

# A photographic match of a western gray whale between Sakhalin Island, Russia, and Honshu, Japan: the first link between the feeding ground and a migratory corridor

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## ABSTRACT

Between 2005 and 2007, four female western gray whales were accidentally entrapped and died in Japanese set nets while migrating along the Pacific coast of Honshu, Japan. Photographs of these animals were compared to a photo-identification catalogue of western gray whales from their feeding ground off Sakhalin Island, Russia, to look for matches of individuals between the two areas. Although useable quality photographs were available for only one of the four whales from Japan, a confirmed match was made to a whale photographed off Sakhalin Island. This match represents the first link between the feeding ground and a migratory corridor and highlights the importance of multi-national research collaboration in the formation of range-wide conservation measures to protect this critically endangered population.

KEYWORDS: GRAY WHALE; PHOTO-IDENTIFICATION; ENTRAPMENT; BYCATCH; CONSERVATION; NORTHERN HEMISPHERE; INCIDENTAL CATCHES; FEEDING GROUNDS; MIGRATION; PACIFIC OCEAN

## INTRODUCTION

The western North Pacific population of gray whales (*Eschrichtius robustus*) is critically endangered (Baillie *et al.*, 2004; Weller *et al.*, 2002). The population is estimated to contain about 130 individuals of age one or older, of which only 23 are known to be reproductive females (Cooke *et al.*, 2008; Weller *et al.*, 2008). The population faces a number of potential anthropogenic threats throughout its range, primarily as a result of oil and gas development on its feeding ground off Sakhalin Island (Reeves *et al.*, 2005) and fishing activities in much of its range. These threats include: collisions with ships, exposure to underwater noise (e.g. seismic surveys); modifications to physical habitat; and entrapment or entanglement in fishing gear (Brownell *et al.*, 2007; Reeves *et al.*, 2005; Weller *et al.*, 2002).

Western gray whales migrate to summer feeding grounds off the northeastern coast of Sakhalin Island, Russia, from winter breeding grounds suspected to be in the South China Sea. While the coastal waters of eastern Russia, the Korean Peninsula and Japan have all been recorded as migratory corridors historically, the current migration route(s) of the population is not well understood (e.g. see review in Weller *et al.*, 2002). Although western gray whales were hunted centuries ago by net fishermen off the eastern shores of Japan (Omura, 1984), present-day sightings in that country are uncommon (Kato *et al.*, 2007). Of the 17 records since 1955 that exist in Japan, 76% ( $n=13$ ) were reported from the Pacific (east) coast while 24% ( $n=4$ ) came from the Sea of Japan (west) coast. Eleven (65%) of these records are from the period 1990 to 2007, with none reported between 1970 and 1982, suggesting that occurrence patterns, sighting effort or both have recently increased. All occurrences took place between January and July with the highest number of records ( $n=11$ ) reported between March and May. Six (35%)

of the 17 observations were reported as ‘entanglements’ by Kato *et al.* (2007). The importance of these records is two-fold in that they: (1) provide recent evidence for use of the eastern and western shores of Japan as migration corridors for at least some whales; and (2) identify and highlight the problem of interactions with coastal fishing gear during migration.

Between 2005 and 2007, four female western gray whales were unintentionally entrapped and died in Japanese set nets (i.e. trap nets) while migrating off the Pacific coast of Honshu, Japan (Kato *et al.*, 2006; Kato *et al.*, 2007; 2005). These four animals included: (1) a 7.8m female found in the southeastern part of Tokyo Bay on 11 May 2005; (2) a large 12.7m female and a smaller 7.7m female (considered a mother-calf pair) found about 340km northeast of Tokyo (near Enoshima, Onagawa Peninsula, Miyagi Prefecture) on 15 July 2005; and (3) a 9.1m female found approximately 430km northeast of Tokyo (in Yoshihama Bay, Ofunato City, Iwate Prefecture) on 18 January 2007 (Fig. 1). Photographs of these entrapped animals were compared to a photo-identification catalogue of western gray whales (Weller *et al.*, 2006; 1999) from their feeding ground in the Okhotsk Sea off Sakhalin Island, Russia, to look for matches of individuals between the two areas. The results of this comparison are presented herein.

## METHODS AND RESULTS

Since 1995, a collaborative Russia-US photo-identification study of western gray whales on their summer feeding ground off the northeastern coast of Sakhalin Island, Russia, has been ongoing (Weller *et al.*, 2008; Weller *et al.*, 1999). Through 2006, 158 individually identified whales have been catalogued, including 59 whales first identified as calves

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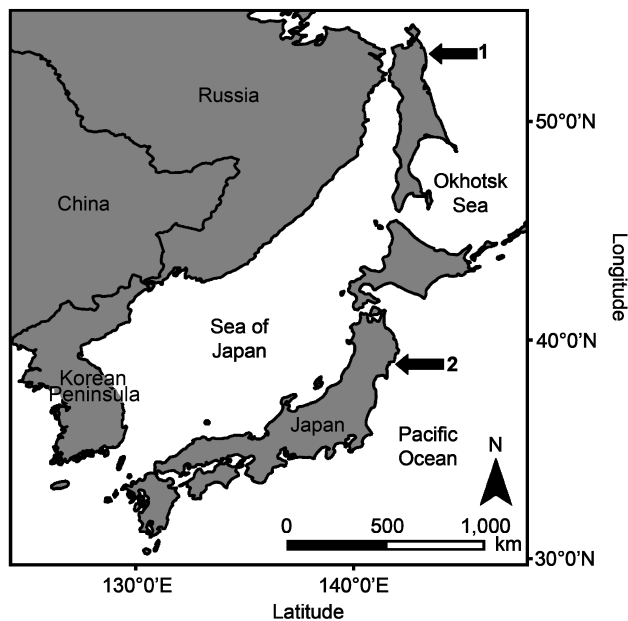


Fig. 1. Map of western North Pacific region showing where western gray whale no. 151 was sighted on the feeding ground off Sakhalin Island, Russia (52°50'N, 143°20'E) on 23 July 2006 (Arrow 1) and found in a trap net off Honshu, Japan (39°08'N, 141°54'E) on 18 January 2007 (Arrow 2).

(Weller *et al.*, 2008). This catalogue of known individuals served as the basis for comparison to images collected from the whales entrapped off Japan. Upon initial inspection of the available photographs of the four whales taken in set nets between 2005 and 2007, it was found that the only images of suitable quality for comparison to the Sakhalin Island catalogue were those of the Yoshihama Bay whale. Left and right dorsal flank images of this whale were examined and found to match whale no. 151 from the Russia-US catalogue.

Whale no. 151 was first sighted off northeastern Sakhalin Island on 23 July 2006. It was sighted again two days later, when a biopsy sample was taken. The final sighting of whale no. 151 occurred on 24 August 2006. During each encounter, this whale was observed in close association with a known reproductive female who was last observed to have a calf in 2002. Based on this relationship and the size difference of the two animals, these whales were recorded as a mother-calf pair, one of four such pairs observed during the 2006 field season (Weller *et al.*, 2008). This mother-calf designation was subsequently confirmed by genetic analysis (A.R. Lang, pers. comm.). Whale no. 151 would have been weaned on the Sakhalin feeding ground in the late summer or early autumn of 2006 before migrating southward along the eastern coast of Japan. Based on the mean birth date of mid-January (Rice, 1983; Rice and Wolman, 1971) and southbound migratory timing (Rugh *et al.*, 2001) reported for eastern gray whales, whale no. 151 was approximately one year old and migrating south when entrapped in a set net off Japan in January 2007.

## DISCUSSION

The photographic match reported here is the first to link the feeding ground of western gray whales to a location more than 1,500km to the south within a migratory corridor. This finding, when combined with other data on gray whales off Japan (see Kato *et al.*, 2007), adds useful contemporary information on when and where gray whales might be found during their migration as well as the pathways being used.

Omura (1984) hypothesised that gray whales occurring off the Pacific coast of Japan could comprise a distinct stock or substock of the western population and Park (2001) went on to suggest that this supposed substock might summer off the coast of southern Kamchatka and migrate along the Kuril Islands. The evidence presented herein does not support the reasoning offered by Omura (1984) and Park (2001). In a broader context, this match highlights the importance of obtaining photographs (and genetic samples) from western gray whales outside of the Sakhalin Island feeding ground whenever possible and emphasises how multi-national research collaboration can benefit range-wide conservation measures designed to best protect this critically endangered population.

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