

All of the following comments provided by the peer reviewers were accepted and the appropriate changes were made within the document.

### **Bill Post, SC DNR, Comments:**

Peer review questions:

- 1) Will the protocols established in this document provide consistent and safe sampling methods when conducting research on sturgeon?

I believe they will be, most of these protocols are already in place for sampling procedures and have shown to be effective.

- 2) Do the protocols established in this document reference the best available scientific information and use those references to provide consistent and safe sampling methods when conducting research on sturgeon?

Yes.

- 3) Are there any research methods that can be used safely on sturgeon that have not been considered in this document?

I can't think of any.

- 4) Are any of the research methods inappropriate for use on sturgeon species?

No.

- 5) Are there any species specific issues that have not been considered?

I can't think of any.

General Comments:

I think limiting researchers to 50 buffer pads will hamper efforts to locate spawning habitat. In past studies, we used ~100 to 150 with success. Since these pads are acting as artificial substrate, the more coverage the better the chances of collecting eggs.

I do agree with most handling recommendations, with the exception of wearing gloves to handle "Atlantic sturgeon". This species skin is unlike the shortnose sturgeons and actually has a very rough texture similar to that of a shark. In my experience, I have never witnessed a "slime/mucus layer" on an Atlantic sturgeon so in my opinion, I think the gloves are unnecessary to ensure the health of the fish, but rather used for protection for the researcher from the animal's scutes.

Standard Research Methods-Measuring. I'm unclear why girth measurements should be taken. I can understand taking the measurement on adult animals which may be in spawning condition, but not for all sturgeon. Also, we don't measure mouth width to interorbital ratios in our current sampling. I feel this is an unnecessary (time consuming step) that is no longer needed as all our researchers have seen hundreds of sturgeon and can tell "by looking" at the general characteristics of the animal whether it is an Atlantic or shortnose sturgeon.

Gastric Lavage- First the sturgeon is anesthetized to the appropriate stage (Table 5, Stage I) causing the sturgeon's esophageal and gastric muscles to relax. The sturgeon is then placed ventrally head down on a stretcher or sling with an irrigation tube in its mouth to irrigate the gills during the procedure to ensure respiration. With water running over the gills, a fine mesh strainer is positioned under the sturgeon's mouth to capture the regurgitated contents of the stomach as it is lavaged. With the sturgeon correctly positioned, a soft, flexible intramedic tubing (typically polyethylene) is inserted into the mouth of the sturgeon and carefully directed down the alimentary canal past the pneumatic duct into the stomach region. At the point of resistance reached at the U-shaped bend of the stomach, the flexible tube is twisted ventrally and gently pushed further down the alimentary canal until the tube can be felt on the ventral surface of the fish.

In response to the phrase, "the flexible tube is twisted ventrally and gently pushed further down the alimentary canal until the tube can be felt on the ventral surface of the fish," Bill Post stated, "We did not push further once resistance was felt. We pinched the tube and turned the fish over (dorsally) and introduced water. I have video of the procedure if you would like to see it."

## **Frank Parauka, USFWS, Comments**

Comments  
Gulf Sturgeon Collection and Handling  
Panama City USFWS  
May 6, 2010

P1: Good point, measuring, PIT tags and genetic tissue (mandatory), feel all fish should be weighed – wt lose/gain. Do not typically use anesthesia for discretionary research.

P3: Good point, do not collect fish during upstream spawning migration. Gulf sturgeon yoys and juveniles feed during the summer months.

P6: Much of our sampling is conducted at water temperatures in excess of 28°C and mortality is negligible. We use a variety of mesh stretch sizes (3, 5, 7, 9 and 12") although much of the work is conducted with 5" stretch. Most of our nets are 150 ft in length and 8-12 feet deep. We normally fish the nets for 1.5 hrs but adjust accordingly to water temp, potential for by-catch, number of nets out, anticipated sturgeon catch, and experience of crew. We'll fish from 4-6 nets and adjust accordingly, need to really assess the situation and not get into a bind. Our drift nets are 9" stretch and when we conduct our fall out-migration studies, we will use 9 and 12" stretch set nets that are 20 ft deep and 200-250 ft in length.

P6/7: Would question the longer nets sets (4+ hrs), even at water temperatures below 20°C, fish will die rather quickly if the gills are constricted, 14 hr sets are way too long for Gulf sturgeon. Agree that fish should be removed from the drift net immediately, no need to stress the fish unduly.

P8: We have used overnight set lines for Alabama sturgeon investigations and have used short sets (4 hrs) for Gulf sturgeon in the overwintering habitat. Although, we have only attempted to collect Gulf sturgeon with set lines on a few occasions, I believe it has some merit and needs more effort.

P8/9: The COE collected yoy Gulf sturgeon in 30 ft of water. Benthic obstacles present a problem and a chase boat is recommended to engage the cod end float and assist with dislodging the trawl when it becomes snagged.

P9/10: Egg pads need to be anchored in suspected spawning areas. Do not believe that the eggs will drift downstream much out the immediate spawning location before the attachment to the substrate. The number of pads is debatable, we have fished up to 90 pads spread over 3 sites and the U of Florida has fished up to 100 pads over several sites. Gulf sturgeon eggs will hatch in 48-73 hours. Frequent checks area needed. We remove all the eggs from the pad (generally 1-10, if a large number of eggs are present, a small percent would work) and return to the office and attempt to hatch the eggs for sturgeon verification. We will bring back water from the site for hatching. Eggs and larvae are genetically analyzed to determine the number of females contributing to the spawning event. Physical and environmental parameters need to be recorded at each location eggs are found (gps, velocity, substrate type, depth, dissolved oxygen, etc).

P12: Our boat is equipped with an 8 ft X 2 ft tank with a recirculation system. Believe that supplemental compressed oxygen introduced in the holding tank has a lot of merit, especially during the warmer months. We have used a boom with a stretcher to lift large fish out of the water and to weigh the fish. However, the process is sometimes awkward and we mostly use large diameter ropes, soft material to lift fish into the boat and place into the holding tank. The ropes are placed posterior to the pectoral fins and anterior to the dorsal fin. Two people can easily move a large fish (we'll collect fish up to 150 lbs, but these are rare). Have not added salt to the tank but I know it has merit, with the flow through tank it may be difficult to maintain the concentration.

P15: Agree that FLs are the most consistent measurement. We will record TLs but rarely girths. We'll use a tape for straight line measurements along the lateral line (have not compared the difference between a flat rule).

P16: We generally use a platform scale (50 kg) and an electronic bench scale (100 kg) for weighing fish. On both scales we will place a board about 4-5 ft x 8" to place the fish on for support (board is needed). We'll use a hanging scale (250 lb) on the boom when weighing fish in the stretcher.

P16/17: We insert PIT tags (14mm – 125 kHz) into the fleshy area at the base of the dorsal fin. We have recorded fish that had been PIT tagged 16 years previously, this site works very well for tagging Gulf sturgeon. Fish under 300 mm should not be PIT tagged. Believe that a lot of error in using PIT tags is failure to recheck the fish after tagging and recording the tag sequence. Always good to double check the numbers, letters and make sure the sequence is correct (most of our tags have 10 digits but through miscommunication we have 9 and sometimes 11 digits, most of the time it's not hard to track the information when the tag reappears, however, it's frustrating!. Slash zeros and sevens are helpful. Letters need to be clear. Need someone that records data legibly.

P31: Feel it is important to tag fish with an external identifier. We routinely tag Gulf sturgeon with T-bar Floy tags, one in each pectoral fin. Retention is not ideal but we have instances of up to six years. Have had people call us regarding a mortality or by-catch (telephone # on tag).

Several things you might want to consider would be to additional visuals:

- Show the hook-up etc of the egg pads, anchor, etc.
  - Telemetry tag locations (external) – visual.
  - Suture illustration – good one in “Hatchery Manual for the White Sturgeon”
  - Illustration regarding site to remove section of pectoral fin for aging.
  - Illustration showing spine section with rings
  - Site illustrated for blood plasma sample
  - PIT tag and visual tag locations
  - Illustration of trawl
- Cont: comments

Some other things to consider:

- Example of a data sheet
- Materials needed to conduct gastric lavage (list items, size of sieve, size of pump, etc)
- Material needed for surgical work (list size and type of needle, suture material, blades, etc)
- Might have stand alone sections for each species or even certain procedures.
- Material needed for telemetry
- Types of equipment needed for biological measurements (list?)
- Might incorporate all your info into a page or two – conservation measures (net sets, time, etc).

- (this is helpful when obtaining permits)
- Could have a list of suppliers.
- Sometimes a glossary and list of abbreviations, symbols, etc are helpful

## **Doug Peterson, University of Georgia, Comments**

P3. “NMFS recommends capturing adult sturgeon while they are still in their winter staging areas, but does not recommend targeting sturgeon during their upstream spawning migration due to the risks of aborted spawning runs.” Comment: Yes, I agree with this as a general rule, but there are exceptions. With Atlantic sturgeon, for, example, it is often difficult to get any assesment of a spawning run unless we target them as they enter rivers.....

P3. “Shortnose sturgeon have also been shown to experience significant reductions in food consumption when temperatures exceed 25.8°C (Niklitschek 2001).” Comment: Yes, but these trials were done with northern fish. Similar trials with fish from southern rivers may give different results.

P4. “Kynard (1997) also notes empirical temperatures of 28° to 30°C in summer months creates unsuitable shortnose sturgeon habitat.” Comment: Again, these were northern fish, while those in the Ziegeweid paper were from the Savannah. That probably accounts for the differences here.

Table 2. “Net set duration.” Comment: Add unit of time (hours)

P8. “While gillnets and trammel nets are most commonly used for targeting adult and sub-adult sturgeon, they are not as effective as trawls at capturing smaller juvenile sturgeon.” Comment: Define “smaller”. I would say YOY.

P10. In response to the sentence: Due to disproportionately high reports of mortality using ten inch stretch mesh with Atlantic sturgeon, this size mesh should not be used to sample Atlantic or Gulf sturgeon, Dr. Peterson suggested distinguishing that this size net would be used to target adult Atlantic and Gulf sturgeon.

P12. Dr. Peterson disagreed that the suggested mitigation measures of protective gloves, electrolyte salt baths, and waterproof cushions on scales would actually be protective of sturgeon.

P13. The number of fish in a net pen depends on the size of the fish. Smaller pens are fine for shortnose provided you have good river flow. Larger pens are used for adult ATL.

P13. “If the researcher observes a visually stressed sturgeon, efforts should be made to revive the fish and release it in a healthy condition.” Comment: When fishing for adult Atlantic sturgeon, we often use the net pen to “recover” tired fish. After a couple of hours in the pen, the fish will be in much better condition, often so much so, that it can be

a very “wet” endeavor to release it. This is where the large net pen is really good. For adult Atlantics, we use a 4X8 ft pen with 4” nylon mesh. We also put small weights in the corners to keep the mesh down in current.

P13. “However, it may be necessary to use a tether or sling briefly when moving large sturgeon from live cars onto the boat.” Comment: We actually developed a simple “halter rope” that we put around the body, right behind the pectoral fins. I would NEVER put a rope around the caudal peduncle – very hard on the fish.

P16. “If necessary, to ensure tag retention and prevent harm or mortality to small juvenile sturgeon of all species, the PIT tag can also be inserted at the widest dorsal position just to the left of the 4<sup>th</sup> dorsal scute.” Comment: This is our preferred location.

P18. Dr. Peterson stated that he did not believe anyone should need to measure the ratio of mouth width to interorbital width to identify the difference between Atlantic and shortnose sturgeon.

P20. “NMFS recommends that noticeably stressed sturgeon should not be anesthetized.” Comment: Agreed. Stressed fish should be released without any invasive procedure.

P23. “There are two methods commonly used by sturgeon researchers to anesthetize sturgeon. The first method incorporates a near-lethal initiation dose of MS-222 followed by a safer maintenance concentration (DeTolla *et al.* 1995, Callahan and Noga 2002, Thorsteinsson 2002, Borski and Hodson 2003).” Comment: This is what we use and it work well. I would not call it a “near-lethal” dose though. Dosage is a function of “concentration” X “exposure time”. We use a “knockout” concentration of about 200-250 mg/l. When the fish reaches the desired level of narcosis, we immediately remove the fish from the “knock out” concentration and pump a much more dilute solution (85 mg/l) over the gills to “maintain” the anesthetic.

P28. “Implanting internal telemetry tags requires anesthesia followed by a surgical procedure.” Comment: Depends on who you talk to. I know some pretty good people who do NOT use any anesthetic.

P35. “Sturgeon must be anesthetized to ensure relaxation of the gut walls to properly position gastric tubes during the procedure.” Comment: Lavage stuff is all fine.

P37. “In Hernandez-Divers *et al.* (2004), the body cavities were insufflated and the swim bladders collapsed, but NMFS recommends avoiding either of these procedures when conducting laparoscopy on Gulf, shortnose, Atlantics, or green sturgeon.” Comment: Deflating the swim bladder is completely unnecessary.

P37. “Although NMFS considers laparoscopy a more invasive endoscopic procedure than boroscopy, it is a more reliable method for determining the sex and stage of maturity of sturgeons (Wildhaber *et al.* 2006).” Comment: I think laparoscopy is the way to go,

but I also think that should be permitted ONLY if someone has been properly trained and practiced the procedure on hatchery fish first.”

P38. “After biopsies are completed, the gonadal tissue is microscopically examined to verify the sex as well as the precise stage of maturation of sturgeon (Van Eenennaam *et al.* 1996, Van Eenennaam and Doroshov 1998).” Comment: Biopsy is at least as invasive as a laparoscope, and if you use a laparoscope correctly, you don’t need to biopsy.”

P39. “Overall, ultrasound was 97.2% accurate in determining sex with the procedure taking only 30 seconds to complete.” Comment: Yes, but the machine costs a FORTUNE!