GLOBAL RE-INTRODUCTION PERSPECTIVES

Re-introduction case-studies from around the globe

Edited by

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Cover photo: Clockwise starting from top-left:

- Formosan salmon stream, Taiwan
- Students in Madagascar with tree seedlings
- Virgin Islands boa

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Saving the sturgeon: re-Introduction of lake sturgeon to the Tennessee River, Tennessee, USA

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Introduction

Lake sturgeon (***Acipenser fulvescens***) were historically distributed in the Mississippi River, Great Lakes, Hudson Bay and St. Lawrence drainages in the United States and Canada, and sparsely inhabited the Mobile Basin in the southeast United States. It is currently listed as a species of Least Concern (LC) by the IUCN and under Appendix II of CITES. While lake sturgeon are not listed under the United States Endangered Species Act, they are protected in 17 of the 19 states where they were historically distributed. Within Tennessee, lake sturgeon are classified as endangered, and their harvest is prohibited. This program aims to restore lake sturgeon to the Tennessee River Basin in order to remove its endangered status within Tennessee. While numbers of lake sturgeon in the Mississippi and lower Missouri river drainages are deemed to be small, but relatively stable, they are not able to recolonize the Tennessee River because of impoundments. Prior to this program, the last commercial harvest of lake sturgeon from Tennessee was from the early 1960s; unverified reports continued through the 1970s. Our re-introduction efforts began in the late 1990s with stock from the Wisconsin and Wolf Rivers, Wisconsin, following the creation of policies leading to better water quality in the region.

Lake sturgeon (*Acipenser fulvescens*)

Goals

- Goal 1: To restore a self-

sustaining population of lake sturgeon to its historic range within the Tennessee River Basin.

- Goal 2: To use the best available science to manage a future recreational fishery and ensure long-term population viability.
- Goal 3: To ensure all significant portions of the management area are occupied by or accessible to the population.
- Goal 4: To educate stakeholders about the project and the need to protect the population of lake sturgeon.

Success Indicators

- Indicator 1: All significant portions of the re-introduction area in the upper Tennessee River Basin are occupied or accessible to the lake sturgeon population.
- Indicator 2: The population contains at least 20 year classes of adults older than 15 years of age.
- Indicator 3: Natural reproduction is evident.
- Indicator 4: Above average natural recruitment at least one out of every five years.
- Indicator 5: Some level of harvest can be supported.

Project Summary

Feasibility: The program to restore lake sturgeon to the upper Tennessee River Basin began with general water quality improvement in the basin following the passage of the Clean Water Act in 1973. Between 1988 and 1993, the Tennessee Valley Authority (TVA), which regulates major dams in the area, began a Reservoir Release Improvement (RRI) program to institute minimum flows and increase dissolved oxygen levels in tailwaters below targeted dams. Douglas Dam, on the French Broad River, was chosen as one of the sites for the RRI. Dramatic improvements in the downstream fish and macroinvertebrate communities over the first 5 years of monitoring following RRI implementation suggested lake sturgeon might once again thrive in the upper Tennessee River Basin. A lake sturgeon recovery team was formed in 1998, including partners from the most important aquatic resources agencies/organizations in the region (U.S. Fish and Wildlife Service, Tennessee Wildlife Resources Agency, TVA, U.S. Geological Survey, Tennessee Aquarium Research Institute, University of Tennessee, Tennessee Technological University, Tennessee Clean Water Network and World Wildlife Fund). In 2000, 41 two-year old lake sturgeon were implanted with radio telemetry devices and released into the French Broad

Releasing lake sturgeon

River over a period of six stockings during three seasons. Because the fish were moving widely and thriving in the river, large-scale rearing of lake sturgeon eggs was initiated at the Tennessee Aquarium Research Institute and three U.S. Fish and Wildlife Service National Fish Hatcheries (Warm Springs, Pvt. John Allen, and Mammoth Spring).

Implementation: The first major release of lake sturgeon occurred 19th July 2000, just below Douglas Dam, with 1,441 fingerling sturgeon entering the French Broad River. Each year, fertilized eggs are gathered from spawning lake sturgeon in the Wolf or Wisconsin rivers, Wisconsin. In order to maximize the number of family groups for each year class of fish, 5 females and 5 males per female are used for fertilizing eggs. These eggs are transported to the Warm Springs National Fish Hatchery, Georgia, and hatched on site. Fry are kept on-site for at least one month, until fingerlings can be distributed to the three other participating hatcheries. Fingerlings are reared until late fall, at which point the majority are released into the French Broad River. Prior to release, a sub-sample of the individuals in captivity are screened by the Warm Springs Fish Health Center for known pathogens, including sturgeon iridovirus. Affected individuals would not be released. All fingerlings are marked by the removal of a particular scute for each year class. During 2000 - 2007, 53,255 lake sturgeon were stocked into the river, with 85% of these individuals stocked as yearlings, 6% as sub-adults (age 1), and 9% as adults (≥age 2). Sub-adults are retained only at the Tennessee Aquarium Research Institute, with the goal of increasing their survival, as well as providing larger individuals for monitoring efforts. All sub-adults have PIT tags implanted prior to release.

Post-release monitoring: The Tennessee River Lake Sturgeon Working Group holds yearly meetings to discuss the ongoing project and conduct monitoring. A variety of methods have been used for monitoring over the past eight years, including routine gill netting, electrofishing, and setting trot lines. Some of the sub-adult fish have been used for radio telemetry and sonic tag studies. Recently, we have begun working with local commercial fishermen, who often capture lake sturgeon as by-catch. We have provided some with PIT tag scanners, and they will photograph, record length, and scan fish before releasing them. We have also distributed cards about lake sturgeon that are distributed with the sale of fishing licenses in east Tennessee. These cards include basic information about lake sturgeon, as well as a number that recreational fishermen can call if they capture a lake sturgeon. Signs about lake sturgeon have also been posted near many fishing ramps in the upper Tennessee River Basin.

An education component was added in 2006. Throughout the preceding years, local schoolchildren were invited to help release young sturgeon. This arrangement was formalized in 2006 with a partnership with nearby Gap Creek Elementary School. The 5th grade students raised a sturgeon in their classroom, learned about sturgeon and watersheds during four visits from a Tennessee Aquarium educator, visited the Tennessee Aquarium, and finally participated in the November 2006 release with Tennessee Aquarium Research Institute staff. This program is set to continue with each new 5th grade class. Additionally, the

Tennessee Aquarium has a lake sturgeon touch tank where visitors can touch a live lake sturgeon, watch videos of releases, and talk to docents about the program.

Major difficulties faced

- Obtaining sufficient eggs to build a genetically diverse population capable of sustaining a healthy, wild population.
- Securing funding for a long-term program with 20 years of captive rearing of lake sturgeon fingerlings.
- Adequately monitoring the highly mobile lake sturgeon to determine if captive rearing, stocking times, and stocking densities are sufficient.

Major lessons learned

- The large partnership of stakeholders in the Tennessee River Lake Sturgeon Working Group has been crucial to our success.
- Re-introduction programs must be adaptable in adopting new technologies and methodologies to meet propagation objectives (e.g. egg hauling protocols) and field assessment (e.g. indirect-fishermen creel information might be better than direct sampling).
- Concern for virulent organisms may supersede fishery management objectives; quarantine protocols must be stringent and inflexible.

Success of project

Highly Successful	**Successful**	Partially Successful	Failure
	√		

Reasons for success/failure:

1. We have reached our target numbers for annual releases and are well-publicized to attract community support.
2. We have incorporated an education component and have been able to work with local fishermen, both commercial and recreational.
3. We are still learning the optimal method of monitoring our sturgeon population, and we need to expand our education program to more schools.
4. Lake sturgeon do not spawn until 12 - 25 years of age; the oldest sturgeon released are currently 10 years old and will not reach maturity for at least two more years.
5. While we are meeting all targets, we cannot consider this project highly successful until there is evidence of natural reproduction in the wild.