The Caspian seal (Pusa caspica) is a small-bodied, ice-breeding phocid, endemic to the landlocked Caspian Sea in Central Asia. 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. It 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 (Fallow 2004, Lake et al. 2006, Fritts 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, operating for 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 — at Kendiri seal beach in October to November 2009, 2010 and 2012, and in Kavkazskiyskiy Bay in April 2011. Seals were caught using a ‘push-and-grab’ approach with hoop nets, or large nets deployed in shallow waters around haul-out groups from rigid inflatable boats. Argos satellite tags were attached to the seals’ heads for a 4- to 6-week period (Fritts et al. 2006, Mazzaro & Dunn 2009).

Two types of satellite tags were used in this study: (1) 42 Smart Position-Only Tags (SPOTs, Wildlife Computers), which return location and velocity data, were deployed from 2009 to 2012; (2) 33 SPOT-H4k 240 day 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 (Babadosov 1983). Our data support the broad-scale seasonal movements reported in earlier literature, with a southward shift in the median latitude of locations from May to September, coincident with increasing Sea Surface Temperature (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 Kendiri. 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 be found here: https://www.youtube.com/watch?v=aFDIg8ykRBQ.

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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 intense 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.