CASPIAN SEAL ECOLOGY AND CONSERVATION

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The Caspian seal (*Pusa caspica*) is a small-bodied, ice-breeding phocid, endemic to the landlocked Caspian Sea in Central Asia. The species is listed as 'Endangered' by the International Union for the Conservation of Nature (IUCN), having declined by around 90% from a population exceeding 1 million individuals at the start of the 20th century, primarily due to unsustainable hunting. It is now subject to a range of threats including high levels of mortality from fishing by-catch and other anthropogenic sources, and habitat loss and disturbance caused by industrial and urban development. Little was known about its' movement and dive patterns, until a group of scientists from Estonia, Kazakhstan, Russia and the UK deployed 75 Argos satellite tags on Caspian seals from 2009 to 2012. Their results, originally published in the Marine Ecology Progress Series, "Individual variation in seasonal movements and foraging strategies of a land-locked, ice-breeding pinniped," provide valuable data to support conservation efforts in the region, as this adaptation of their article points out.

Observing seal movements by satellite

One of the most effective ways to study movement patterns of marine mammals is through satellite telemetry, which has been used to address questions relating to resource selection, foraging strategy, dispersal, migration, home range, survival, population abundance and distribution (Folkow et al. 2004, Lake et al. 2006, Freitas et al. 2008, Dietz et al. 2013).

In our article, "Individual variation in seasonal movements and foraging strategies of a land-locked, ice-breeding pinniped," we present the first extensive study of Caspian seal movement, based on deployments of Argos satellite tags on 75 individuals, spanning 4 consecutive years (2009 to 2012). We assess seasonal dispersal at the population level and individual variation, describe basic movement parameters and dive capabilities of Caspian seals, and test whether there is variation in foraging strategy among individuals.

The results are relevant for identifying important habitat areas and the design of conservation strategies for the species.

Methods

Caspian seals were captured at 2 sites in Kazakhstan - on Kendirli sand bank in October to November 2009, 2010 and 2012, and in Komsomolets Bay in April 2011. Seals were caught using a 'rush-and-grab' approach with hoop nets, or tangle nets deployed in shallow waters around haul-out groups from rigid inflatable boats. Argos satellite tags were attached to the seal's head fur with epoxy glue (Fedak et al. 1983, Mazzaro & Dunn 2009).

Two types of satellite tags were used in this study: (1) 42 Smart Position-Only Tags (SPOT5, Wildlife Computers), which return location and wet/dry data, were deployed from 2009 to 2012; (2) 33 SPLASH Mk10 tags (Wildlife Computers), which provide position and information on diving and haul-out behaviour, were deployed from 2010 to 2012.

Key findings

The historic observational view of Caspian seal movements was of a homogeneous migration with seals dispersing from northern moulting sites to the mid and southern Caspian via the east and west coasts from late April, followed by a return to the north Caspian from September (Badamshin 1969). Our data support the broad-scale seasonal movements reported in older literature, with a southerly shift in the median latitude of locations from May to September, coincident with increasing Sea Surface Temperatue (SST) and Net Primary Productivity (NPP), and a return north from October onwards (Fig. 1) as SST and NPP decline.

However, the Argos telemetry data revealed a high degree of individual variation in the timing, destination, and consistency of movement patterns, indicating that migratory movements are much more heterogeneous than previously thought.

Movement during the winter was similarly heterogeneous. In contrast to earlier assumptions, rather than staying in the ice pack for the whole season, animals made frequent return trips out of the ice, presumably to forage, with some ranging as far south as Kendirli. The longest track recorded over 11.5 months was more than 14,000 km and the deepest dives exceeded 200m and 20 minutes duration. An accompanying video to the paper can found here: https://www.youtube.com/watch?v=aFDIg8ykRBQ.

Credit: Simon Goodman, University of Leeds.

▲ Figure 1: A Caspian seal about to be released after tagging with a Wildlife Computers SPOT tag.

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From left to right, Kobey Karamendin, Mart Jussi, Lilia Dmitrieva, Simon Goodman, Timur Baimukanov, Yermukhammet Kassymbekov.

Caspian seal conservation

A Caspian Seal Conservation Action Plan developed by the Caspian Environment Programme was accepted by Caspian governments in 2007, but many of its key recommendations remain to be introduced. There are still very high rates of human-caused mortality, particularly from by-catch in illegal fishing gear. While plans for dedicated protected areas for seals have been discussed, none are yet fully implemented, and intensive human activity overlaps with many areas of crucial seal habitat. The most vital conservation steps needed for Caspian seals are therefore to reduce by-catch and establish protected areas encompassing important breeding, moulting, resting and foraging locations, and the migration routes which connect them.

Crucial data for conservation

Intensive human activity throughout the Caspian, including fishing, oil and gas extraction, shipping and coastal development overlap with the seal movements identified here.

A seal 'migration corridor' along the Kazakh coast connecting the north-east and mid-Caspian overlaps with intensive shipping and fishing activity. Areas used by seals along the western coast also overlap with commercial fishing grounds. The north Caspian, which is an important year round habitat used for moulting, transit, foraging, resting and breeding, is an area of intensive oil and gas development and also has high levels of sturgeon poaching activity which generates substantial bycatch of seals (Dmitrieva et al. 2013). In view of these environmental pressures, Argos telemetry data can help assess impacts from human activities and contribute to conservation measures such as defining protected areas which encompass critical habitats for Caspian seals.

Read the original article: Dmitrieva L, Jüssi M, Jüssi I, Kasymbekov Y and others (2016). Individual variation in seasonal movements and foraging strategies of a land-locked, ice-breeding pinniped. Mar Ecol Prog Ser 554:241-256 http://www.int-res.com/abstracts/meps/v554/p241-256/

Learn more about Caspian seals: Goodman, S. & Dmitrieva, L. 2016. Pusa caspica. The IUCN Red List of Threatened Species 2016: e.T41669A45230700. http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T41669A45230700.en. http://www.iucnredlist.org/details/41669/0

This work was conducted by an international team of European, Russian and Kazakh researchers, (Caspian International Seal Survey (CISS)), who have been interested in Caspian seal ecology and conservation since 2004. The lead author of the paper is Dr. Lilia Dmitrieva, a post-doctoral research fellow in marine mammal ecology at the University of Leeds, UK, working with the programme leader Dr. Simon Goodman. Dr. Goodman's research spans marine mammal ecology, conservation biology, and population genetics, and he is a member of IUCN Pinniped Specialist Group. The team would like to thank Agip KCO and NCOC for financial support under the North Caspian Sea Production Sharing Agreement (NCSPSA) Venture, which made the work possible.

For more information about Caspian seal research see: www.goodmanlab.org and http://ihe.kz/en/

CASPIAN SEAL CONSERVATION NETWORK

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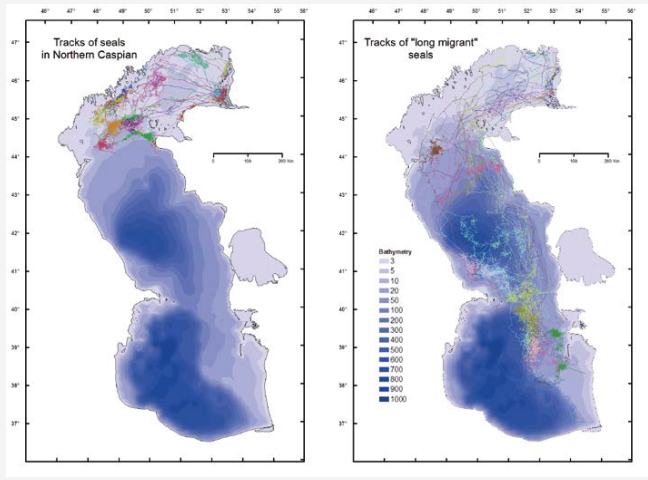

▲ Figure 2: Example tracks for Caspian seals tagged in April 2011 showing some of the variation in migration patterns observed. Left seals which made long distance movements into the mid and southern Caspian, right seals which remained in the northern Caspian for the whole deployment period April 2011-April 2012.

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