MISSISSIPPI INTERSTATE COOPERATIVE RESOURCE ASSOCIATION

PADDLEFISH & STURGEON COMMITTEE

MEETING MINUTES & STATE REPORTS

14-15 January 2020

Powder Valley Conservation Nature Center, St. Louis, Missouri

MEETING MINUTES

14 JANUARY 2020

WELCOME/INTRODUCTIONS/OPENING REMARKS

The meeting was called to order at 8:30 am by Eric Ganus who introduced himself and welcomed the MICRA Paddlefish & Sturgeon Committee's Commercial Paddlefish Workgroup. A roll call of Delegates was conducted; it was determined that a quorum was not met. The agenda was distributed and finalized, and the meeting was called to order. Participant introductions ensued.

PARTICIPATION

Chairperson and Delegate from Tennessee: Eric Ganus

Assistant Chairperson and Delegate from Missouri: Joe McMullen

Delegates: Ryan Hupfeld (IA), Craig Jansen (IN), Dennis Riecke (MS), Jason Schooley (OK), Katie Zipfel (WV), Aaron Delonay (USGS)

MICRA Coordinator: Greg Conover (USFWS)

Guests: Dave Glover (IL-DNR), Sara Tripp (MO-DOC), Travis Moore (MO-DOC), Trish Yasger (MO-DOC), Stephen Floyd (WV-DNR), Jessica Hogrefe (USFWS), Brandan Brooke (University of Missouri), Michael Moore (University of Missouri)

Commercial Paddlefish Workgroup

Eric Ganus provided the group with a recap of the workgroup's activities. Dr. Michael Wilberg (University of Maryland) submitted a report to the Committee on 27 June 2019: *Analysis of Commercial Age Composition Data for Paddlefish in the Mississippi and Ohio Rivers during 2014-2017*. MICRA paid for Dr. Wilberg's work.

The Workgroup convened at the LMRCC meeting in Memphis, TN on 18 September 2019 and again for a conference call on 7 November 2019. The purpose of those meetings was to identify minimum regulatory standards and recommendations for commercial paddlefish fisheries on the Mississippi and Ohio rivers, based on the results of Dr. Wilberg's report. A continuation of that discussion is scheduled to occur today (14 January 2020).

***Greg Conover will discuss the fee for Dr. Wilberg's work with the Executive Board and whether participating states should be invoiced.**

***Joe McMullen will send Greg Conover the following reports to be uploaded to the Committee website.**

- Sharov, A. et al. 2014. *Developing Biological Reference Points and Identifying Stock Status for Management of Paddlefish (Polyodon spathula) in the Mississippi River Basin*
- Scarnecchia, D. 2015. *Paddlefish Age Determination for the Commercial Fisheries*
- Wilberg, M. 2019. *Analysis of Commercial Age Composition Data for Paddlefish in the Mississippi and Ohio Rivers during 2014-2017*

The workgroup's goal is to identify minimum regulatory standards and recommendations for commercial paddlefish fisheries on the lower Mississippi and Ohio rivers. Once the workgroup makes a recommendation the Committee would have the opportunity to accept and forward them on to sub-basin's (LMRCC, UMRCC, etc.) for consideration. The group discussed establishing standards for minimum length limits, season length/dates, permit quotas, gear restrictions (e.g., gill net minimum mesh size, number of nets allowed), and reporting requirements. Wilberg 2019 recommended a 36" minimum length limit for commercial paddlefish fisheries. The workgroup discussed a suite of regulations that could be implemented that would reduce harvest commensurate with a lower minimum length limit.

Dave Glover recommended further discussion with Dr. Wilberg regarding evaluating the data for a threshold effect, refitting the Von Bertalanffy growth parameter while holding L_{∞} constant, determining the model's sensitivity to changes in maturity at length and maximum age, and including additional length at maturity data from Missouri and Indiana. Sara Tripp mentioned that paddlefish in Missouri have a lower length at maturity and lower exploitation rates than those used in Dr. Wilberg's model. A conference call was held with Dr. Wilberg to discuss/address this and other concerns (see conference call minutes from 11 February 2020 below). The group agreed that inclusion of existing data in the model was appropriate and does not recommend gathering additional data.

The group discussed the possibility of recommending other regulations (e.g., season timing/length, permit quotas, gear restrictions, and reporting requirements) (see Appendix 1 below – PowerPoint slide notes from Greg Conover). Dave Glover stated that while we have some quantitative evidence of what changes to a minimum length limit will do to the population, the same is not true for other regulation recommendations being considered. Mr. Glover asked if there was a quantitative way to predict the effectiveness of other regulation recommendations because any regulation change put forward in IL would need good justification.

Craig Jansen indicated that Indiana would consider a rule that would restrict harvest to gravid females only, if commercial paddlefish harvest is allowed to continue. Since 2012, approximately 44% of the fish harvested in Indiana were male or non-gravid females. Eric Ganus mentioned that wholesale fish buyers in Tennessee have been encouraging harvesters to only bring in gravid females.

The group also reviewed the State Paddlefish Regulations Table.

***Eric Ganus will send out the State Paddlefish Regulations Table to the workgroup for updates.**

***Eric Ganus will contact Dr. Wilberg to discuss the analysis questions as described above.**

ADJOURN

Eric Ganus adjourned the meeting at 4:30 pm.

15 JANUARY 2020

WELCOME/INTRODUCTIONS/OPENING REMARKS

The meeting was called to order at 8:00 am by Eric Ganus who introduced himself and welcomed the MICRA Paddlefish & Sturgeon Committee to the meeting. A roll call of Delegates was conducted; it was determined that a quorum was not met. The agenda was distributed and finalized, a recap of the previous day was provided, and the meeting was called to order. Participant introductions ensued.

OLD BUSINESS

2019 Meeting Minutes

***Joe McMullen will send out the Committee's 2019 meeting minutes to Delegates for approval.**

***Joe McMullen will send Greg Conover approved meeting minutes to be uploaded to the Committee website.**

NOAA Saltonstall-Kennedy Grant Proposal

Greg Conover updated the Committee on the status of the NOAA Saltonstall-Kennedy Grant proposal. The first year, eight states cooperated to draft and submit the proposal. Since then the states of Mississippi and Alabama have suspended commercial paddlefish harvest, but both decided to continue the partnership. The Executive Board decided not to submit the proposal last year. Dr. Dennis Scarnecchia (University of Idaho) brought the proposal forward again this year and it was decided to submit given that NOAA increased funding levels for this opportunity. The proposal was accepted by NOAA and the full proposal is currently under review. If the project is funded, 1 October 2020 would mark the beginning of a 2-year project performance period.

MICRA Goals, Objectives, and Priorities 2019-2023

Greg Conover reminded the Committee that *MICRA Goals, Objectives, and Priorities 2019-2023* includes several priorities related to the Committee and is intended to provide a link between the Executive Board and the committees. The document will be updated every five years. The Committee is encouraged to review the current priorities and identify priorities for 2024-2028.

MICRA Goals, Objectives, and Priorities 2019-2023

- Objective 1 – Priority 1b: Standing committees review priorities and discuss emerging issues of concern within the basin every 3-5 years. Committees will report to the Executive Board at least once annually on progress of priorities identified in this document.
- Objective 1 – Priority 2a: Support continued efforts for coordinated basin-wide management of paddlefish and sturgeon species.
- Objective 1 – Priority 2b: The Paddlefish and Sturgeon Committee will develop a basin wide management plan for paddlefish.
- Objective 1 – Priority 2c: The Paddlefish and Sturgeon Committee will continue to coordinate and manage (e.g. Regional tag coordinators) a basin-wide coded-wire tag database for paddlefish.
- Objective 1 – Priority 2d: The Paddlefish and Sturgeon Committee will provide recommendations to the Executive Board for standardized methods for documenting and reporting harvest data for paddlefish.
- Objective 1 – Priority 2e: The Paddlefish and Sturgeon Committee will provide recommendations to the Executive Board for basin-wide commercial harvest databases for paddlefish and sturgeon, including roe harvest and roe buyers.

The group discussed the possibility of adding several priorities in the future including lake sturgeon issues and identification of new ageing techniques for sturgeon and paddlefish.

***Joe McMullen will survey Delegates to identify and document Committee priorities.**

Paddlefish Tagging Database

Jason Schooley updated the group on the Paddlefish Tagging Database. Last year Jason sent out a preformatted Excel spreadsheet to simplify the process of data entry, but little use or updating of the database has occurred since the last meeting. Royce Bowman (IA-DNR) submitted tagging data from Iowa. Jason indicated that there is a need to identify new sub-basin coordinators. Several Delegates indicated that there is still a backlog of data.

***Jason Schooley will send out the Excel spreadsheet to Delegates again.**

***Joe McMullen will identify sub-basin coordinators and update the Coordination Directory.**

***Jason Schooley, Ryan Hupfeld, and Sara Tripp will convene a Paddlefish Tagging Database Workgroup to evaluate the database's structure and purpose, and provide recommendations to the Committee.**

NEW BUSINESS

Chair

Joe McMullen will assume the Chair after this meeting. Eric Ganus will continue to lead the Commercial Paddlefish Workgroup.

***Joe McMullen will consider establishing a basin rotation for Chair-Elect nominations.**

***Joe McMullen will identify or draft Committee by-laws and amend or create a process for nominations. The process will need to be approved by Delegates.**

***Joe McMullen will identify Delegates and interested parties and update the Coordination Directory.**

Chair Elect

Ryan Hupfeld was nominated as Chair-Elect by Eric Ganus. The nomination was seconded by Joe McMullen (MO).

***Joe McMullen will send out Ryan Hupfeld's nomination to Delegates for approval.**

Delegate from Illinois

Dave Glover informed the group that Rob Maher (Delegate from Illinois) had retired; his position will likely be vacant for several months. Illinois will need to select a new Delegate.

Listing a Species as a Threatened or Endangered Species

Jessica Hogrefe presented on *Listing a Species as a Threatened or Endangered Species* as the process pertains to Lake Sturgeon. The USFWS was petitioned by the Center for Biological Diversity to review whether lake sturgeon should be listed as a federally threatened or endangered species. The USFWS is currently reviewing the status of lake sturgeon. Details about the review and listing process can be found here: https://www.fws.gov/endangered/esa-library/pdf/listing.pdf.

Missouri River Tributary Lake Sturgeon Project

Michael Moore presented on *Missouri River Tributary Lake Sturgeon Project*. Project details are included in Missouri's State Report.

Statewide Paddlefish Reproduction and Exploitation in Missouri's Large Rivers and Reservoirs

Sara Tripp presented on *Statewide Paddlefish Reproduction and Exploitation in Missouri's Large Rivers and Reservoirs*. Project details are included in Missouri's report.

STATE REPORTS

Reports were received from Delegates from Arkansas, Indiana, Iowa, Missouri, Oklahoma, and Tennessee (attached).

ADJOURN

Eric Ganus adjourned the meeting at 4:30 pm.

CONFERENCE CALL MINUTES

11 FEBRUARY 2020

PARTICIPATION

Chairperson and Delegate from Missouri: Joe McMullen

Assistant Chairperson and Delegate from Iowa: *Ryan Hupfeld*

Chairperson of the Commercial Paddlefish Workgroup and Delegate from Tennessee: Eric Ganus

Delegates: Dave Glover (IL-DNR)

MICRA Coordinator: Greg Conover (USFWS)

CONFERENCE CALL

The conference call held on 11 February 2020 was to clarify a few questions that were asked at the annual MICRA Paddlefish/Sturgeon committee meeting that was held in St. Louis. Below are responses received via email from Dr. Wilberg to questions posed at the 2020 MICRA Paddlefish & Sturgeon Committee meeting.

Please see below for some short responses to each of the questions. There appears to be two requests for additional analyses: reanalyze the size-at-age data, and conduct a thorough review/reanalysis of paddlefish maturity. Once these analyses are redone, redo the SPR reference point model. These analyses are possible, but the amount of work associated with them would not be trivial. Given my other work, I estimate that conducting these additional analyses would take until the end of the summer and will cost ~$8-10k.

1) Refit the von Bertalanffy growth function using Linf as a constant and solving for k and t0. These are highly correlated parameters and changes to Linf by using an average length of fish age-15+ should result in changes to K and t0 that were determined by Sharov et al. (2014).

There is not a single growth curve in the Sharov et al. report. Rather, it includes a broad review and analysis of growth of paddlefish throughout its range. I have some concerns about some of the data we analyzed in that report as well as some of the published studies as the aging did not appear to be very accurate in several places. For our more recent report, we had updated data from the commercial sampling in each of the states and wanted to incorporate that into the analyses. The growth parameters are not estimable from the catch monitoring data alone, but these data do provide some information about growth. I thought updating the Sharov et al. values with the new data was a better approach than just using the values from that report.

2) Incorporate all existing data to estimate length at maturity to ensure estimate is more reflective of total range (MO, IN, etc.). Was all existing data used from MO and IN from 2014 through 2017?

If I'm understanding this question, the answer is no- the maturity from the commercial catch sampling from MO and IN were not used to estimate maturation curves. The main issue with any estimation of maturation curves for paddlefish is that immature fish generally seem to be underrepresented in the sampling. I was concerned that immature fish were underrepresented in the data that were provided by the states, which would bias the maturity curve toward younger, smaller fish. Based on conversations with Jeff Quinn, I thought the Arkansas data avoided those problems. That's why we used those.

3) Conduct sensitivity analyses using a range of length at maturity (size at which 50% are mature) to determine how recommended minimum length limits change across this range. The range should be reflective of our confidence in length at maturity based on re-analysis using all existing data.

This sensitivity analysis could be done; however, the main challenge will be to develop the maturity curves to include more of the available data. If the immature fish are underrepresented in the sampling, this will cause a bias in the maturation curve, which we want to avoid. Therefore, it's possible some of the data may not be useful for estimating maturation.

Appendix 1. Commercial paddlefish harvest regulation recommendations under consideration (notes from Greg Conover).

Management Options to Achieve F30

- suite of minimum regulatory standards for MSRB

- Minimum Size Limit
- Season Length / Dates
- Number of Permits
  - Commercial fishers
  - Roe buyers
- Gear Restrictions
  - Mesh size
  - Number of nets
  - Length of nets
- Reporting Requirements

Minimum Length Limit *

- 34" standard for minimum length limit (EFL)

- **34" – AR **, TN, IN, KY, MO?, IL?**
- 36" - IN, KY, AR?, MO?, IL?
  - TN – not an option
- 32" – MO, IL

* boundary waters only, not statewide recommendation

** 35" now, would not go down

*** Evaluate for threshold effect

- Refit Von B holding L infinity constant
- Sensitivity of maturity (black eggs or S&P) at length, and maximum age?
  - Inclusion of additional existing data (MO, IN, etc)

Minimum Length Limits (eye to fork)

- Arkansas – 35"
- Illinois – 28"
- Indiana – 32"
- Kentucky – 32"
- Missouri – 24"
- Tennessee – 34"

Season Length and Dates

- Standard for maximum season length or opening and closing dates

State	October	November	December	January	February	March	April	May	Total Days
Arkansas		Nov 20					April 10		142
Illinois	Oct 1 (MS)	Nov 1 (OH)					April 30 (OH)	May 31 (MS)	243
Indiana		Nov 1					April 30		181
Kentucky		Nov 1					April 30		181
Missouri*	Oct 15							May 15	212
Tennessee		Nov 15					April 15		152

- Is a shorter season warranted to achieve F30?
  - If so, is it more important to consider changing early or late season dates?

Season Length and Dates

- based on 58° water temp; rounded in some cases

State	October	November	December	January	February	March	April	May	Total Days
Arkansas		Nov 20					April 10		142
Illinois		Nov 1 (MS); Nov 15 (OH)					April 15 (MS); April 15 (OH)		243
Indiana		Nov 12					April 18		181
Kentucky		Nov 1					April 30		181
Missouri		Nov 1					April 15		212
Tennessee		Nov 15					April 15		152

- IL/MO – Cape Girardeau gage Oct 28th and April 19th
- IL/IN/KY? – Olmstead gage Nov 12th and April 18th
- TN – Memphis gage Nov 7th first 58° water temp

Number of Commercial Paddlefish Fishers

- Standard for maximum number of licenses sold for Mississippi and Ohio Rivers?

- Arkansas – No limits; 2018-19 17 roe takers, 16 helpers, 3 resident buyers, 1 non-resident buyer; 2015-16 40 roe takers and 43 roe helpers – likely to require all to buy roe taker license in future which could double the number of roe taker licenses sold
- Kentucky – 101 residents and 18 nonresidents (Statewide); ~60's past 5 years?
- Missouri – No limits; no more than 7/year sold in last 10 years; no non-residents sold since 2009 (pre-SOA); 3 harvesters, 2 are also dealers
- Tennessee – 40 residents and 5 nonresidents (statewide); ~10 MSR sold last several years
- Illinois – 50 permits for roe-bearing species for Mississippi River north and south zones; 10 permits Ohio River and MSR south zone (L&D 26 to Ohio River); 15 permits Illinois River. 75 total possible. 65 sold in 2019.
- Indiana – Ohio River Roe Harvester capped at 15 total (in-state and out-of-state combined); 2-3 sold last several years
- Recommendation: Prevent future growth in license sales by capping at current or recent levels (or reciprocal with border state, i.e., MO) to limit potential for increased fishing mortality by managing a limited entry fishery.

Gear Restrictions

- standard for minimum mesh size?

- Arkansas – Gill and trammel nets > 3.5" bar mesh. Nets must be marked with gear tags. (MS River only regs)
- Kentucky – Gill and trammel nets 3.5-4.5" bar mesh. Stationary nets can use bar mesh > 4.5". Nets checked every 24 hours.
- Missouri – Gill and trammel nets attended at all times (2" minimum bar).
- Tennessee – Gill nets > 5" bar mesh. Limited to 12 gill nets daily.
- Illinois –Trammel and gill nets attended 10am-4pm (with roe-bearing species). 2" minimum bar mesh MSR; 4" minimum OHR only
- Indiana – Gill and trammel nets minimum bar mesh 4". Nets must be marked with gear tag for every 100ft of net. Gill and trammel nets checked every 24 hours, with captured fish removed.

Gear Restrictions

5" or 6" standard for minimum mesh size to reduce handling of smaller females

- *'Paddlefish may only be harvested out of nets with 6" or larger bar mesh'*
- are there restrictions against hobbling nets?

- Arkansas – Would consider 5 or 6" mesh size
- Kentucky –
- Missouri – Would consider 5 or 6" mesh size
- Tennessee – Would consider 6"
- Illinois – Would consider 5 or 6" mesh size
- Indiana – Would consider 6"

* Need an evaluation of length curves of females caught by different mesh sizes: 4" (if data), 5", and 6"

* Evaluation of mono vs twist vs multi-filament nets? Not immediate need

Gear Restrictions

- standards for maximum net length, net number, or total yards fished?

- Arkansas –
- Kentucky –
- Missouri –
- Tennessee – Limited to 12 gill nets daily.
- Illinois –
- Indiana –

* First need to tease apart set vs drifting nets; need a standardized effort to evaluate

Gear Restrictions

- net length, net number, or total yards fished

- Arkansas – currently requires tag every 100 yards
- Kentucky –
- Missouri – fishermen need to be within site of nets with current regs; currently requires tag every 100 yards
- Tennessee – Limited to 12 gill nets daily (30 yrds each). Does not allow drifted nets.
- Illinois – currently requires tag every 100 yards
- Indiana – currently requires tag every 100 yards

* First need to tease apart set vs drifting nets; need a standardized effort to evaluate
* Could limit the number of tags/fisherman, with std requirement per net

Reporting Requirements

- Minimum reporting standards?

- Arkansas – Monthly reporting required – day of roe harvest, # egg sacks, # of fish harvested.
- Illinois – List all helpers prior to commercial fishing season.
- Indiana – Maintain daily records. Monthly reporting required (commercial fishers and roe harvesters). Roe dealers must submit a monthly dealers report.
- Kentucky – Maintain daily records. Monthly reporting required.
- Missouri – Monthly reporting required (commercial fishers and roe dealers).
- Tennessee – Daily harvest/import receipt for all roe fish species.

Arkansas Commercial Paddlefish Harvest Data

License Year	Number of Permits	Egg Harvest (lbs)	Fish Harvested
2015 - 2016	13	2,354	750
2016 – 2017	9	2,918	979
2017 - 2018	11	1,766	605

Kentucky Commercial Paddlefish Harvest Data

License Year	Number of Permits	Egg Harvest (lbs)	Fish Harvested
2015 - 2016	30	18,212	8,382
2016 – 2017	27	13,294	8,860
2017 - 2018	28	11,299	7,731

Missouri Commercial Paddlefish Harvest Data

License Year	Number of Permits	Egg Harvest (lbs)	Fish Harvested
2015 - 2016	2	221	180
2016 – 2017	6	446	209
2017 - 2018	3	110	86

Tennessee Commercial Paddlefish Harvest Data

License Year	Number of Permits	Egg Harvest (lbs)	Fish Harvested
2015 - 2016	12	5,611	1,181
2016 – 2017	7	804	283
2017 - 2018	10	3,471	1,195

Illinois Commercial Paddlefish Harvest Data

License Year	Number of Permits	Egg Harvest (lbs)	Fish Harvested
2015 - 2016	53	1,388	458
2016 – 2017	60	791	246
2017 - 2018	57	664	268

Indiana Commercial Paddlefish Harvest Data

License Year	Number of Permits	Egg Harvest (lbs)	Fish Harvested
2015 - 2016	7	245	128
2016 – 2017	6	468	130
2017 - 2018	2	1,146	368

STATE REPORTS

ARKANSAS

Report to the MICRA Paddlefish and Sturgeon Committee
Arkansas
2019

1. The Arkansas Paddlefish Management Plan has been drafted and is in revision. This plan may be finished in the next 6 months. This plan will have a summary of commercial harvest.

2. Dylan Hann and Eric Brinkman are studying abundance of Shovelnose Sturgeon in the Red River.

3. A total of 243 Paddlefish have been captured for the White River stock assessment. We have collected 6 known age fish. We have sectioned all the jaw bones for these fish and are finishing the egg counts.

INDIANA

2020 MICRA Paddlefish/Sturgeon Committee

STL/Fenton, MO – January 14-15, 2020

Indiana State Update – Craig Jansen

- 2019 Paddlefish Sampling:
    - 5 sampling trips yielded 218 paddlefish. Mean EFL was 781 mm (30.7 in). Of these fish, 101 were female, with 13 of those being gravid (F4). Three of 13 gravid females were under 32 inches.

- 2019 Shovelnose Sturgeon Sampling:
    - 697 shovelnose were sampled; all new fish were floy tagged. Mean FL was 649 mm (25.5 in) for all fish, mean FL for gravid females as 664 mm (26.1 in). 16 fish were recaptures from previous years, including 1 individual that were at large for 14 years – it was 0.2 inches smaller at the recapture event. 28 fish were gravid females (4.7%), of which seven were under the current 25 in MLL.

- 2019 Lake Sturgeon Sampling:
    - Annual monitoring of the small East Fork White River population as usual. Confirmed report of a lake sturgeon caught at a lowhead dam up the West Fork White River, over 200 river miles from the East Fork populated stretch.

- 2019 Commercial Fishing:
    - Only had two Ohio River roe harvester license holders
        - They collectively reported 592 paddlefish, and 1240 lbs eggs
    - Had three inland roe harvester license holders (Shovelnose sturgeon harvest only), after no one purchased a license in either 2017 or ’18. They likely only purchased because of the roe closure proposal sitting on the table.
        - They collectively reported 145 shovelnose sturgeon, and 44 lbs eggs.

- The roe closure regulation proposal has been pulled from the collective rule package, and is being discussed independently at this point. It is still not completely off the table, but OMB (Office of Management and Budget) has been asking a lot of questions that is delaying the proposal from moving forward. This proposal was prompted by the continual documented declines of the Wabash River sturgeon fishery accompanied with a suspected decline of Ohio River paddlefish, both due to the limited protection for gravid females under current regulations. In addition, the money generated through roe harvester and dealer license sales does not come close to the operational costs associated with managing those roe fisheries. Because there is a state moratorium on rules/regulations that impact ‘small business’, OMB is finding it hard to justify the need for this closure.

IOWA

Iowa MICRA Paddlefish and Sturgeon Committee Meeting Update

Iowa Regulation Change:

In 2007, a 27" commercial fishing minimum length limit was implemented. Additionally, in 2009 a rule was passed that made it illegal to possess any Shovelnose Sturgeon less than 27" in Iowa waters to help prevent commercial fishers from just using an Illinois license.

Since the regulation change, the population appears to be responding well. Annual standardized trawling catch rates of Shovelnose Sturgeon have increased substantially since 2011 (i.e., twenty-five-year median- 2.79 fish/haul, median for years 1993-2009- 2.08 fish/haul, median for years 2010-2019- 6.80 fish/haul; Figure 2). Commercial overharvest of mature females appears to be the primary factor that was affecting the reduced natural recruitment.

Continue to work with interconnected state agencies (e.g., Illinois) to continue to develop consistent regulations and management strategies.

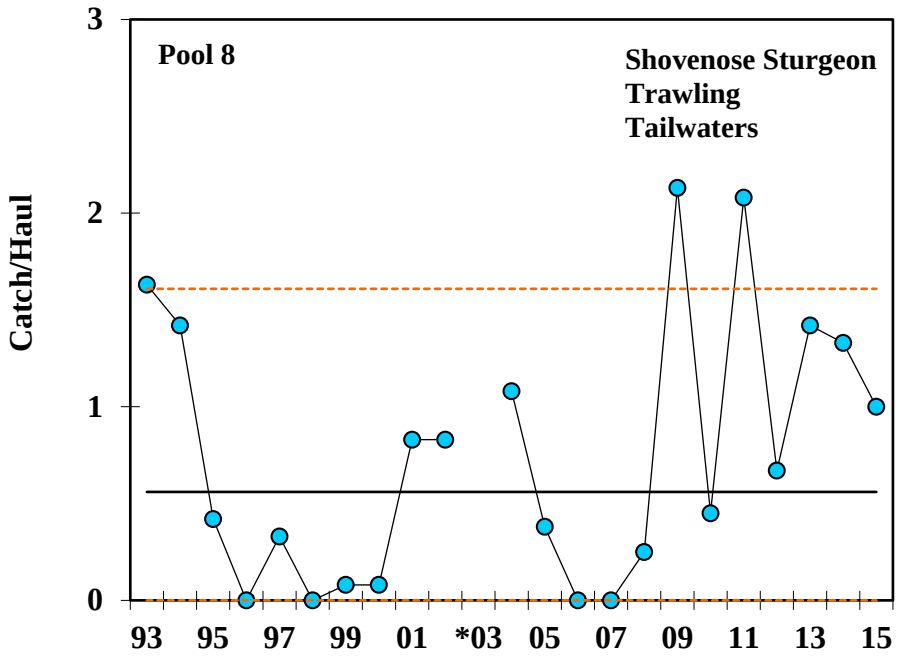

Figure 1. Trends in mean catch per unit effort (CPUE; circles), with 27-year medians (solid line) and 10% and 90% percentiles (dashed lines) of Shovelnose Sturgeon in Pool 8 tailwater trawling used in LTRM sampling, 1993-2015 with 27" minimum length limit in place.

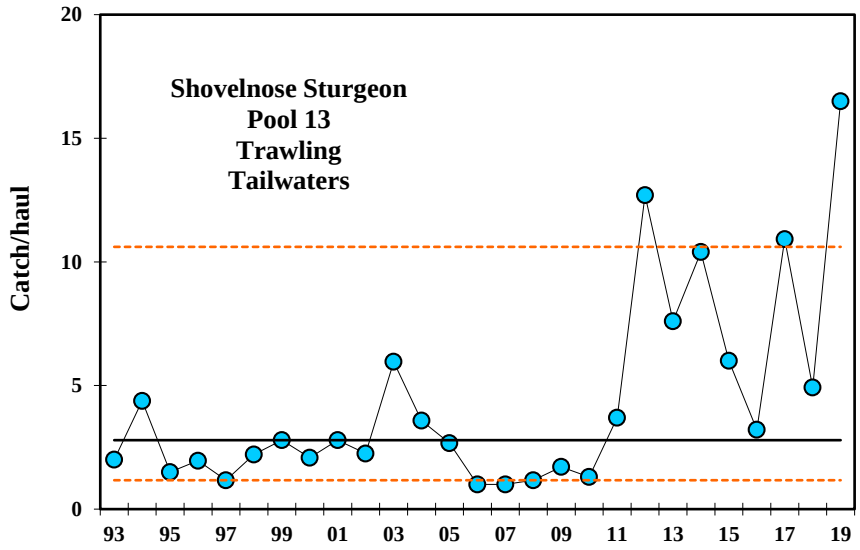

Figure 2. Trends in mean catch per unit effort (CPUE; circles), with 27-year medians (solid line) and 10% and 90% percentiles (dashed lines) of Shovelnose Sturgeon in Pool 13 tailwater trawling used in LTRM sampling, 1993-2019 with 27" minimum length limit in place.

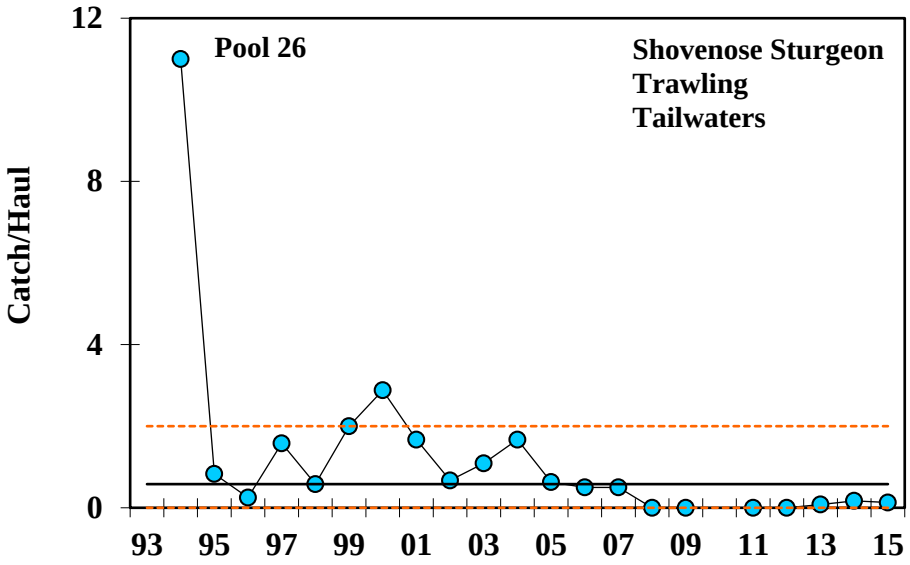

Figure 3. Trends in mean catch per unit effort (CPUE; circles), with 27-year medians (solid line) and 10% and 90% percentiles (dashed lines) of Shovelnose Sturgeon in Pool 26 tailwater trawling used in LTRM sampling, 1993-2015 with no minimum length limit in place.

See- 7047 Completion report for Shovelnose Sturgeon update.

Main Points:

The objectives of this study were to:

1) Evaluate methods/gears to sample Shovelnose Sturgeon in tributaries
2) Evaluate population demographics of populations

Gear Evaluation: Drifted trammel nets, electrofishing, and otter trawling were evaluated, mostly in the Cedar River

- Trammel netting was the most consistent gear with the lowest variation in catch, thus the fewest samples to gain estimates in relative abundance are required compared to electrofishing and trawling
    - Trammel netting also captured the widest size range of fish and most proportionate male:female ratio
- Electrofishing and trawling provided higher efficiency (e.g., catch/day) than did trammel netting
- Smaller fish were largely absent from sampling in the Cedar River, thus further investigation into gears and sampling locations is an area of interest for us to investigate in the future
    - These tributaries do contain suspected spawning congregations, and because larval sturgeon are known to drift for hundreds of river kilometers, these smaller fish may not be present in primary sampling location in the Cedar River- UMR/Trib Dynamics???

Population Demographics:

- Have been sampling and tagging Shovelnose Sturgeon in the Cedar River since 2006 so we have a fairly substantial mark-recapture database
- Using this we are investigating:
    - Growth via mark-recapture similar to Hamel et al. (2014 and 2015).
        - Growth is SLOW!
        - Once individuals reach 550mm growth slows to ~3 mm/year
        - Likely reach ages much older than previously thought
            - Still working through model to predict estimated max age but it currently does not predict growth of smaller individuals very well
                - Still trying to diagnose why this is happening and how we may be able to make adjustments to make it fit better
        - Looking into bomb radiocarbon analysis to hopefully determine how old these individuals may get.
            - Otoliths are hard to find and are tiny and brittle, not sure if it is possible yet
- Spawning periodicity:
    - Males- likely spawning in successive years
    - Females- 2-3 year periodicity

MISSOURI

Report to the MICRA Paddlefish and Sturgeon Committee
Missouri
2019

Lake Sturgeon (LKSG)

Management

Missouri Department of Conservation (MDC) staff having been working to write the third edition of our LKSG recovery effort. "A Continuing Plan for Recovery and Management of Lake Sturgeon in Missouri" has been reviewed by MDC staff in Fisheries, Resource Science, Protection, and Outreach & Education divisions as well as select sturgeon production and management staff from the USFWS, Wisconsin DNR, and the Pacific Northwest National Laboratory. The current draft of the plan is under a second review by MDC's Fisheries Administration. This effort is expected to be completed during 2020.

Genoa National Fish Hatchery experienced high survival from hatched fingerlings and offered surplus to MDC for early stocking. In June, 28,500 small fingerlings were stocked into the Gasconade River. In mid-September, 2019, 10,000 6 – 8-inch, coded wire-tagged, fingerling LKSG raised at Genoa NFH were evenly split and stocked into Pools 21 and 24 of the Upper Mississippi River.

Contact Information:
- Name: Travis Moore
- Email: travis.moore@mdc.mo.gov
- Phone: 573-248-2530 x6385

Culture & Stocking

Lost Valley Hatchery

- Source and Number of Fish Received
    - 76,592 fertilized eggs were received from Wild Rose Hatchery in Wisconsin on 5/14/19.
    - All LKSG were reared in production tanks on well water. There was some concern dealing with fin curl and more work will be done in the future to address this issue.
    - Sac fry were started on hatched brine shrimp cysts and then progressed to frozen pacifica krill and frozen brine shrimp for the remainder of the season.
- Produced and Tagged
    - 10,820 fish wire code tagged and had scoots removed then stocked 9/25-27/19.

- 103 fish were tagged with telemetry tags, allowed to heal, and stocked 10/17/19 and 10/28/19. An additional 44 fish were stocked with this group that were not tagged but initially held back for the telemetry study.
- 17,272 surplus LKSG were stocked into the Lamine River at De Bourgmont Access.
- From egg to <8" and >8" fish Lost Valley had a 36.8% survival rate in 2019.

- Stocking Locations and Number Stocked

Production <8"		
Requested Lake Name	# Requested	Total # Stocked
Missouri River - Osage (Mari-Osa) <8	3,334	3,762 f
Missouri River - Gasconade (Rollins Ferry) <8	3,333	3,262 f
Missouri Ricer- Gasconade (Fredricksburg) <8	3,333	3,796 f
Production =>8" (Telemetry Tagged)		
Requested Lake Name	# Requested	Total # Stocked
Missouri River - Gasconade (Fredricksburg) =>8	100	26 f
Missouri River - Osage (Mari-Osa) =>8	0	26 f
Missouri River - Osage (Snellen Property) =>8	0	24 f
Missouri River - Gasconade (Rollins Ferry) =>8	0	27 f
Surplus =>8"		
Requested Lake Name	# Requested	Total # Stocked
Missouri River - Osage (Mari-Osa) =>8	0	44 f

Literature Available: *2019 Lake Sturgeon Production and Stocking Report*
Contact Information:

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Research

***Missouri River Tributary Lake Sturgeon Project*:** The objectives of the project are to determine habitat selection, distribution, movement, and site fidelity of stocked juvenile, subadult, and adult LKSG in the Osage and Gasconade rivers. Sampling and tagging of adult LKSG concluded in the spring of 2019 resulting in a final sample size of 100 LKSG implanted with Vemco V16 acoustic telemetry tags with ~4-year battery life. Sixty-six LKSG were tagged in the Osage River and 34 in the Gasconade River. Several fish over 50" FL were tagged and 77% of tagged fish are potentially reproductively mature at >40" FL. Mortalities and shed tags have been rare. We have documented seven confirmed mortality or tag shedding events and the status of three additional fish not recently detected remains unknown.

We will continue to monitor movement of tagged fish with boat-mounted hydrophone surveys through June 2020, providing precise location and microhabitat selection information. We will also continue monitoring movement of tagged LKSG using a network of over 40 Vemco stationary receivers through

May 2021. Movement data show that large, Missouri River tributaries are important habitats, with LKSG spending >70% of their time there. Tributary use is highest in the spring spawning season when many LKSG make upstream migrations. While we haven't observed evidence of reproduction, we have documented aggregations of LKSG near large shoals that may provide suitable spawning habitat. During summer, LKSG select the deepest available habitats with low current velocities specifically near the mouths of the Osage and Gasconade rivers and in a gravel dredging pool in the Osage River. In the spring and fall, fish are more likely to occupy shallower habitats in areas with swifter flows.

The Osage and Gasconade rivers are the most frequently used tributaries by LKSG we have tagged. LKSG have been detected in the Moreau, Lamine, and Grand rivers, and last spring an adult male LKSG was detected by a receiver at Rathbun Dam, 142 miles up the Chariton River. An adult female was detected in the Mississippi River near Keokuk, IA in June 2019. Preliminary data suggests that fish follow annual movement patterns and a population structure may exist. LKSG movement patterns are most similar among fish that were tagged in the same location. Three distinct movement patterns are emerging among tagged fish. Groups include fish that primarily occupy the Osage River gravel dredging pool, those that occupy the lower 10 miles of the Osage River, and those that occupy the lower 10 miles of the Gasconade River. The latter two groups may mix in the Missouri River; 51% of Gasconade tagged fish having spent time in the Osage and 23% of Osage tagged fish having spent time in the Gasconade.

To assess interannual variability in movements a juvenile telemetry study was conducted. In October 2018, 100 fingerlings were implanted with acoustic, ultrasonic transmitters and held at Lost Valley Hatchery for 11 days. Mortality and/or tag-shedding prior to stocking was minimal (n=5). Remaining fingerlings were divided into four batches and stocked at two sites on the Osage River (river miles 10 and 50) and two sites on the Gasconade River (river miles 9 and 50). Osage River fingerlings were actively tracked for three days post-stocking and intermittently through February 2019. Only the downstream-most 10 miles of the Gasconade River was actively tracked during the winter of 2018-2019. Remote receivers placed approximately eight miles apart in each river also collected movement data. Over the 4-month study, 3 fish were detected leaving the Osage or Gasconade rivers. One fingerling from the Gasconade River traveled downstream, entered the Missouri River, traveled 21 miles upstream, and entered the Osage River. Spatial capture-recapture models using only receiver detections estimated 4-month survival at 0.48 and 0.12 for age-0 LKSG stocked in the Osage and Gasconade rivers respectively. Low estimated survival rates using this method was likely a result of limited dispersal at low water temperatures. When manual hydrophone detections were added, inferred overwinter survival rose to 0.59 (Osage) and 0.34 (Gasconade), despite limited manual tracking of the Gasconade. Average dispersal of age-0 fish was greater in the Osage (35.8 km) than the Gasconade (8.2 km).

In October 2019, 100 telemetry tagged fish were again stocked at the same 4 sites. Manual tracking of juveniles for survival estimates and habitat selection is ongoing through February 2020 and has focused on the Gasconade River. Preliminary results indicate similar movement patterns as 2018 with many stocked fish remaining in the lower 20 miles of the Gasconade. Age-0 LKSG are frequently relocated downstream of inside river bends in habitats with finer substrates and lower current velocities.

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Pallid Sturgeon (PDSG)

Culture & Stocking

Blind Pony Hatchery

Blind Pony Fish Hatchery transported and held no potential PDSG broodstock during the 2019 production year. Due to the concerns of ranavirus it was decided that no fish for the restoration program would come through Blind Pony. No PDSG were stocked from Blind Pony in 2019.

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Research

***Pallid Sturgeon Monitoring*:** The 2019 sampling year in Missouri was impacted by prolonged flooding on the Missouri River, but still resulted in 55 pallid sturgeon capture events (45 hatchery and 10 wild). Sampling resulted in 24 pallid sturgeon captures above the confluence with the Kansas River in Segment 9 and 31 captures below the Kansas River in Segment 10. Also, 14 genetically confirmed shovelnose x pallid sturgeon hybrids were sampled between both segments. In the Missouri River above the confluence with the Kansas River, some individual pallid sturgeon had shown a decline in their condition starting in 2014, but condition trends from MDC sampling have continued to display a positive trajectory in subsequent years and are now similar to those seen in 2008 - 2013.

Broodstock collection efforts were not conducted in 2019 due to a change in overall sampling protocols and project objectives. Still, sampling efforts resulted in 6 potential broodstock fish transported to Neosho National Fish Hatchery. Genetic samples were taken on 292 young-of-year sturgeon captured in otter trawls. All were confirmed to be shovelnose sturgeon. Overall, there is still insufficient documented recruitment of naturally reproducing pallid sturgeon.

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***Habitat Assessment and Monitoring Program – Interception and Rearing Complexes Evaluation*:** Flooding during a large part of the 2019 sampling season made accessing sites difficult and reduce overall sample numbers. Missouri Department of Conservation personnel completed 480 trawls at 4 bends for the interception and rearing complex study on the lower Missouri River. Proposed IRC sites included: Pelican Bend (RM 10-16), St. Albans Bend (RM 52-55), Morrison Bend (RM 110-112), and Portland Bend (RM 112-116). Three additional bends- New Haven Bend (RM 80-82.5), Providence Bend (RM 170-172), and Searcy Bend (RM 178-181) were sampled opportunistically to catch additional age-0 sturgeon. Sampling was conducted mid-May through September 2019. Fish collections used standard sampling protocols outlined in the Missouri River standard Operating Procedures for Fish Sampling and Data Collection version 1.8. Sites sampled included:

A total of 2,540 fish were collected during 2019. Thiry-six unidentified *Scaphirhynchus* sturgeons <170 mm fork length (FL) were collected by MDC field staff, ranging from 15 mm total length (TL) to 76 mm FL. Highest abundances of USGs collected during 2019 were at Pelican Bend (N=23).

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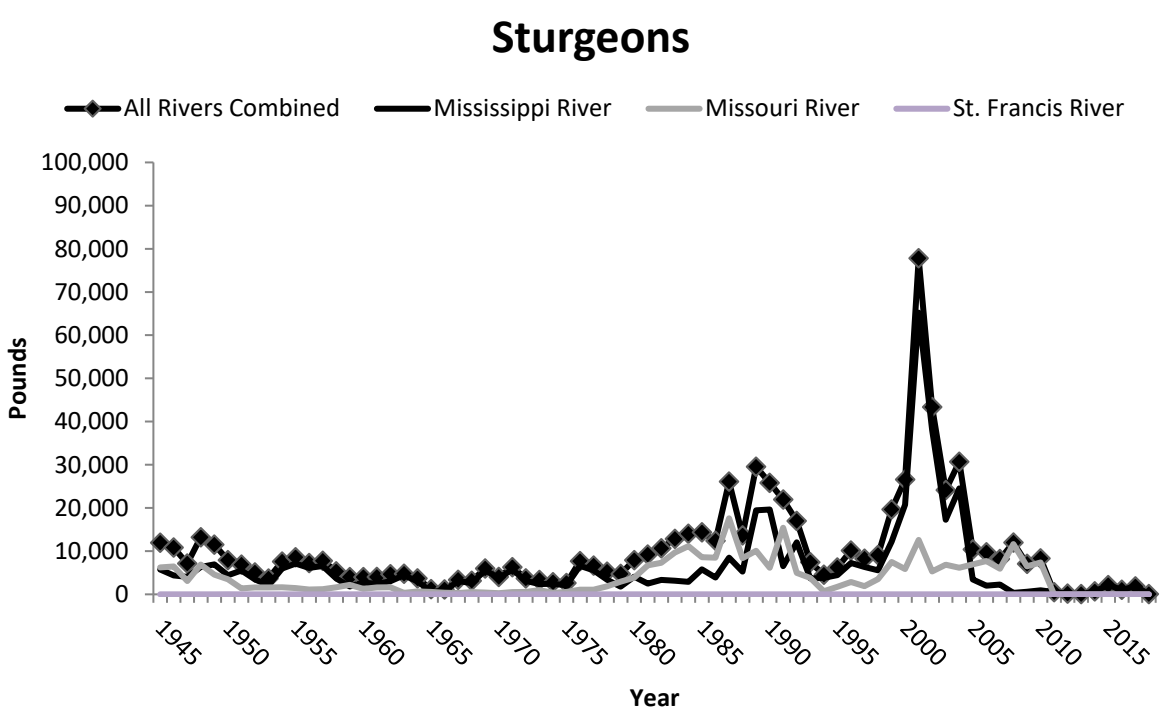
Shovelnose Sturgeon (SNSG)

Commercial Fishing Program

Upper Mississippi River shovelnose sturgeon harvest decreased from 1,849 lbs. in 2017 to 48 lbs. in 2018 (the second lowest harvest ever recorded), consisted of 19 fish (average weight 2.5 lbs./fish), produced 10.59 lbs. of roe, and was entirely from Pool 24. All fish were captured in trammel nets.



Pounds of sturgeons commercially harvested, by river and from all rivers combined: 1945-2018.

Literature Available: *Missouri Commercial Fish Harvest Report 2018*
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Paddlefish (PDFH)

Management

Reservoir Snag Fisheries: The 2019 snagging season was very good. Rains and high-water levels maintained good flows for most of the snagging season. As a result, snaggers harvested a lot of fish. Snaggers had good luck on the three reservoirs (Lake of the Ozarks, Harry S. Truman Lake and Table Rock Lake), especially on Truman and the Marias des Cygnes River. We're continuing to see good snagging on the Lamine and Osage rivers. High flows kept snaggers off the Mississippi and Missouri rivers and some of their tributaries. The 2020 snagging season should be good. The extremely large 2008-year class of fish is now 12 years old and will continue to provide good numbers of fish for snaggers to harvest. We are seeing an increase in complaints from "traditional" snaggers about those

using dipsy divers – complaints include damage to sublegal sized fish and releasing legal sized fish (which is not legal).

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Culture & Stocking

***Blind Pony Fish Hatchery*:**

Broodstock:

- 10 females collected from Harry S. Truman Reservoir
- 10 males collected from Harry S. Truman Reservoir
- 13 females collected from Osage River
- 11 males collected from Osage River
- 2 non-reproductive females collected from Osage River

Hatchery staff implemented PDFH broodstock collection much earlier than in the past. Staff collected Truman reservoir broodstock on February 21st, and the Osage River broodstock on February 26th. This early collection was successfully tested in 2018 and implemented in 2019 as the standard operating procedure moving forward. Early collection offers several benefits including; an increased timeline to collect needed broodstock, increased docility of PDFH due to the cooler water temperatures, a decrease in pre-spawn mortality (0 in 2018-2019), and an overall reduction of stress on staff. Early collection has been made possible by the acquisition and use of a modern ultra-sound unit. Using this device, staff can immediately identify the sex and maturity of male and female PDFH after capture. Potential broodstock are kept, while all other fish are immediately returned to the water. Traditionally, PDFH brood were collected in mid-March as the water temperatures warmed to 52 degrees. This allowed staff to place gill nets in the upper reaches of the river arms of reservoirs where spawn ready PDFH would be making their run. This method was successful in catching enough mature broodstock, however, it presented several issues including, stress/temperature related gill-net and handling mortality, collection of spawned-out fish, and a short timeline to collect, transfer, and spawn PDFH broodstock.
In 2019, a total of 46 broodstock PDFH were collected from Harry S. Truman Reservoir (20) and the Osage River (26) below the Bagnell Dam. Collecting an equal number of males and females was attempted to achieve a 1:1 spawn ratio. Emphasis was placed on the Osage River collection to avoid collecting hatchery reared fish. No broodstock were collected from Table Rock Lake in 2019. Later analysis revealed two of the Osage River males were non-reproductive females resulting in the actual total of males collected standing at 21. River PDFH exhibit a lower body condition which makes them more difficult to sex. Males are particularly difficult to differentiate from non-reproductive females. However, the use of an ultra-sounding device in 2019 nearly eliminated misidentification in 2019.

Spawning:

- 2,175,899 eggs collected
- 1,312,349 eggs hatched (60% Hatch)

Twenty-three females were given a dose of 1 mg/kg of LHRH-a through two intraperitoneal injections. A .1 mg/kg dose was given 32 hours before expected ovulation. The remaining .9 mg/kg dose was injected 20 hours prior to expected ovulation. All males received .1 mg dose 32 hours prior to spawning which has long been proven to be sufficient for adequate sperm production.
Fifteen 1:1 PDFH male x female crosses were initially achieved. 3 additional females were crossed with sperm from 3 males which had already been used. Decisions on specific male x female crosses were made at random during the spawning process. In total, 2,175,899 eggs were produced from 18 females and 15 males. A 60% hatch rate was achieved for a total of 1,312,349 fry. 1 female's eggs did not produce any fry; therefore, fry were only produced from 17 females and 14 males.

One female produced eggs which exhibited strange behavior throughout their time in the production room. These eggs were collected, fertilized, and incubated in the same conditions as all family groups taken. They were split between 3 separate egg jars and subsequently three holding tanks after hatch. All three sets of this same family group developed the same. The eggs took 12 days to hatch as compared to 7 days for all other eggs. Once these eggs hatched the fry continued to exhibit abnormal behavior. Typically, PDFH fry exit the egg and immediately begin swimming (and never stop). These fry laid on the bottom of the egg jars similar to the behavior of salmonid sac fry. Most fry typically swim out of the jar and into the holding tank, however, these fish had to be poured out by staff. They continued to lay on the bottom of holding tanks for another several days where they slowly began to swim up, again similar to salmonids. Once they "swam-up" the majority showed unstable/erratic swimming behavior for another day or two. Eventually, most of the fry were swimming strong and appeared to be normal. Their initial development was much slower than their counterparts, so much so that they were pond stocked with fry from the second spawn which were a week younger. These fry were given no special considerations and were stocked into production ponds at an equal percentage as compared to the other family groups.

Osage River (open-river) broodstock contributed to 72% of all fry produced. Some of these were crossed with Truman Lake males/females. Only 15% of fry produced were a pure Osage x Osage cross.

Male x Female	Truman x Truman	Truman x Osage	Osage x Osage	Osage x Truman
Fry	366,318	513,475	201,676	231,680
% of all Fry	28%	39%	15%	18%

Production:

- Ponds 27, 29, 31, 33 stocked at 33,333/acre
- Ponds 28, 30, 32, 34 stocked at 50,000/acre
- 503,348 fry stocked to Blind Pony production ponds.
- 200,000 fry stocked to Lake of the Ozarks

Eight 1.5-acre earthen ponds were used for advanced production of PDFH. Ponds were filter-filled and fertilized two weeks prior to fry stocking. Fry were stocked on April 18th and April 23rd. Distribution of family groups to ponds were determined by the size of each family group and the total number of fry needed. Each pond was represented with a nearly equal percentage of fry from every family group. Assuming equal survival among family groups post fry stocking, progeny from all contributing broodstock were equally available in every pond at time of harvest. Fry stocking rates of 33,333 per acre and 50,000 per acre were varied into ponds on an alternating basis. In total, 503,348 fry were stocked into Blind Pony Hatchery production ponds. 809,001 surplus PDFH fry were realized due to the exceptional hatch percentage (60%). 200,000 fry were stocked into Lake of the Ozarks. The remaining surplus fry were destroyed.

Harvest data showed no apparent relation of fry survival rates as compared to fry stocking densities in ponds. Ponds stocked at 33,333 fry/acre exhibited survival rates ranging from 2.78% - 14.62%. Ponds stocked at 50,000 fry/acre exhibited very similar rates ranging from 2.89% - 13.23%. This is consistent with past data which suggest fry survival is not immediately affected by stocking densities ranging between 33,333-50,000 fry/acre. This data also suggests there are other factors affecting the differences in survival rates between ponds. Further studies are still needed to determine limiting factors of PAH fry survival in Blind Pony Hatchery's production ponds.

PDFH were fed a Skretting trout diet ranging from #1 starter to 4.5 mm.
Harvest:

- 43,715 fish harvested
- 8.74% survival
- 15,002 Lake of the Ozarks
- 15,564 Harry S. Truman Reservoir
- 7,550 Table Rock Lake
- 525 Black River
- 5,022 to Kansas Department of Wildlife and Parks

Traditionally PDFH have been harvested in late September to Mid-October. Cool summer weather allowed staff to harvest two ponds in August, one in early September and the remaining 5 in October.

New: Surplus Paddlefish were requested by the Kansas Department of Wildlife and Parks. Blind Pony Hatchery realized 5,022 surplus 16" PDFH. These fish were picked up by Kansas Staff on October 17th and stocked into Pomona (1,412), Perry (2,128), and Tuttle Creek (2,128) reservoirs.

Literature Available: *Blind Pony State Fish Hatchery Report 2019*
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Research

***Black River Paddlefish Monitoring*:** The Black River downstream of Clearwater Dam supports a significant PDFH sport fishery. Trammel nets and angler use surveys in the large pool below Clearwater Dam have been used to monitor the fishery since 1994. Exploitation rates are calculated assuming 20% non-compliance and zero tag loss. Over the past four years, exploitation ranged between 15 and 31%.

Black River	2015	2016	2017	2018	2019	2020
New jaw tagged fish =	94	32	83	48	107	
Number harvested =	22	4	17	8	28	
20% non-reporting	26.4	4.8	20.4	89.6	33.6	
Est. Exploitation	**28.1**	**15.0**	**24.6**	**20.0**	**31.4**	

PDFH movement in the Black River is substantial. In December 2016, 24 acoustic tags were implanted in PDFH captured just downstream of Clearwater Dam. Acoustic tags from harvested PDFH are implanted back into additional PDFH at this same location. Stationary acoustic tag receivers have been installed just downstream Clearwater Dam (river mile 257), Highway 67 Bridge near Hendrickson, MO (river mile 228), Highway 62 Bridge near Corning, AR (river mile 152), and Highway 69 Bridge near Newport, AR (river mile 0). Of the 33 PDFH with an acoustic tag, 11 PDFH appear to have never moved out of the dam pool. Fourteen PDFH have been located more than 30 river miles downstream of the original tagging location. Five individuals have been located more than 100 river miles downstream from the original tagging location. Two of these five PDFH have been documented moving from the Clearwater dam site to Corning AR twice.

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***Statewide Paddlefish Reproduction and Exploitation in Missouri's Large Rivers and Reservoirs*:** We have completed the fifth sampling season of the five-year study and still receiving calls for tag returns.
Jaw Tagging & Exploitation:

Mississippi River	2015	2016	2017	2018	2019	Total
Tagged	297	305	281	675	666	2,224
Jaw bands harvested	9	22	12	18	31	92
Annual exploitation rate	3.47%	4.25%	1.61%	1.36%	1.64%	
Mean exploitation rate (SE)						2.47 (0.58)

Lake of the Ozarks	2015	2016	2017	2018	2019	Total
Tagged	357	618	358	630	171	2,134
Jaw bands harvested	20	38	88	120	204	470
Annual exploitation rate	2.30%	3.28%	8.15%	7.77%	13.47%	
Mean exploitation rate (SE)						6.99 (1.99)

Truman	2015	2016	2017	2018	2019	Total
Tagged	665	181	448	464	307	2,065
Jaw bands harvested	52	53	75	122	152	454
Annual exploitation rate	8.93%	8.48%	6.66%	9.02%	10.27%	
Mean exploitation rate (SE)						8.67 (0.58)

Table Rock	2015	2016	2017	2018	2019	Total
Tagged	423	687	397	691	349	2,547
Jaw bands harvested	36	64	130	133	93	456
Annual exploitation rate	9.79%	6.73%	11.10%	7.00%	4.91%	
Mean exploitation rate (SE)						7.91 (1.12)

*2019 exploitation estimates are not final – we are still receiving calls and jaw tags have not been at large a complete year

*Non-reporting estimates from transmitters are an average estimate from four years of data.

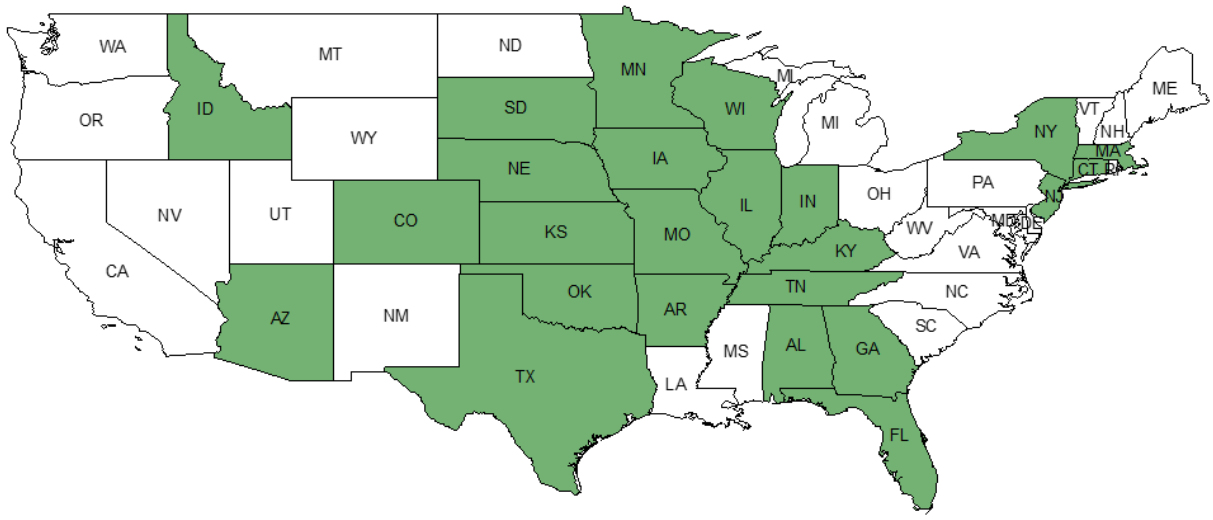
*$\text{Exploitation} = \frac{(\text{Jaw Bands Harvested/Reporting Rate})}{\text{Available Jaw Bands}}$

River Paddlefish: A total of 54 fish were recreationally harvested, accounting for 58.7% of the total, with commercial harvest compromising the remaining 41.3%. More than half the jaw band returns were from fishermen in other states.

All Recaptures	N	Average Distance Swam	Percent of Recaps	Median	Max	Min
Arkansas	7	738.99	5.00%	703.76	981.70	589.02
Illinois	14	64.71	10.00%	33.80	455.44	0.00
Iowa	5	37.66	3.57%	0.00	128.75	0.00
Kentucky	47	224.71	33.57%	152.08	1509.56	4.83
Louisiana	1	820.76	0.71%	820.76	820.76	820.76
Mississippi	4	319.45	2.86%	162.54	775.70	518.21
Missouri	56	56.44	40.00%	0.00	496.48	0.00
Nebraska	1	1491.21	0.71%	1491.21	1491.21	1491.21
Tennessee	5	234.74	3.57%	234.16	456.57	146.45
Totals	140	443.19	100.00%	399.81	790.69	396.72

*All recaptured PDFH, average distance traveled by state as shown on the vertical column with the number in the sample (N), average distance swam (km), percent of recaptured fish, median, maximum (Max) and minimum (Min).

Reservoir Paddlefish



*Green states are ones where a person who snagged a PDFH tagged in one of the reservoirs had a license.

Paddlefish Movement

In 2019 we continued to track and monitor the movement of implanted PDFH with stationary receivers in the Mississippi River (102), Black River (25), St. Francis River (25), Lake of the Ozarks (100), Truman (100) and Table Rock Lake (100).

The transmitter fish have served a dual purpose: 1) measure of non-reporting and 2) track reproductive movement patterns. We documented successful reproduction in the Mississippi River in all 5 years of the study. We did not focus on finding reproduction on the reservoirs this year.

Movement Information:
Reservoirs

- Truman Lake
    - Fish were caught by anglers on the Marais des Cygnes River below Osawatomie Dam KS.
    - Fish passed through Truman Dam and were detected in Lake of the Ozarks and Bagnell Dam and were detected in the Osage River.
    - Fish were snagged by anglers below Gavins Point Dam.
- Lake of the Ozarks
    - Fish passed through Bagnell Dam and was snagged below Clinton Dam near Lawrence, KS on the Wakarusa River (tributary to Kansas River).

    - Others passed through Bagnell and were caught below Gavins Point Dam or were detected on stationary receivers throughout the Mississippi and Missouri River Basin.
- Table Rock
    - Fish snagged below Bull Shoals Power Site Dam in Forsyth, MO.

Not only have jaw banded fish been detected outside of the reservoirs, but also 10 of the fish tagged with transmitters in Lake of the Ozarks and 1 tagged in Truman have been detected outside of the reservoirs (i.e., Osage, Missouri, Mississippi, Illinois, and Kaskaskia Rivers).

Mississippi River

- 552 river miles – Tagged near Cape Girardeau, MO, swam down the Mississippi River, up the White River, AR, up the Cache River, AR, and caught/released near Fredonia, AR.
- 519 river miles – Tagged near Cape Girardeau, MO, swam this distance downstream over a two-month period before being harvested in northern Louisiana.
- ~438 river miles – Three PDFH, all implanted in different locations, swam ~218 miles up the Mississippi River, 220 miles up the Illinois River, and detected at Starved Rock Lock and Dam in Illinois by the USFWS. One of those PDFH then swam back to the Mississippi River and was detected again just below the confluence of the Des Moines River near Keokuk, Iowa; an additional distance of 366 miles, totaling at least 804 river miles.
- 393 river miles – Two PDFH, implanted downstream of Thebes, IL swam 196 miles up the Mississippi River, 197 miles up the Missouri River, and detected at Boonville, MO.
- Almost 2000 miles – one PDFH tagged near the mouth of the Ohio River was detected near Mississippi River mile 3 in the Delta National Wildlife Refuge stationary receiver array and then detected again back at the mouth of the Ohio River.
- 32 tagged or implanted PDFH were recaptured or detected in the Ohio River or tributaries of the Ohio River (i.e., Tennessee and Cumberland River).

Information Link: https://huntfish.mdc.mo.gov/fishing/protect-missouri-fishing/help-improve-paddlefishing

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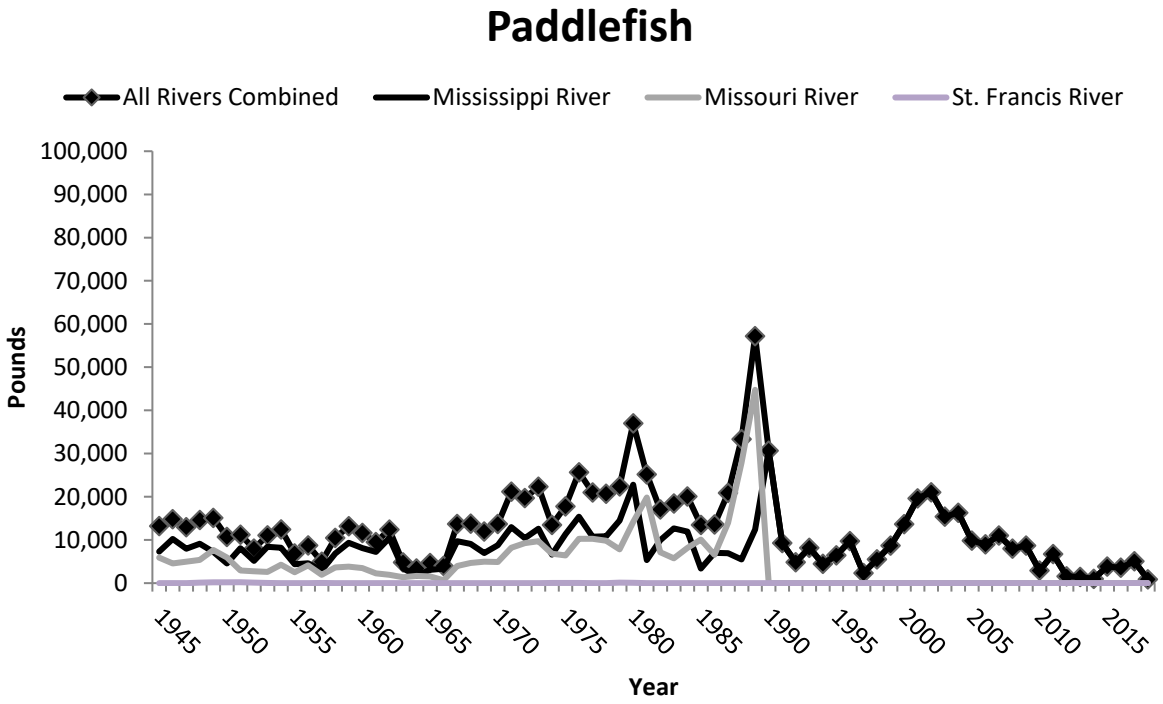
Commercial Fishing Program

Mississippi River paddlefish harvest decreased from 5,042 lbs. in 2017 to 872 lbs. in 2018 (the lowest harvest ever recorded), consisted of 44 fish (average weight 19.8 lbs./fish), and produced 62.71 lbs. of roe. Paddlefish harvest was highest on the LMR (835 lbs.), more specifically RM 828-878 (835 lbs.) near the Arkansas border. All fish were captured in gill nets (872 lbs.).



Pounds of paddlefish commercially harvested, by river and from all rivers combined: 1945-2018.

Literature Available: *Missouri Commercial Fish Harvest Report 2018*

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OKLAHOMA

MICRA Paddlefish and Sturgeon Committee – January 2020
OK State Report - Oklahoma Department of Wildlife Conservation

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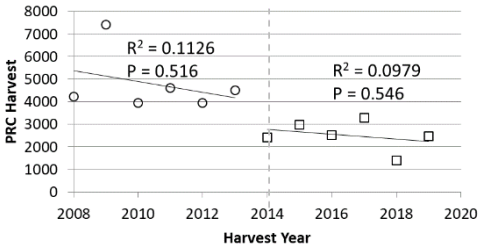
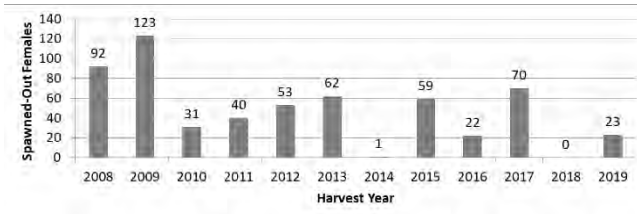
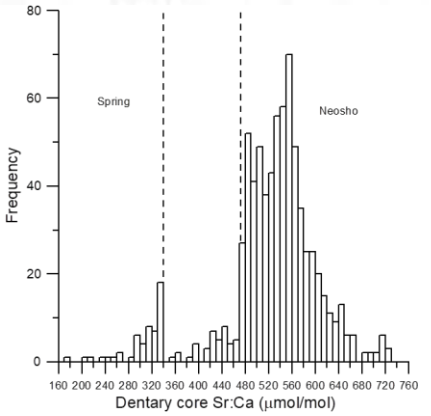
1) Paddlefish Collections
   a) Winter Netting 2019-20
      i) Keystone – large fish, gaining reputation as a trophy destination
      ii) Grand Lake – banding lots of fish from 2015 spawn, positive outlook for abundance and snagging
      iii) Ft. Gibson – abundance low due to timing?
2) Angler harvest – Spring 2019
   a) 2,451 fish were checked in at the Paddlefish Research Center (PRC)
      i) Within expected range of harvest (large increase over 2018)
      ii) Spawning was documented with spent fish, later observance of YOY
      iii) Statewide flooding likely contributed to recruitment success and distributed fish
   b) Caviar – the PRC produced 7,386.4 lbs of caviar, average 6.7 lbs per female
      i) Avg GSI for females holding at ~20%
      ii) Caviar market increasingly dominated by inexpensive Chinese imports
3) Harvest Management
   a) No regulatory or infrastructure changes in 2019
   b) Considering some regulation changes for 2021
      i) Rescind Monday and Friday catch and release days
      ii) Allow snagging at Arkansas River Zink Dam (Tulsa)
4) Current Research 2020
   a) Wrapping up dentary microchem project with Dr. Whitledge (SIU)
      i) 87% of samples originated in the Neosho River (7% Spring River)
   b) OK State Univ. investigating factors influencing restoration success in 2 of 4 OK Reservoirs, recommendations on future restoration sites
5) Future Research 2020 and beyond
   a) Providing viral/RNA samples for Fisheries and Oceans Canada







Shovelnose Sturgeon

No movement on additional low-water dams on the Arkansas River; USACE has yet to issue the 404 permits (despite having issued 401 permits). Discussions are ongoing and ODWC has maintained opposition to the structures on behalf of Shovelnose, Paddlefish, American Eel, and other migratory fishes.

TENNESSEE

MICRA report for Tennessee

Table 6. Annual statewide commercial paddlefish harvest in FY 2019 based on Daily Commercial Roe Fish Harvest Reports (WR-0896).

	Paddlefish				
Waterbody	Flesh (lbs)	Egg Weight (lbs)	No. of Females	No. of Males	Total Number of Fish
Mississippi River	15,004	4,150	1,277	74	1,351
Chickamauga Reservoir	3,485	576	85	101	186
Kentucky Reservoir	2,630	461	97	20	117
Barkley Reservoir	185	17	5	5	10
Guntersville Reservoir	157	54	6		6
Nickajack Reservoir	154	28	6		6
Cheatham Reservoir	31	14	2		2
Not Provided	11	4	1		1
Total	21,657	5,303	1,479	200	1,679

Lake Sturgeon Sampling and Stocking for 2019 calendar year

Totals

- 577 Lake Sturgeon angler reports as of 11/19/2019
- 281,427 total stocked (212,889 – Tennessee River / 68,538 Cumberland River)

5 year average stocking numbers

- Cumberland River – ~7,500
- Tennessee River - ~14,500

Sampling

- Sampled on Old Hickory Reservoir 10/20-21/2019 by TVA (gillnet) and 11/18-21/2019 by TWRA (trotlines)
    - 2019 Cumberland River – 14 captured (40 to 124 cm total length) (0.21 to 10.6 kg total weight)
- Sampled on for East TN 12/9-13/2019 by TVA, USFWS, UTK, TWRA (trotlines)

86 captures and 2 re-captures - USFW