

## Unexpected timing of mature female sturgeon migration in the Danube River

The Critically Endangered Beluga sturgeon *Huso huso* persists in diminished numbers in the Black Sea, the Sea of Azov, the Caspian Sea and their tributaries, along which adult sturgeons migrate for reproduction after spending years at sea. In July 2023, on the Chilia branch of the Danube River near Ismail, Ukrainian law enforcement intercepted poachers capturing a c. 110 kg mature female carrying 14 kg of eggs. The extraordinary aspect of this news is in its timing, as adult sturgeons typically enter the Danube River for reproduction in the autumn or early spring.

The observed gonadosomatic index (GSI) of 12.7 corresponds to stage 3 or 4 of oocyte maturation, just before egg deposition. However, to exclude the possibility the eggs were resorbing as a result of failed reproduction, an analysis of the eggs would have been necessary. Unfortunately, this analysis was not possible because the caviar was seized. Capturing an adult female with such a substantial number of eggs in the middle of summer is rare. The previous known case dates from August 2004 when a female was captured in the Danube River with a GSI of 11.2. Historical data indicate an estimated GSI of 3.69 in July 1967 and 2.42 in July 1968, based on 24 and 18.5 t of females, respectively.

The fishing technique employed excludes the possibility that the animal was migrating downstream, but it is challenging to determine whether this female was very late for the spring migration of 2023 or very early for the autumn migration of 2024. The critical factor, however, is the degree of variability in the timing of migration. Although shifts in the phenology of reproduction and the relationship of this with climate change have been extensively studied in terrestrial organisms, these matters have received less research attention in aquatic organisms. Such observations could offer a monitoring tool for understanding the impacts of global warming on sturgeon populations. Looking ahead, the consequences of increased water temperatures could extend across the entire life cycle, influencing the growth rate and potentially leading to an earlier reproductive age, as hypothesized for other anadromous species such as salmon (Rinaldo et al., 2023, *Journal of Fish Biology*). Recognizing the importance of these dynamics, we recommend establishment of monitoring to evaluate the extent of apparent out-of-season sturgeon migrations and to assess the potential effects of climate change on sturgeon reproduction.

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## Saving the Endangered daisy tree *Scalesia cordata* from the brink of extinction on the Galapagos Islands

The giant daisy tree *Scalesia cordata* is one of 15 species of the endemic Galapagos genus *Scalesia*. It is restricted to the humid zone of the Sierra Negra and Cerro Azul volcanos on southern Isabela, where it used to form a dense forest, home to endemic Darwin's finches and flycatchers. This forest covered an area of c. 17,300 ha in the 1900s but today only c. 0.1% of the original distribution remains, mainly as a result of land-use change, fires and, recently, invasive plant species, especially guava *Psidium guajava*, blackberry *Rubus niveus* and Siam weed *Chromolaena odorata*. These invasive plants form a thick and dark understorey that prevents germination of the small and light-dependent *S. cordata* seeds. This interruption of natural regeneration has caused a marked decline of *S. cordata*. Of 1,075 trees recorded in 2002 only 17 remained in 2019, and the Charles Darwin Foundation and the Galapagos National Park Directorate estimated then that there were only c. 300 individual trees left in the wild. *Scalesia cordata* has been categorized as Endangered on the IUCN Red List since 1998 but the assessment is outdated. The 2019 data indicates that *S. cordata* should be categorized as Critically Endangered.

In 2021, with funding from the Keidanren Nature Conservation Fund (Japan) and Fondation Franklinia (Switzerland), we embarked on a mission to save the giant daisy tree from extinction. From drone imagery of > 500 ha and several field trips, we have so far identified and mapped 980 *S. cordata* trees and the invasive plants threatening them. Control of invasive plants is being carried out, and this has facilitated the natural regeneration of a total of c. 150 *S. cordata* seedlings at some of the study sites. We have also managed to propagate c. 800 *S. cordata* seedlings in the Galapagos National Park Directorate greenhouse, and these have been planted at several study sites. Two years of intense conservation efforts resulted in the recording of a total of almost 2,000 *S. cordata* trees on southern Isabela in October 2023.

However, the survival of *S. cordata* is not yet secure. It has a low number of fertile seeds when self-pollinated, despite being a short-lived tree (10–15 years). We therefore have to continue restoration efforts until self-sustaining *S. cordata* populations are established.

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