Zhang et al. (1993) estimated the Yangtze population at about 2,700 individuals.

4. Biology and Behaviour

Habitat: The finless porpoise is mainly an inshore species, occurring both in salt and fresh water. *N. phocaenoides* appears to prefer murky or turbid conditions and can be found in warm rivers, lakes (if connected to rivers), mangroves, estuaries, deltas, and saltmarshes (Carwardine, 1995). In the Yangtse River, finless porpoises are found up to 1,600 km from the sea and in Japanese waters, they prefer shallow depths (<40m) while proximity to the shore is not so important (Amano et al. 2003). In Chinese waters, water depth and food availability are the main factors limiting inshore distribution. The porpoises prefer to concentrate in confluences of several currents, where boat traffic is light and small-sized fish prey are more abundant. However, porpoises have no apparent preference for water clarity and water velocity. The Balijsiang section of the Yangtze possesses many adequate microhabitats and is proposed as a site to create a protected area (Wei et al. 2003).

Behaviour: Like other porpoises, their behaviour tends to be not as energetic and showy as that of dolphins. They do not ride bow waves, and in some areas appear to be shy of boats. Mothers have been seen carrying calves on the denticulated area on their backs. In the Yangtse River, however, finless porpoises are known to leap from the water and perform "tail stands" (Jefferson et al. 1993).

Schooling: Finless porpoises are generally found as singles, pairs, or in groups of up to 12, although aggregations of up to about 50 have been reported (Jefferson et al. 1993). Recent data suggest, that the basic unit of a finless porpoise school is a mother/calf pair or two adults, and that schools of three or more individuals are aggregations of these units or of solitary individuals. Social structure seems to be underdeveloped in the species, and the mother/calf pair is probably the only stable social unit (Kasuya, 1999).

Reproduction: Reproduction in most areas has not been well studied. Reports indicate that calving in the Yangtse River occurs between April to May; on the Pacific coast of Japan between April and June; in western Kyushu between November–December and March. Animals from Kyushu live 25 years and attain sexual maturity at 4-6 years of age. Gestation lasts 11 months and lactation 7 months. Calving may occur every two years. Longevity was 33 years in the oldest specimen recorded from the South China Sea (Amano, 2009).

Food: In stomach contents investigated in western Kyushu, Japan, fish (Gobiidae and Atherinidae) were the most numerous and most frequently occurring prey in Omura Bay, whereas both cephalopods (Octopodidae, Sepiidae, Sepiolidae/Sepiidae, and Loliginidae) and fish (Clupeidae, Engraulidae, and Sciaenidae) were equally important in Ariake Sound-Tachibana Bay. There were no differences between day or night in stomach contents (Shirakihara et al. 2008). In the Yangtse River, finless porpoises are reported to eat fish and shrimp, and fish, shrimp and squid in the Yellow Sea/Bohai area and off Pakistan. To summarise, finless porpoises are opportunistic feeders utilising various kinds of available food items available in their habitat (Kasuya, 1999).

5. Migration

Available information suggests that finless porpoises are probably found year-round throughout their range, and show various degrees of seasonal movement and density change which are not well documented in most areas (Kasuya, 1999).

Annual migration is reported in the Inland Sea of Japan, where porpoises are faced with drastic seasonal changes in surface water temperature between 6°C (March) and 28°C (September). Their density is lowest (40% of the peak season) in early winter, and starts to increase in January, reaching its peak in April. Finless porpoises migrate to and from the Pacific coast mainly through two passes at the eastern Inland Sea of Japan. From observations in the fluctuation of the proportion of mother-calf pairs, it is suggested that porpoises use the Inland Sea of Japan as a breeding ground. In summer, the animals move out to the Pacific coast (Reyes, 1991 and refs. therein; Kasuya, 1999). In Kanmon Strait, Japan, the presence of finless porpoises was monitored acoustically. On average, one individual was detected every two days. Most of the finless porpoises appeared at night, and the animals presumably swam along the current direction, passing through the strait rather than searching for prey (Akamatsu et al. 2008). In other areas around Japan, they are known to occur year-round, e.g. in Ise and Mikawa Bays with a peak abundance in April-June, or off western Kyushu.

Along the Chinese coast, finless porpoises are present all year, but reported to have some seasonal density changes in Bohai and on the Yellow Sea coast (low in winter and high in summer/autumn). There, they apparently move from shallow to deeper water in winter. While movements between the Yangtze and the ocean have not been confirmed (Kasuya, 1999), the Yangtze population is not sedentary: Akamatsu et al. (2002) documented daily horizontal travel distances in two porpoises of 94.4 km and 90.3 km.

Parsons (1998a) reports on strandings in Hong Kong territorial waters, where finless porpoises were more frequently found in winter. They were more frequently sighted during the winter months, mostly south of Lantau Island. Abundance was negatively correlated with water temperature and positively with salinity. Seasonal distribution appears to be linked with reproductive cycles and hydrography. Diurnal patterns and tidal state also seem to affect abundance (Parsons, 1998b).

In the Indus delta, finless porpoises move to the sea in April and return to the creeks and delta in October, following the movements of prawns (Reyes, 1991 and refs. therein).

6. Threats

Direct catch: According to Reyes (1991 and refs. therein), the species has been hunted in Japan, in particular in the East China Sea, although direct catches were not large and have not been reported since the mid-1980's. No direct catches of small cetaceans existed in China in 1994-95. Incidentally captured small cetaceans did not occupy an important place in the daily life of people in coastal China, and they were discarded in the sea or sold at a very low price in fish markets (Yang et al. 1999). According to Kasuya (1999) there is some controversy about the usefulness of this species for human consumption. People in Ayukawa on the Oshika Peninsula at the northern limit of this species, for instance, do not eat them, believing that they have a strong purgative effect, which was confirmed by a small experiment. However, the species is known to be sold for human consumption in Korea (IWC, 2000), although the source of these animals is unknown. This has been confirmed more recently through molecular monitoring of 'whalemeat' markets in the Republic of (South) Korea between 2003 and 2005 (Baker et al. 2006).

Incidental catch: Finless porpoises are accidentally caught in nets along most of their distributional range although there is no recent estimate of the magnitude of these catches (Amano, 2009). Of a total of 114 specimens collected between 1985-1992 off western and north-eastern Kyushu, Japan, including part of the western Inland Sea of Japan, 84 were killed

incidentally by fisheries. The main threats were bottom gill net (58 deaths), surface gill net (17), trap net (7), trawl net (1) and drifting (ghost) net (1). The operation of such fishing gear is common in other parts of Japan and probably is killing finless porpoises off other coasts, although usually such catches remain unreported (Kasuya, 1999 and refs. therein). In Chinese waters, by-catch rates were estimated at 2,132 in 1994 and 1,484 in 1995, predominantly in trawl-, gill-, and stow nets (Yang et al. 1999).

Concentrations of gill netters/long liners are particularly high in shallow nearshore waters of many distributional areas. E.g. off the Mergui (Myeik) Archipelago of southern Myanmar where at least 150 vessels were operating in the bay where the only sightings of finless porpoises in the area were made (Smith and Tun, 2008). Similarly, in the nearshore waters of Bangladesh a potentially excessive bycatch in gillnet fisheries targeting elasmobranchs was detected (Smith et al. 2008b). And in Yangtze finless porpoises bycatch in unregulated and unselective fishing constitutes a continued threat (Zhao et al. 2008).

Detecting deadly obstacles such as nets in their paths in time is fundamental for cetaceans and other marine animals. However, free-ranging finless porpoises do not use their biosonar constantly. Instead, they inspect the area ahead of them before swimming silently into it. They were found to inspect distances of up to 77 m, and then swim laps without using sonar of less than 20 m (Akamatsu et al. 2005). Although the inspection distance is long enough to ensure a wide safety margin before facing most risks, the low echo-reflection of monofilament gill nets (approx. 3-6 m for harbour porpoises; Kastelein et al. 2000), ensures that the distance they swim quietly is quite sufficient for entanglement. Safety margins could be increased by a change in net material: e.g. nylon twine enriched with barium sulfate can increase echolocation distance by 4.4 m (Koschinski et al. 2006).

Habitat degradation: Habitat degradation through dredging, pollution and noise, vessel strikes (Van Waerebeek et al. 2007) and water development threatens finless porpoises everywhere in their range, and this is especially true for the Yangtze River (Zhao et al. 2008), where they face the same threats as the baiji (*Lipotes vexillifer*). Increasing development requires construction of dams for hydroelectric power and diversion of water for agriculture. Dams prevent movements of dolphins between sections or reduce food availability (Reyes, 1991). In the Tongling River Sever Section, with many zigzag river channels and well-developed sandbars, the construction of dams and bridges has fragmented and isolated the habitat (Zhang et al. 2001). However, these effects are also noticeable at sea: In the Inland Sea of Japan, no individuals were observed in waters between 132°51' and 133°11'E, and between 133°43' and 133°59'E, where sand dredging and other human activities were made responsible for habitat fragmentation (Shirakihara et al. 2007). Habitat degradation by land reclamantion and deforestation of mangrove areas is also a severe problem (Amano, 2009).

Pollution: Pollution is very possibly a threat to the species. For instance, finless porpoises disappeared from Ise Bay, Japan, during a time of high pollution and returned when pollution was reduced (Reyes, 1991 and refs. therein). Blubber samples from the Inland Sea of Japan and Pacific area contained DDT isomers and metabolites at levels up to 10 times the concentration found in striped dolphins, and similar to those found in Baltic ringed seals with stenosis and uterus occlusion (Kasuya, 1999 and refs. therein). Le et al. (1999) report concentrations of butyltin and Minh et al. (1999) of persistent organochlorines in finless porpoises.

Specimens collected in 1990 and 2000/01 from the South China Sea also showed high levels of DDT and PCB concentrations (Ramu et al. 2006). And the same was found in tissue samples from Hong Kong waters, suggesting that PBDEs should be classified as priority

pollutant in Asia. Elevated residues of PCBs and DDTs suggests the species may be at risk (Ramu et al. 2005). Parsons (1999) reports that mercury levels were high enough in some individuals as to pose a health risk and Parsons (1998a) noted that the number of reported small cetacean strandings in Hong Kong has increased dramatically in recent years: possibly due to escalating levels of anthropogenic pollution.

In the Yangtse River, damage to the riverine ecosystem comes from the high level of pollution produced by several industries. In Yangtse river dolphins polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), and polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) were determined in tissue samples. The hazard quotients based on toxic equivalency were determined to be greater than one in all individuals for these contaminants, suggesting that a reduction of environmental contamination may contribute greatly to protecting this highly endangered species (Yang et al. 2008b). Finally, in Eastern Dongting Lake, mercury concentrations in some key tissues were much higher than those reported for other Phocoenidae species (Dong et al. 2006).

7. Remarks

Range states (Reeves et al. 2008) :

Bahrain; Bangladesh; Brunei Darussalam; Cambodia; China; Hong Kong; India; Indonesia; Iran, Islamic Republic of; Iraq; Japan; Korea, Republic of; Kuwait; Malaysia; Myanmar; Pakistan; Philippines; Saudi Arabia; Singapore; Sri Lanka; Taiwan, Province of China; Thailand; United Arab Emirates; Viet Nam.

The species is listed in Appendix II of CITES. *N. phocaeoides* is listed in Appendix II of CMS. The IUCN considers the species as being “Vulnerable” (Reeves et al. 2008). This is justified on the basis of taxonomic uncertainty, range discontinuity, a 70% decline over the past 30 years (qualifying for “Endangered”) for the two population where some abundance data is available (Sea of Japan, Yangtse River and adjacent lakes), and a suspected overall decline of 30% over the last 3 generations.

The species as a whole is in no immediate danger of extinction, but several populations (possibly representing separate taxa) are apparently declining (Jefferson and Hung, 2004). The IWC sub-committee discussed, in particular, the Inland Sea of Japan, where this species has declined in abundance in recent years (IWC, 2000). The causes of this decline are not fully understood. Incidental mortality in various kinds of fisheries is the only documented anthropogenic factor affecting the survival of finless porpoises. However, a number of anthropogenic influences such as chemical pollution, depletion of prey species, loss of habitat due to construction or extraction of sand, ship strikes may all have contributed to the decline. Here, as elsewhere in the species' range, human populations adjacent to the finless porpoise's habitat are increasing in size and becoming more industrialised, so the expectation should be that anthropogenic pressures will continue and intensify. See also Perrin et al. (1996) for recommendations.

8. Sources

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