Movements of western gray whales from the Okhotsk Sea to the eastern North Pacific: evidence from satellite tagging, photo-identification and genetic studies

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On 4 October 2010 a team of scientists from Russia and the United States satellite tagged a western gray whale off the east coast of Sakhalin Island, Russia[1]. This whale has now been successfully tracked for over 4 months traveling from the Okhotsk Sea to the eastern North Pacific and is currently off the west coast of the U.S.[2,3] This tagging effort was conducted collaboratively by Oregon State University, A.N. Severtsov Institute for Problems in Ecology and Evolution of the Russian Academy of Sciences, and the University of Washington with sponsorship from Exxon Neftegas Ltd. and Sakhalin Energy Investment Company through the International Whaling Commission (IWC) and the International Union for Conservation of Nature (IUCN).

This whale, a 14-year old male nicknamed "Flex" by researchers, was first photo-identified on the Sakhalin feeding ground as a calf in 1997 and has subsequently been observed in multiple years off Sakhalin during the summer feeding season. As part of a broader effort to understand this whale's movements, photo-identification images of him collected by the Russia-U.S. joint research program on western gray whales were sent to Cascadia Research Collective (CRC) for comparison to a catalog of over 1000 eastern gray whales identified by CRC and its collaborators working in U.S. and Canadian waters from California to Alaska. This catalog focuses on several hundred gray whales (termed the "Pacific Coast Feeding Group") that feed during summer and fall in coastal waters between northern California and the Gulf of Alaska but also includes a small number of gray whales identified in the spring during their northward migration to the Bering and Chukchi Seas.

The photo comparison of Flex resulted in a confirmed match between Sakhalin Island and Vancouver Island. He was sighted April 2008 in the Barkley Sound area off the west

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[1] http://www.iucn.org/wgwap/?6614/International-scientists-track-endangered-whale-to-discover-breeding-grounds

[2] http://mmi.oregonstate.edu/Sakhalin2010

[3] http://www.sevin.ru/menues1/index_rus.html?../ExpeditionsRAS/Gray_whale/Gray_whale.html

side of Vancouver Island (photos by W. Szaniszlo) and then during the summer of 2008 off Sakhalin Island. This photographic match, in combination with the telemetry data, provides the first evidence that links the Sakhalin feeding ground of western gray whales to locations in the eastern North Pacific. An earlier photo match had been made of a female western gray whale first identified off Sakhalin as a calf in summer 2006 and then found fatally entangled in a set net off the Pacific coast of Japan in January 2007, more than 1,500 km south of the Sakhalin feeding area (Weller *et al*., 2008).

A comparison of the entire Russia-U.S. and CRC photo catalogs is now underway to look for additional matches and will likely take 1-2 months to complete. The results of this comparison will be presented at the next annual meeting of the IWC Scientific Committee in June 2011.

Additional findings relevant to the tagging and photo-identification results provided above come from a genetics study conducted as part of the Russia-U.S. joint research program on western gray whales. This study was designed to evaluate the population structure of eastern vs. western gray whales in the North Pacific (Lang, 2010). Here, genetic samples of western gray whales collected between 1995-2007 off Sakhalin Island were compared to samples of eastern gray whales collected between 1990 and 2006 off the west coast of North America and in northeastern Russia (Chukotka region). The results of this study found that two individuals from the western population, sampled in 1998 and 2004, matched the microsatellite genotypes, mtDNA haplotypes, and sexes of two whales sampled off southern California in 1995. Based on these findings, Lang (2010) stated the following:

"While previous studies have supported genetic differentiation between eastern and western populations of gray whales, the relatively low level of genetic differences observed at nuclear markers suggests that some dispersal between the two populations could be occurring. The finding of two whales apparently sampled on both sides of the North Pacific, although subject to numerous caveats, provides support for that possibility."

As part of a new study to examine gray whale population structure in the eastern North Pacific, Lang and colleagues have processed additional gray whale samples from Russia (the Chukotka region), Canada, Alaska and the northwestern United States. Results of this research will also be reported to the IWC Scientific Committee in June 2011.

Finally, an expanded genetic comparison of the entire Russia-U.S. western gray whale genetic data set with the aforementioned data set for eastern gray whales is now underway to look for additional inter-area matches. This work will likely take 3-4 months to complete and the results of such will also be presented at the meeting of the IWC Scientific Committee in June 2011.

Lang, A.R. 2010. The population genetics of gray whales (*Eschrichtius robustus*) in the North Pacific. Ph.D. thesis, University of California San Diego, 202 pp.

Weller, D.W., Bradford, A.L., Kato, H., Bando, T., Ohtani, S., Burdin, A.M. and Brownell, R.L., Jr. 2008. Photographic match of a western gray whale between Sakhalin Island, Russia, and Honshu, Japan: First link between feeding ground and migratory corridor. Journal of Cetacean Research and Management, 10(1):89-91.