

**National Fish and Wildlife Foundation  
Final Report**

**Project Number: 2003-0206-002**

**Project Name: Distribution and Movement of Shortnose Sturgeon**

**Project Manager: Andrew Nunn-Miller Email: Andrew.Nunn.Miller@nfwf.org**

**Reporting Period: 01 October 2004 thru 30 June 2006**

Objectives

I. The objectives of the Chesapeake Bay tagging portion of this project were:

- 1) Determine movement patterns of shortnose sturgeon.
- 2) Determine if the Chesapeake Bay population is genetically distinct from that of the Delaware River.
- 3) Determine to what extent shortnose sturgeon use the C & D canal.
- 4) Tag fish with external (T-bar) and internal (PIT) tags for future recapture information.
- 5) Enable biologists to increase number of shortnose sturgeon specimens by identifying fish aggregation sites

II. The objectives of the shortnose sturgeon health component of this project were:

- 1) Determine the sex ratios for the "southern" populations of the shortnose sturgeon.
- 2) Determine serum levels of testosterone, estrogen, and vitellogenin in sexed fish during different life and reproductive stages.
- 3) Evaluate the health of individuals in these populations using hematology, as well as internal and external visual assessment.
- 4) Evaluate estrogen levels and water quality parameters at the site of fish capture.
- 5) Establish "normal" hematology and hormonal values based on hatchery-reared animals.

Accomplishments

Scientific Research Permits – Dr. Rob Bakal, USFWS, holds a SRP, # 1261, allowing data collection from hatchery-reared shortnose sturgeon. Permit amendment applications were submitted to the National Marine Fisheries Service, Office of Protected Resources (NMFS OPR), to allow cooperators on this grant to conduct laparoscopy and phlebotomy on wild shortnose sturgeon. Applications were submitted for the following population segments included in this project: Chesapeake Bay (Maryland Department of Natural Resources (MD DNR) and the United States Fish and Wildlife Service Maryland Fisheries Resource Office (USFWS MFRO)); Delaware River (ERC, Inc., #1486); Altamaha River (Doug Petersen, UGA, # 1420); and Santee and Cooper Rivers (Doug Cooke, SC DNR, # 1505). The permit amendment process continued throughout the timeframe of this grant period for all cooperators. Therefore data collection from wild fish with existing collection permits was not allowed and objectives II.1-4 were not completed. Note that since the conclusion of this grant period, NMFS OPR approved permits 1486 and 1505. Data will be collected from fish in the Delaware and Santee and Cooper Rivers, analyzed and presented in subsequent reports for NFWF grant #2006-087-001.

The NMFS Office of Protected Resources suspended the permitting process for this project, and all extant sturgeon SRPs, for work in the Chesapeake Bay in 2003. It was determined by NMFS OPR that an Incidental Take Permit had to be issued to any and all commercial watermen operating in the Chesapeake Bay that report shortnose sturgeon by-catch to MD DNR or USFWS MFRO. Currently, the only access to shortnose sturgeon in the Bay for scientific study is through a Reward Program in which watermen are compensated for reporting, holding and transferring live sturgeon (shortnose and Atlantic) to either MD DNR or USFWS MFRO. In addition, the State of Maryland was tasked to develop a Habitat Conservation Plan for the Chesapeake Bay that would address fisheries interactions with endangered species. Development of the Habitat Conservation Plan for the Chesapeake Bay is on-going. Therefore no work with shortnose sturgeon was permitted within the Chesapeake Bay and objectives I.1-5 were not completed.

Training – An intern position, funded by this grant, was filled in March, 2004, to assist Dr. Bakal with the development of training tools, assembly of anesthesia carts, and processing of blood and water samples. A standard operating procedure manual and video tutorial on laparoscopy and phlebotomy techniques were developed for this project and distributed to all cooperators. A workshop was held on October 27 and 28, 2004, at the Warm Springs Regional Fish Health Center, Warm Springs, Georgia. The purpose of this workshop was to conduct an orientation of the project, provide instruction on techniques employed in this project, and allow each cooperator to gain experience by performing these techniques on live fish under the supervision of Dr. Bakal. Instruction included proper anesthetic, laparoscopic, and phlebotomy techniques, as well as data recording and reporting, sample processing and shipping, and use and care of equipment. Attendees included staff of MD DNR, Georgia DNR, South Carolina DNR, USFWS MFRO, Environmental Research and Consulting Inc., Fort Stewart Fish and Wildlife Branch, University of Georgia, and Auburn University. A full set of phlebotomy and laparoscopy supplies were distributed to each cooperator participating in year-1 of this project.

In May of 2005 and 2006, additional laparoscopy training and practice was conducted at University of Maryland Center for Environmental Science, Horn Point aquaculture facility, on sub-adult Atlantic sturgeon. These sessions were hosted by MD DNR and supervised by Dr. Bakal, and provided biologists additional opportunity to practice anesthesia and laparoscopy procedures used in this project.

Hatchery Fish – Beginning in July, 2004, phlebotomy and laparoscopy procedures were performed on twelve shortnose sturgeon held at Bears Bluff National Fish Hatchery (BBNFH) to determine sex, reproductive status, level of circulating hormones and general condition. Procedures followed methods outlined in NFWF grant #2003-0206-002. Blood samples were collected from each fish and one portion of each sample was submitted to Antech Inc. for analysis including complete blood count, albumin, aspartate aminotransferase, urea nitrogen, calcium, chloride, creatinine phosphokinase, globulin, glucose, phosphate, potassium, sodium, total protein, and lactate dehydrogenase. A second portion of each blood sample was processed for serum analysis of circulating hormone and vitellogenin levels to be performed at Warm Springs Regional Fish Health Center. Serum samples for hormone and vitellogenin analyses were archived at -70°C until additional samples are collected to maximize cost effectiveness of the test kits. Additional blood samples from these twelve fish were collected again in October 2004, February 2005, and May 2005. Replicate seasonal values will be used to determine

“normal” ranges under controlled conditions. Additional hatchery fish are to be bled to increase sample size (see grant #2006-0087-001). Analysis of this population, once completed, will provide a reference interval for each of the hematology components and hormone levels measured, which will fulfill objective II.5. Reference intervals will be provided in subsequent reports for grant #2006-0087-001.

Anesthesia was induced in a bath containing 250 ppm MS-222, and maintained by circulating a solution containing 85 ppm MS-222 over the gills while on the anesthesia cart. A small (~5mm) incision was made in the ventral body wall slightly off midline at a level midway between the pectoral girdle and the cloaca. A 5 mm cannula was inserted through the incision. The body cavity was insufflated with ambient air by attaching an air pump to the insufflation port of the cannula. A 5 mm rigid laparoscope was then inserted through the cannula to allow visualization of the internal anatomy. In some fish it was also necessary to deflate the swim bladder to better visualize internal anatomy. A Veress pneumoperitoneum needle was inserted percutaneously into the swim bladder, using the laparoscope to ensure proper placement, and all the air was removed from the swim bladder using a vacuum pump. A general visual assessment of all internal organs, using the modified version of a quantitative health assessment (Adams et. al., 1993) was made and recorded for each animal. Sex and reproductive status of the animal was recorded. In those instances where the sex of the animal was not readily apparent a biopsy of the gonad was taken. A second small (~5mm) incision was made midway between the first incision and the pectoral girdle on the lateral aspect of the body approximately 1 cm dorsal to the ventral scutes. A second 5 mm cannula was placed through this incision and a laparoscopic biopsy instrument was inserted through the cannula. A biopsy approximately 5 mm in size was collected from the gonad using the biopsy instrument and submitted to MD DNR for evaluation. The instruments were removed from the body and each incision was closed with a single suture.

#### Continuation of Objectives

Work outlined in this grant will continue as grant #2006-0087-001. Additional hatchery fish will be assessed to compile “normal” hematology and hormone reference intervals. Maryland DNR will continue to develop a Habitat Conservation Plan that will, when approved, allow work to be done in the Chesapeake Bay. Fieldwork will be conducted on other population segment as permit amendments are approved. Data will be analyzed and compared between wild fish and “normal” controls and presented in subsequent reports for grant #2006-0087-001.

**National Fish and Wildlife Foundation  
Final Financial Reporting Form**

*\*Fill in all shaded areas*

**Project Name and Number:** Distribution and Movement of Shortnose Sturgeon #2003-0206-002

**Period of Performance (from Grant Agreement):** February 1, 2004 to June 30, 2006

Note: All project expenditures, including match, must take place between the project start and end dates designated in the Grant Agreement.

**Budget for Phase #1:**

Category	Approved Budget NFWF Funds <i>(from Grant Agreement)</i>	Actual Expenses NFWF Funds
Salaries & Benefits	\$0.00	
Equipment**	\$0.00	
Other	\$96,555.00	\$96,555.42
<b>Total</b>	\$96,555.00	\$96,555.42

Matching Contributions Required for Phase #1: \$3,135.00 *(from Grant Agreement)*

Matching Contributions Expended for Phase #1: \$4,985.00

**Budget for Phase #2:**

Category	Approved Budget NFWF Funds <i>(from Grant Agreement)</i>	Actual Expenses NFWF Funds
Salaries & Benefits	\$0.00	
Equipment**	\$0.00	
Other	\$22,994.58	\$280.95
<b>Total</b>	\$22,994.58	\$280.95

Matching Contributions Required for Phase #2: \$6,523.00 *(from Grant Agreement)*

Matching Contributions Expended for Phase #2: \$15,183.53

**Budget for Phase #3:**

Category	Approved Budget NFWF Funds <i>(from Grant Agreement)</i>	Actual Expenses NFWF Funds
Salaries & Benefits	\$0.00	
Equipment**	\$0.00	
Other	\$0.00	
<b>Total</b>	\$0.00	

Matching Contributions Required for Phase #3: \$3,135.00 *(from Grant Agreement)*

Matching Contributions Expended for Phase #3: \$0.00

**Total Project Budget:**

Category	Approved Budget NFWF Funds <i>(from Grant Agreement)</i>	Actual Expenses NFWF Funds
Salaries & Benefits	\$0.00	
Equipment**	\$0.00	
Other	\$126,500.00	\$96,836.37
<b>Total</b>	<b>\$126,500.00</b>	<b>\$96,836.37</b>

\*\*Equipment only includes tangible nonexpendable personal property having a useful life of more than one year and an acquisition cost of \$5,000 or more per unit.

Total Matching Contributions Required for Project: \$14,055.00 *(from Grant Agreement)*

**Total Matching Contributions Expended for Project:** \$20,168.53 \*\*

\*\*This total must match the total contributions described on the Certification of Matching Contributions form.

**Describe All Expenses:** *(Use additional space if necessary.)*

A total of \$96,555 in project related expenditures have been received for phase-1 of this project. Expenditures included a personal computer and software, five sets of laparoscopes and fish anesthesia carts, surgical and phlebotomy supplies, water-samplers, microscope camera, acoustic tags and receivers to track fish, and hormone assay supplies. Diagnostic services were used to analyze blood samples and FedEx was used to ship supplies and samples. Travel expenses were provided for biologists to attend a 2-day laparoscopy and phlebotomy training session. In addition, an intern was hired to assist on the project.

Additional expenditures since completion of phase-1 included diagnostic services (Antech) for blood samples from hatchery-reared fish, totaling \$73.50, surgical supplies totaling \$113.90, and supplies for public outreach (display of sturgeon laparoscopy) totaling \$93.55.

Matching funds contributed to this project since completion of phase-1 consisted of salary and benefits for full-time DNR staff. Salary and benefits totaling \$15,183.53 is based on actual time documented by Dr. Cindy Driscoll, state veterinarian, Brian Richardson, Project Leader for MD Sturgeon Reward Program, and Larry Pieper, Natural Resources Biologist. Benefits are calculated at a rate of 30%.

I hereby certify that all expenditures described above are complete and that the above information is accurate and complete.

**Maryland Department of Natural Resources**

Approved: \_\_\_\_\_ Date: 6/29/2006

*Signature*

Mark Matsche, Natural Resources Biologist,

Project Officer and Co-PI

*Print name and title*

E-mail: mmatsche@dnr.state.md.us Telephone: 410-226-5421 x129