

【Ayu and the Nagara River】

The Nagara River flows north-to-south through the heart of Gifu Prefecture. From its source near Mt. Dainichigatake to its mouth in Ise Bay, the Nagara spans 166 kilometers. Though it runs directly through Gifu City, which is populated by 400,000 people, the Nagara is considered one of Japan's three cleanest rivers. It provides drinking and irrigation water to numerous communities and supports fishing industries vital to the prefectural economy. The excellent water quality is also why the river can sustain rare species like the bagrid catfish and the Japanese giant salamander, creatures whose habitats are rapidly disappearing. The Nagara also offers unrestricted access to the ocean: fish runs have been installed in the barrage dam near the river's mouth, allowing aquatic life to pass through freely. This is crucial for migratory species that divide their life cycles between the river and the ocean. On the Nagara, these include the red-spotted masu salmon, the fourspine sculpin, the Japanese mitten crab, and the *ayu* (sweetfish).

The ayu (*Plecoglossus altivelis*) is a silver fish with comb-like teeth and sail-like dorsal fins. Adults reach about 30 centimeters in length and live for only one year. Ayu fry hatch in December and spend their first winter along the coast, feeding on plankton. In spring, after the water has warmed to around 10 degrees Celsius, they gather in schools at the mouth of the Nagara. Depending on yearly temperature fluctuations, they can gather as early as the beginning of February, but it usually takes place in March or April.

Having grown to around 7 centimeters in length, the juvenile ayu begin swimming upstream. By the time they reach the river's central watershed (denoted by the map's middle circle), they measure between 10 and 20 centimeters in length and have developed saw-like teeth. As summer begins, they are ready to establish solitary feeding territories. Each ayu looks for broad, gravelly areas, where they stake out about 1 square meter of territory and defend it fiercely. The fish feed on blue-green algae that grows on the rocks of the riverbed, and their teeth leave distinctive marks that are visible when the rocks are removed from the water.

Ayu reach maturity over the summer and continue to operate independently until the autumn typhoons arrive. When the water levels rise, the ayu enter the next stage of their life cycle. In October and November, the ayu again form schools and let the current carry them downstream. When they reach an area near Gifu City, about 40 kilometers from the river's mouth, they spawn.

A single ayu lays an average of 50,000 eggs, each only 1 millimeter in diameter.

The eggs take about two weeks to hatch, after which the new fry are carried downriver to the ocean.

Ayu populations in Japan have decreased dramatically in the last few decades due to disease, environmental changes, and declining water quality. On the Nagara River, however, the population has been maintained through early and sustained conservation efforts by residents and local fishing cooperatives. In 1915, the Nagara River Fisheries Association began artificial hatch-and-release programs, and today, hatcheries at the mouth of the Nagara produce more than 100 million eggs each year.

Next to this exhibit is an interactive display featuring a replica of the prow of a cormorant-fishing boat. Suspended from the prow is a movable *kagaribi*, a fire basket used to illuminate ayu beneath the water's surface. Move the basket's glow across the image of the river to see the shapes of ayu appear.