Pennsylvania Fish & Boat Commission Biologist Report

Sweet Arrow Lake

Schuylkill County

Channel Catfish Spawning Box Study Results

Sweet Arrow Lake is located approximately one-mile northeast of the Borough of Pine Grove and is owned and operated by Schuylkill County Parks and Recreation. The impoundment supports year-round recreational angling opportunities for warmwater sportfish species and catchable trout during spring. There is one public boat launch, a mooring area, and an ADA-accessible fishing pier with ample parking; all are located off State Route 3002 (Sweet Arrow Lake Road). Only non-powered and electric motorized boats are permitted.

Figure 1. Sweet Arrow Lake, Schuylkill County.

The warmwater fishery at Sweet Arrow Lake is supported mostly by self-sustaining fish populations with maintenance stocking of Channel Catfish and Tiger Muskellunge by the Pennsylvania Fish and Boat Commission (PFBC). The impoundment also offers seasonal angling opportunities for catchable-sized trout stocked by the PFBC and the Northern Swatara Cooperative Trout Nursery. Fishing is regulated under Commonwealth Inland Waters Regulations and the fishery is managed as a Stocked Trout Water Open to Year Round Fishing.

Catfish Spawning Box Study Results

Sweet Arrow Lake's Channel Catfish population was evaluated from 2014 through 2021 to assess the benefit of placement of artificial catfish spawning habitat as an alternative management approach to maintaining the catfish population solely by stocking and/or to enhance that stocking approach. Use of cavity spawning habitat (i.e., catfish spawning boxes) for adult Channel Catfish was pursued for its potential cost-saving benefits over stocking since PFBC's hatchery production is limited (Table 1). The use of catfish spawning boxes in impoundments like Sweet Arrow Lake is based on their application in open-pond culture as a natural spawning methodology for Channel Catfish in hatchery operations. Studies conducted by the PFBC's Lake Habitat section have expanded on their successful use in hatchery settings and documented that wooden boxes (Figures 2 and 3) have been successfully utilized by spawning Channel Catfish when deployed in other stocked impoundments in Pennsylvania. However, use of these spawning structures beyond established aquaculture has not been fully evaluated in a natural setting where predators and other challenges occur. Therefore, we investigated whether placing artificial spawning structures in Sweet Arrow Lake would create suitable spawning habitat for a cavity-nesting species to support their population through natural reproduction and therefore result in more resourceful management of the fishery.

Table 1. Sweet Arrow Lake Channel Catfish stocking history from 2004.

Year	Life Stage	Number	Estimated Number/Acre
2004	Fingerling	1,993	20
2006	Fingerling	1,500	15
2007	Fingerling	3,000	30
2008	Fingerling	3,000	30
2010	Yearling	3,000	30
2012	Yearling	4,000	40
2013	Fingerling	2,000	20
2013	Fingerling	2,000	20
2021	Fingerling	2,500	40
2021	Yearling	1,000	10

Thirty-three catfish spawning boxes were strategically placed in the lake and fingerling Channel Catfish plants were suspended in 2013. These actions provided a timeframe to assess spawning box use by adult Channel Catfish for reproduction and recruitment of young into the population. Statewide Channel Catfish average length-at-age information was used to assign a probable length range of Channel Catfish that would be attributable

to natural reproduction for this evaluation. Based on that information, we conservatively assigned any Channel Catfish 18" long and less to natural reproduction while all fish longer than 18" were credited to prior management (i.e., stocking) efforts.

Figure 2. Catfish spawning box

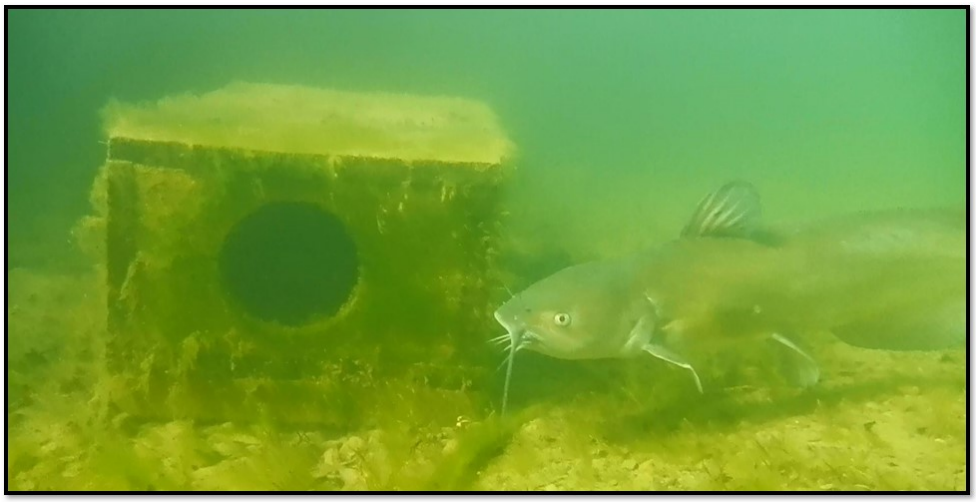

Figure 3. Underwater image of Channel Catfish at entrance to catfish spawning box

In conjunction with this study the PFBC's Lake Habitat Section surveyed Channel Catfish occupancy and/or use of spawning boxes during June when peak spawning typically occurs, and reproductively mature females seek nesting cavities to deposit their eggs that are then guarded by males. Channel Catfish occupancy of spawning boxes was highly variable, ranging from zero to 96% utilization (Table 2).

Table 2. Summary of Channel Catfish spawning box occupancy and/or use.

Date	Number of Boxes Checked for Occupancy/Use	Number Occupied/Used	Percent Utilization
06-01-2016	28	21	75
06-20-2016	33	17	52
06-20-2017	26	25	**96**
06-14-2018	30	5	17
06-2019	Not surveyed	-	-
06-08-2020	28	**0**	**0**
6-14-2021	13	7	54

A second phase of the study was performed by PFBC's Division of Fisheries Management to capture Channel Catfish in hoop and trap nets in 2014 and 2015 (Pre-placement of spawning boxes) and in 2019 and 2020 (Post-placement of spawning boxes). This was done to assess population dynamics before and after fingerling plants were discontinued. Here, the objective was to compare Channel Catfish abundance and population size structure to when hatchery stocking did and did not occur.

Overall, the number of Channel Catfish collected decreased from pre-placement of catfish spawning habitat (N=108) to post-placement (N=24) in Sweet Arrow Lake (Tables 3 and 4). This difference was reflected in catch per net night (CPNN) and catch per hour values for total catch and fish ≤ 18 inches for hoop and trap nets. Interestingly, the lower number of Channel Catfish collected in 2019 and 2020 corresponded with the period of no hatchery stocking. Thus, the absence of young-of-year, yearling, and larger juvenile (i.e., ≤ 18") Channel Catfish during the 2019 and 2020 surveys suggests insufficient production and recruitment to maintain the population's abundance established through the maintenance stocking program. Additionally, before and after survey catches showed a shift in the range of sizes present to larger and fewer individuals, and no individuals less than 20 inches when managed for natural reproduction solely (Figure 4). Although observations of high spawning box occupancy were encouraging, other factors like water temperature and survival of eggs through fry and fingering life stages apparently played a larger role in shaping year-class production and strength in this lake.

Table 3. Summary of Channel Catfish catch from hoop net surveys.

Year	Number Caught	Catch Per Net Night	Number ≤ 18 inches	Catch Per Hour ≤ 18 Inches	Netting Effort (hours)
2014 -Pre	8	0.67	3	0.01	282.22
2015 -Pre	0	0.00	0	0.00	283.92
2020 -Post	1	0.08	0	0.00	275.00

Table 4. Summary of Channel Catfish catch from trap net surveys.

Year	Number Caught	Catch Per Hour	Number ≤ 18 inches	Catch Per Hour ≤ 18 inches	Netting Effort (hours)
2014 -Pre	28	0.08	8	0.02	327.17
2015-Pre	72	0.22	14	0.04	329.27
2019-Post	17	0.06	0	0.00	327.92
2020-Post	6	0.02	0	0.00	277.50

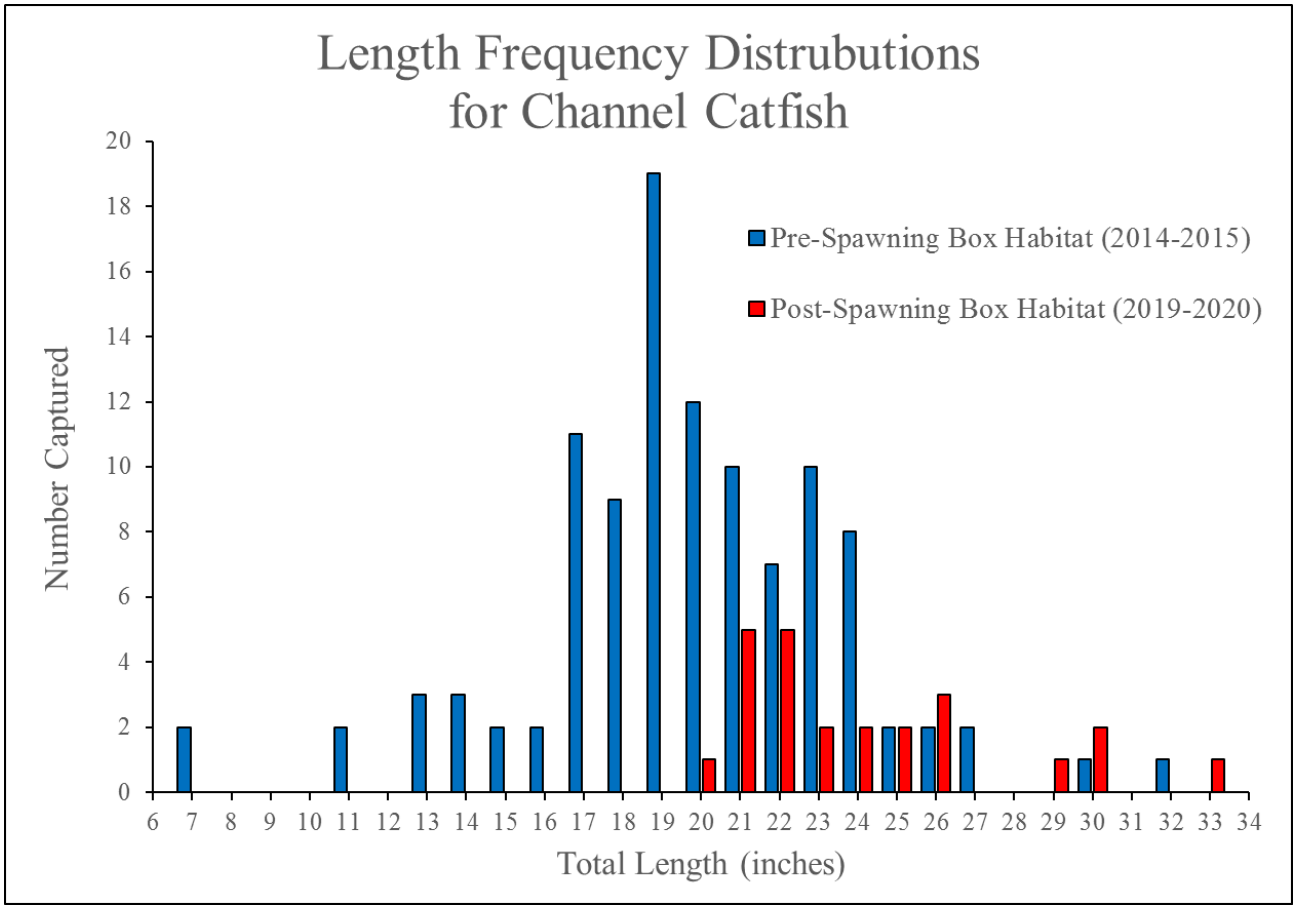

Figure 4. Comparison of length frequency distributions for Channel Catfish collected during 2014 and 2015 (pre- catfish spawning box habitat) and 2019 and 2020 (post-catfish spawning box habitat) at Sweet Arrow Lake, Schuylkill County.

In conclusion, the management objective to maintain and/or enhance Sweet Arrow Lake's Channel Catfish fishery through placement of catfish spawning box structures to promote natural reproduction was not realized over the duration of the study. As a result, Sweet Arrow Lake was returned to the Channel Catfish stocking program with annual plants resuming in 2021. To expedite rebuilding of the population, yearling Channel Catfish were stocked in addition to fingerlings (Table 1). Yearling Channel Catfish were included as recent evaluations have shown them to be more successful in recruiting to the population because large fish have been shown to exhibit greater survival and create higher quality fisheries sooner. In coming years, PFBC's production and management will transition to stocking larger Channel Catfish to be more efficient in population maintenance. Despite not meeting expectations, catfish spawning boxes were left in place to provide nesting habitats for Channel Catfish as broodfish numbers (Figure 5) rebuild through stocking to potentially supplement the hatchery supported fishery over time through their documented use by adults to naturally reproduce in the lake.

Figure 5. Adult Channel Catfish from Sweet Arrow Lake

Fisheries Management Area 7
Southcentral Region