

Training sturgeon for survival

By Maria Camara Ruiz

The Baltic sturgeon (*Acipenser oxyrinchus*) no longer lives in the Baltic Sea. Until the beginning of the 20th Century, most of the rivers and tributaries in the southern Baltic were inhabited by this iconic species. Nowadays, sturgeons are missing due, principally, to river damming, overfishing and pollution. As part of a restoration program, the sea is being restocked with hatchery produced fish. Since fish reared in a hatchery originate from a deprived, monotonous environment, strong evidence suggests that such fish are poorly adapted to survive after release.

In my project, I aim to improve individual fitness and survival of hatchery-reared juvenile Baltic sturgeon. First, since all Baltic sturgeon are hatchery produced, I established a semi-natural population which was raised in a pond mimicking a stretch of river. In the first experiment, I reared fish in a plain tank and provided the food buried below a sand spot. After two weeks of training, fish were transferred to a tank fully covered with sand. I demonstrated that trained fish recovered the feed quickly (in 14 minutes) whereas untrained fish were unable to recover the feed within two hours. To identify causes for this, I was able to describe differences in the gene expression of marker genes that regulate neuroplasticity and cognition. Interestingly, trained fish revealed a similar expression as wild fish in a pond.

Next, I studied how the presence of a predator influences naïve fish. Here, sturgeons were reared in water originating from a predator population. We looked at the distribution of the fish in the tank in relation to the inlet as well as at the morphology of the bony external plates on the fish's back, known as dorsal scutes, which function as armour against predators. Since fish were distributed evenly over the raceway throughout the observation period of 30 days, it has to be assumed that they do not recognize the presence of a predator by olfactory cues. Surprisingly, the scutes did not develop differently than those of the control after 30 days of exposure either.

From the experiments, it can be concluded that short-term training can improve sturgeon's individual fitness, but have to be evaluated carefully. Often reduced neuroplasticity represents an obstacle resulting from deprived and monotonous rearing conditions applied in classical aquaculture. Further research is needed to understand the linkage between rearing environment, brain and behaviour.