

On the risks of salmon fishing trap-nets to gray whales summering off Sakhalin Island, Russia

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It is well established that gray whales (*Eschrichtius robustus*) are vulnerable to entanglement in near shore net and pot fisheries. Heyning and Lewis (1990) reviewed gray whale entanglements between 1981 and 1989 in swordfish and shark driftnet fisheries and inshore set net fisheries off California. Most gray whale entanglements were attributable to inshore set nets and consisted predominantly of whales three years old or less. Baird *et al.* (2002) found that gray whale entanglements off the coast of British Columbia, Canada, occurred in salmon drift gillnet, salmon seine, long line and trap fisheries. One record was also reported of a gray whale entangled in a herring net pen.

In the western North Pacific there is substantial concern about interactions between gray whales and coastal fisheries. Between 2005 and 2007, four female gray whales were unintentionally entrapped and died in set nets (i.e. trap-nets) while migrating off the Pacific coast of Honshu, Japan (Kato *et al.*, 2013). One of these whales, entrapped off Japan in January 2007, was photographed earlier as a calf (with its mother) off Sakhalin Island, Russia, during July-August 2006 (Weller *et al.*, 2008).

During the summer of 2013, salmon trap-nets were observed operating in coastal waters on the western gray whale feeding ground off northeastern Sakhalin Island, Russia (Fig. 1). This represents the first known deployment of such nets in this feeding area (at least since 1995 when annual research on gray whales in the region began). The placement of these nets directly overlapped with a core portion of the feeding ground and within critical habitat for mothers with calves (Weller *et al.*, 1999; Gailey *et al.*, 2011; Sychenko 2011). Trap-net fisheries for salmon are passive nets designed to intercept migratory salmon and guide the fish into a holding pen. These trap-nets are set with a “wing-net” perpendicular to shore and leading to a trap or pen generally within 1 km of shore (see description in Barlow *et al.*, 2004).

The two salmon trap-nets set in coastal waters used by gray whales were approximately 1.5 km long and set perpendicular to the coastline (Fig. 2). The placement of this gear is of particular concern given that: (1) most whales feeding in the area are distributed within 1.5 km of shore (Gailey *et al.* 2011), and (2) mother-calf pairs are most often found < 1 km from shore (Sychenko 2011). In 2013, observations were made of gray whales, including mother-calf pairs, within 100 m of the salmon nets. On 22 August a whale was photographed with a rope entanglement that was cutting into its caudal peduncle (Fig. 3). This entangled whale (Russia-U.S. catalog no. 35) was first identified off Sakhalin in 1995 and is one of the individuals most frequently photographed by the Russia-U.S. research team between 1995 and 2013. He is a father of multiple calves sampled off Sakhalin (Lang *et al.* 2010), and in 2004 was photo-documented in the eastern North Pacific off Vancouver Island, Canada (Weller *et al.* 2012). In 2013, whale no. 35 was sighted on 9 and 14 July and 22 and 24 August. His entanglement was first observed from photographs taken on 22 August.

Examination of all photographs of this whale from 2013 was inconclusive with respect to determining if the observed entanglement existed prior to or after 22 August. That being said, the wound observed on the peduncle appeared to be relatively fresh (i.e. the presence of apparent redness and a lack of cyamids), suggesting that the entanglement happened on the Sakhalin feeding ground in 2013 and relatively close in time to when the entanglement was first documented on 22 August. Additionally, the color of the entangling rope (and related blue thread) appears similar to the gear used on the nearby salmon trap-nets (Fig. 2). This observation suggests the possibility that the entanglement resulted from an interaction with the nearby salmon fishery.

When this entangled whale was first observed, details were promptly provided to the IUCN Western Gray Whale Advisory Panel and IWC. After considerable deliberation, it was concluded that immediate disentanglement efforts were not realistic due to logistical difficulties, deteriorating late season weather conditions off Sakhalin and a low likelihood of finding the entangled whale.

While a multi-year (1995–2005) study of 150 individuals identified on the Sakhalin feeding ground found that a minimum of 20.0% ($n = 30$) had detectable anthropogenic scarring, with 18.7% ($n = 28$) determined to have been previously entangled in fishing gear (Bradford *et al.*, 2009), the entanglement reported here is the first to be observed between 1995 and 2013. In the absence of additional photographs, the fate of this whale is presently unknown and the observed entanglement is considered to be potentially life threatening. The incident reported here represents the first documented entanglement of a gray whale off Sakhalin Island since the inception of our research program in 1995. The coincidence of this event coinciding with the introduction of salmon fishing net-traps in 2013 is cause for concern.

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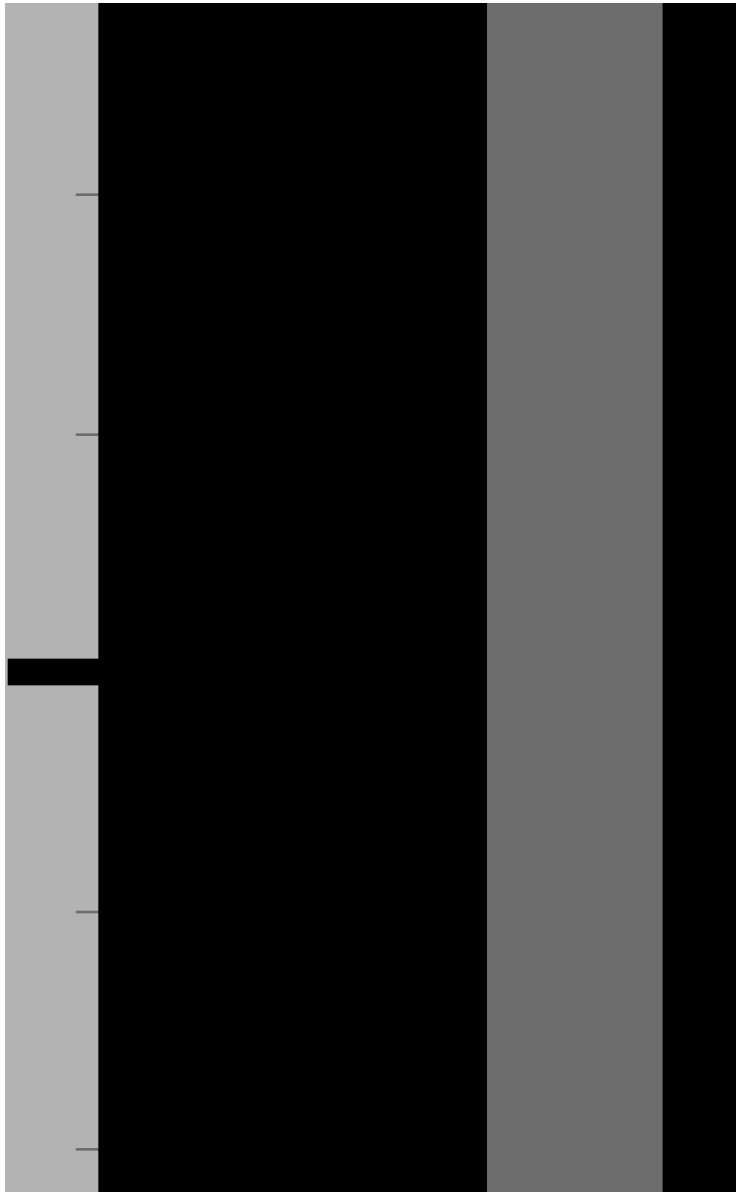


Figure 1. Gray whale in 2013 denoted in red. Salmon trap-net locations denoted in yellow.



Figure 2. Salmon fishing gear deployed on the gray whale feeding ground off Sakhalin Island, Russia, in 2013.



Figure 3. Gray whale photographed off Sakhalin Island on 22 August 2013 with rope entanglement.