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What the Taimen Said: An Urgent Call for Conservation of the World's Largest Salmonids

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Photo credit: Andrew Burr.

"What did the taimen say to you?" asked Khandsuren Jigmen, one evening this summer at a riverside camp high in the Mongolia headwaters of the Yenisei basin. It was day three of a 2-week expedition into one of the world's last, best taimen strongholds. At breakfast each morning, Khandsuren, our camp manager, offered prayers for our success. For her and other local Mongolians, taimen are children of the river god, a link between humans and the spirit of the land and water. And that day, the incantations had been answered. Out on the river in the afternoon, a meter-long fish had smashed a surface fly I skated slowly across a glassy run. The taimen's leap cleared the water in the process and then it hooked itself as it crashed back into the river. After several strong runs, our team netted the fish, measured its size, and collected a quick scale and fin sample. On release, this giant made a powerful tail slap back into the current and was gone. But its fight and then its yielding to our grasp did leave a message—about something fierce, wild, and completely vulnerable.

The Siberian Taimen *Hucho taimen* of Mongolia are the most common and widely distributed of the five species of

"Taimen," a unique group of imperiled freshwater apex predators and the largest salmonids in the world. The Siberian Taimen range extends from the Ural Mountains in the west to the Sea of Okhotsk in the east, covering vast swathes of Kazakhstan, Russia, Mongolia, and China (Figure 1). They are also the biggest of the big, haunting fly anglers' dreams and gracing magazine covers by growing nearly 2m long (Figure 2).

Taimen of the Danube River system, more commonly called Huchen *Hucho hucho* or Danube salmon, also achieve exceptional size. The species has been extirpated across much of its former range but is still found across Eastern Europe (Figure 1), and where they are locally abundant, they remain popular among anglers.

Meanwhile, two other *Hucho* species are extremely rare. A few isolated populations of Sichuan Taimen *H. bleekeri* persist in China's Yangtze River headwaters (Song 2012). And very little is known about the Korean Taimen *H. ishikawae*, native to the largely inaccessible mountain borderlands of North Korea and China.



Figure 1. The distribution of *Hucho* spp. and *Parahucho* spp. in Europe and Asia and their International Union for Conservation of Nature status (Huchen: EN, endangered; Siberian Taimen: VU, vulnerable; Sakhalin Taimen and Sichuan Taimen: CR, critically endangered; Korean Taimen: DD, data deficient).

Sakhalin Taimen *Parahucho perryi* native to Russia's Sakhalin Island, the east slope of the Sikhote Alin range, and Japan's Hokkaido Island (Fukushima et al. 2011) are also known as *Ito* in Japan; although they once grouped with genus *Hucho*, more recent phylogenetic analyses place them as the sole member of the genus *Parahucho* (e.g., Shed'ko et al. 1996; Crete-Lafreniere et al. 2012).

Sakhalin Taimen are the only one of these species known to spend part of its life history in the ocean, migrating regularly between rivers, brackish waters, and coastal areas (Figure 3).

But the other species are also vigorous migrants within freshwater systems. Siberian Taimen, for example, can move over 100km annually between spawning, feeding, and overwintering areas, all entirely within freshwater (e.g., Gilroy et al. 2010; Kaus et al. 2016).

In addition to their shared wanderlust, the species have many other similarities, including slow growth, late age at maturity, large size, and a life fueled primarily by piscivory.

And it's this predatory lifestyle that makes Huchen and taimen the stuff of legends. By the time they are just 5–7 cm long, the diet of juvenile Huchen and taimen is mainly fish (Holčík et al. 1988). Voracious and aggressive, they are nicknamed, "river wolves," because they sometimes hunt in packs. Capable of eating fish measuring nearly half their body length,

Siberian Taimen eventually grow large enough to swallow adult salmon whole (Kul'bachnyi and Kul'bachnaya 2018). A Russian guide I worked with described once catching and killing a large taimen (catch-and-release for taimen is relatively new in the Russian far east) and in its belly was a female Chum Salmon *Oncorhynchus keta* still fresh enough from the ocean that they ate the salmon caviar along with taimen steaks.



Figure 2. Releasing a 46-kg Siberian Taimen from the Tugur River, Russia. Photo credit: Guido Rahr.



Figure 3. A spawning pair of Sakhalin Taimen, also known as Ito, from the Sarufutsu River, Hokkaido, Japan. Photo credit: Satoshi Adachi.



Figure 4. Scientists found this 1.5-m Siberian Taimen in northern Mongolia that had choked to death attempting to eat a 0.9-m taimen. Photo credit: Zeb Hogan.

Their appetites sometimes get the better of them, though. Occasionally, they are found choked to death with their last attempted meal lodged firmly in their gape (Figure 4). And though fish are their main prey, lemmings, muskrats, ducks, frogs, and snakes are all on the list of opportunistic snacks found in the stomachs of Huchen and taimen (Holčík et al. 1988). There is even a report of a taimen that died attempting to eat a small dog (Kvet 1961, cited in Holčík et al. 1988).

Huchen and taimen appetites have also found their way into folklore. Ainu stories from Japan's northern island of Hokkaido speak of monstrous taimen (known as *chirai* in Ainu) large and voracious enough to eat deer, bear, and humans whole. In Mongolia, legend tells of an especially



Figure 5. Mongolia fly fishing guides and anglers work together to collect biological data from Siberian Taimen as part of a conservation-focused angling program. Photo credit: Andrew Burr.

harsh winter when starving herdsman discovered a giant taimen trapped in river ice. Relieved to find food, the herdsman chopped off pieces of its flesh. They survived the winter, but when the river ice melted in spring, the giant taimen came onto the land, tracked them down, and ate them all.

Though legends speak to the ferocity of these fish, their populations are increasingly fragile. Large body sizes, long life spans, late maturity, and long-distance movements make them especially vulnerable to the threats of poaching, habitat loss and fragmentation, and climate change. As apex predators, they also rely on healthy prey populations and impacts to the prey base also impact their populations. Population declines for freshwater megafish, a group including Huchen and taimen, are among the highest of any vertebrate group on Earth (>90% globally over the last 50 years; He et al. 2019). They face an uncertain future throughout their range and increased conservation efforts are urgently needed to save these disappearing giants.

A central challenge to protecting Huchen and taimen is raising awareness of their plight, which, like much of the freshwater biodiversity crisis, has received less attention than similar marine and terrestrial conservation issues (Monroe et al. 2009; Edmondstone et al. 2022). An important milestone was reached in 2012 with the completion of the first range-wide status assessments of all the species in the genera *Hucho* and *Parahucho*. These fish were added to the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, following the conclusion that all species were either threatened or data deficient (Hogan and Jensen 2013; Rand 2013).

An updated assessment of the genera *Hucho* and *Parahucho* will be completed in 2023 and though it is unlikely that species-level status has improved, some conservation bright spots are noteworthy. A growing number of freshwater protected areas in Japan, Russia, and Mongolia safeguard critical taimen habitat. Now in their third decade, conservation-oriented angling programs are also proving to be effective long-term approaches for protecting key populations, providing economic incentives to local communities for taimen stewardship, and funding education and antipoaching enforcement (e.g., Granek et al. 2008; Jensen et al. 2009; Figure 5).

Conservation actions benefiting Huchen and taimen are likely to provide broader ecosystem benefits beyond these

species themselves. Their large range size and complex habitat requirements make them effective “umbrella species,” whose conservation is expected to confer protection to many naturally co-occurring species (Kalinkat et al. 2017). These remarkable fish already have a loyal following in myriad cultures across Eurasia. By making them even more visible in the public eye, they can also serve as charismatic flagship species to promote freshwater conservation (Bailey 2012). For example, Sakhalin Taimen were recently nominated to serve as a global flagship species to raise awareness of freshwater biodiversity conservation as part of an IUCN initiative led by the Indianapolis Zoo Global Center for Species Survival and Shoal (shoalconservation.org) to showcase 50 freshwater species at risk around the world (Edmondstone et al. 2022).

For taimen to fulfill their role as Mongolian demigods and other cultural touchstones that powerfully bond humans to nature, their message needs to be heard broadly. Through community involvement, education, and science-based strategies to identify and protect remaining Huchen and taimen strongholds, we have an important opportunity to restore these critically endangered freshwater giants to health, and to make a lasting contribution to Eurasia’s remarkable freshwater ecosystems.

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