Lake Moomaw Angler - Creel Survey

April – September 2018

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Background: The purpose of this creel survey was to quantify angler demographics, effort, preferences, success, and satisfaction at Lake Moomaw, Alleghany and Bath Counties, Virginia between April 1 through September 30, 2018. Past creel surveys at the lake were conducted in 1983, 1986, 1992 and 2006.

Lake Moomaw is a 2,530 acre impoundment located in the Ridge and Valley physiographic province of western Virginia. Gathright Dam impounds 12 miles of the Jackson River with a drainage area of 345 square miles above the lake. The reservoir is quite dendritic with a shoreline distance is 43 miles. Over 13,420 acres of the Gathright Wildlife Management Area and hundreds of acres of George Washington National Forest surround Lake Moomaw. There is minimal human development around the reservoir (Figure 1).

Figure 1. Sattelite image of Lake Moomaw (2011).

The construction of Gathright Dam was authorized in 1946, and was built by the U. S. Army Corps of Engineers between 1970 and 1981. It filled to recreational pool level in January, 1982. Its primary functions, in order of importance, are downstream water quality mitigation, flood control, and recreation. The dam backs up water to 1,582 feet

above sea level (conservation pool) and discharge out of the lake is controlled by an intake tower with ten water control portals (Figure 2). Water can be selectively withdrawn from different elevations in the impoundment, mixed in the intake tower, and released downstream to maintain coldwater habitat for trout in the tailwater. Gathright Dam also includes two large sluice gates on the bottom of the intake tower for flood control releases.

Figure 2. View of intake tower from Gathright Dam at Lake Moomaw.

Lake Moomaw has an average depth of 79 feet, with a maximum depth of 150 feet near Gathright Dam. During summer, much of the lake undergoes thermal stratification, creating an ideal environment for both warmwater and coldwater fish species. When the Jackson River was impounded, native or naturalized fish species such as Smallmouth Bass, Rock Bass, Chain Pickerel, Redbreast Sunfish, White Sucker, Creek Chubsucker, and Yellow Bullhead populated the developing reservoir. The Virginia Department of Game and Inland Fisheries (VDGIF) developed a stocking strategy that added Largemouth Bass, Bluegill, Redear Sunfish, Channel Catfish, Alewife, Blueback Herring, and Black Crappie to the warmwater fisheries component. These species were released in the early 1980's and have not been stocked since. All of these stockings were successful, except for the blueback herring introduction. Common Carp were introduced via bait bucket in the 1990's and have developed a significant population throughout the lake. Yellow Perch were also introduced to the lake by anglers in the early 1990's. A strong metalimnion exists during summer and VDGIF made a decision before 1981 to use trout as the pelagic predator. Advanced fingerling Brown Trout and Rainbow Trout are stocked annually into Lake Moomaw to support the coldwater fishery component.

Three public boat landings are available to watercraft under 25 feet in length. One primitive boat launch exists at the north end of the lake. Two developed campgrounds are available to the public, as well as two primitive camping areas.

Methods An access point creel survey was chosen to replicate past access surveys at Lake Moomaw, to take advantage of heavily-used boat landings, and to obtain as much completed trip data as possible. One creel technician was hired to conduct interviews following a randomized survey schedule. A stratified, multi-stage sampling design was used to capture time periods (AM or PM), sampling days (weekday or weekend), seasons (daylight savings or regular time), and boat landings (three). Non-uniform probabilities were assigned to each of the above variables to help develop monthly schedules that covered the entire lake, with appropriate weight given to more heavily used locations. The survey was conducted 12-15 days per month. The number of sample days for the entire survey period (April – September) was 88. The DGIF Creel Technician asked anglers a series of questions about their fishing trip when they were finished fishing for the day (Appendix I).

Results

Angler Statistics

A total of 412 anglers were interviewed during the survey. Lake Moomaw is predominately a "local" fishery as ~75% of anglers lived within 100 miles of the lake. 83% of anglers were from Virginia and 16% came from West Virginia. 1.2% travelled from four other states (IN,NC, PA,TN).

There are limited areas accessible to shoreline anglers at Lake Moomaw. Previous creel surveys reported that roughly 10% of anglers fished from shore at Lake Moomaw. While we did not differentiate boat from shoreline anglers during this survey, shoreline anglers fishing in the vicinity of the boat access points where we surveyed were interviewed.

Anglers were asked to rate their fishing trip for that day. 55% indicated that they were "satisfied" with their fishing experience that trip, while 40% of anglers rated their fishing experience that day as good to excellent.

Lake Moomaw anglers are a dedicated group, fishing the lake an average of 28 days per year. Days fishing Lake Moomaw per year ranged from 1-200.

Fishing tournaments, primarily for black bass, are held at Lake Moomaw almost weekly during the spring and nighttime tournaments are common in the summer months. 30% of anglers interviewed during the survey indicated that they participated in fishing tournaments at Lake Moomaw. Participating in tournaments appears to be very important to these anglers as they averaged fishing in 10 tournaments per year at Lake Moomaw.

Effort

A total of 54,846 hours of angling pressure was expended at Lake Moomaw in 2018 (Figure 3). Peak effort was in April (14,102 hrs.) and May (13,177hrs.). The majority of fishing pressure at Lake Moomaw in 2018 was directed toward black bass (80%), closely followed by trout (14%). Other fish species received insignificant directed fishing pressure (Figure 4). Trout fishing pressure was the greatest in the spring, peaking in June, and anglers concentrated on black bass mainly in April and May (Figure 5).

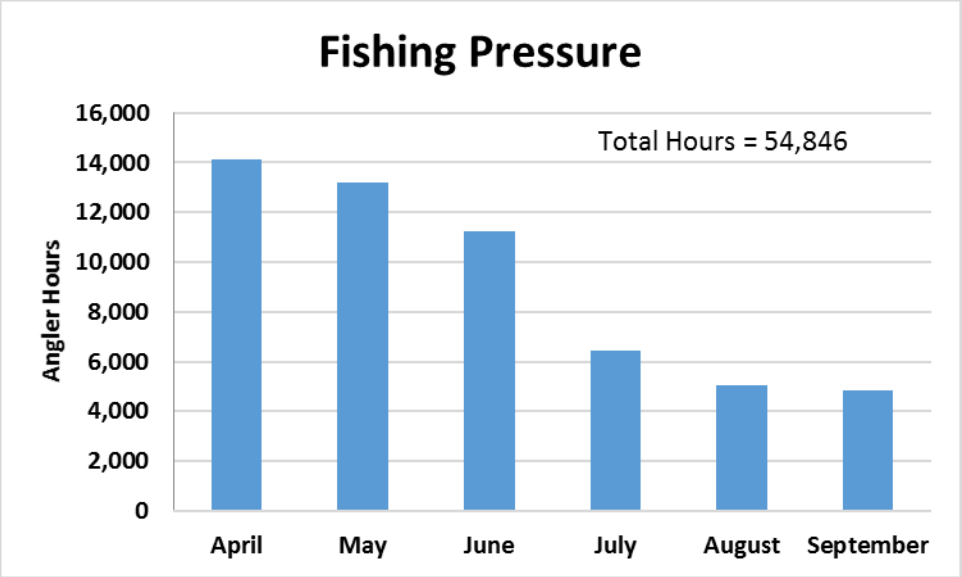


Figure 3. Monthly fishing pressure at Lake Moomaw in 2018.

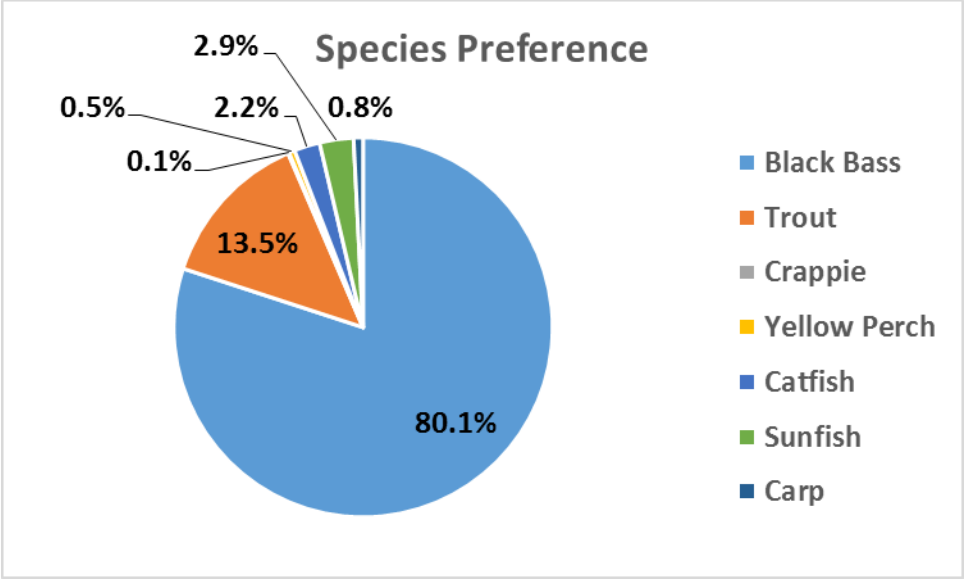


Figure 4. Angler Species preference at Lake Moomaw in 2018.

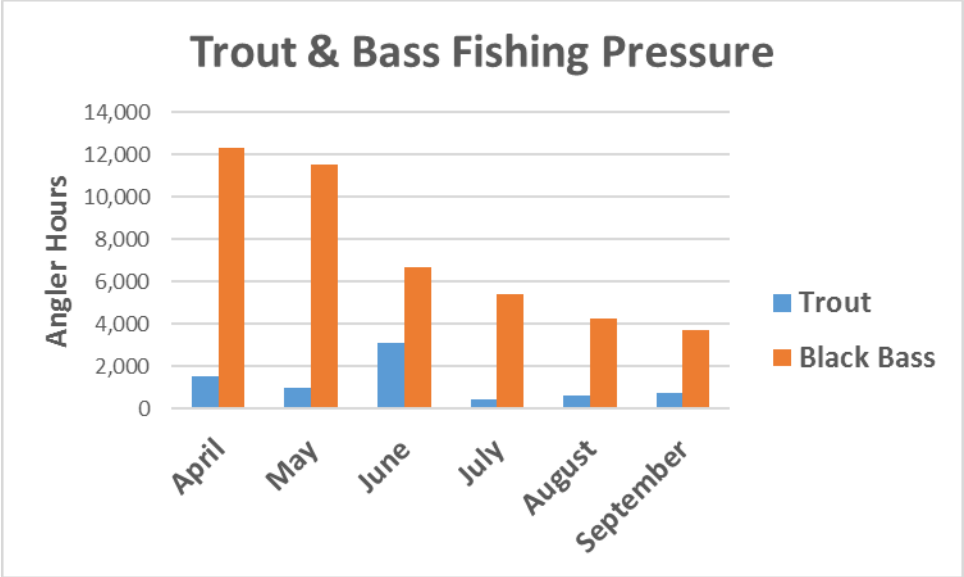
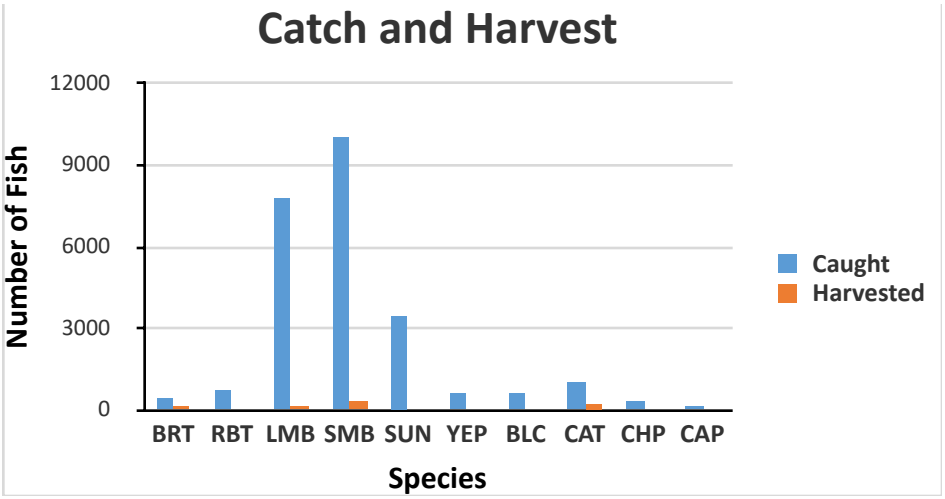


Figure 5. Monthly fishing pressure for bass and trout in 2018.

Catch and Harvest

Close to 25,000 fish were estimated caught at Lake Moomaw during the 2018 survey. The most frequently caught species was Smallmouth Bass, followed by Largemouth Bass, sunfish, and Channel Catfish. To a lesser degree, Rainbow Trout, Yellow Perch, Black Crappie, Brown Trout, and Chain Pickerel were caught, in that order (Figure 6). Of

these, only 3.5% were removed from the reservoir; the remainder were released. The most frequently harvested fish species were Smallmouth Bass and Channel Catfish.



Total
Catch = 24,967
Harvest = 869

(Table 1)

Figure 6. Catch and Harvest by species from Lake Moomaw 2018.

Black Bass: Lake Moomaw is home to a healthy Largemouth and Smallmouth Bass fishery (Figure 7). Smallmouth Bass have increased in dominance over the 37-year life of the reservoir to where they are currently greater in abundance than Largemouth Bass. The black bass fishery was largely catch-and-release, with 98% of Largemouth Bass and 97% of Smallmouth Bass returned to the lake. The overwhelming majority of both Largemouth and Smallmouth Bass released were between 12 and 20 inches. Approximately 10,000 Smallmouth Bass were caught in 2018, compared to 7,800 Largemouth Bass. Although anglers expended more fishing effort toward Largemouth Bass, 2,200 more smallmouth were caught in 2018. The Largemouth Bass catch rate was 0.17 fish per hour and the smallmouth catch rate was 0.15 fish per hour. This is a significant decline compared to the catch rates observed during the 2006 angler creel survey (0.6 and 0.49 fish per hour respectively). However, anglers caught almost twice as many black bass in 2018 compared to the last creel survey in 2006 (Figure 8). The combined angler catch rate for "black bass" (Smallmouth & Largemouth) in 2018 = 0.31 fish per hour (Figure 9).

Figure 7. Typical Largemouth Bass and Smallmouth Bass angled from Lake Moomaw.

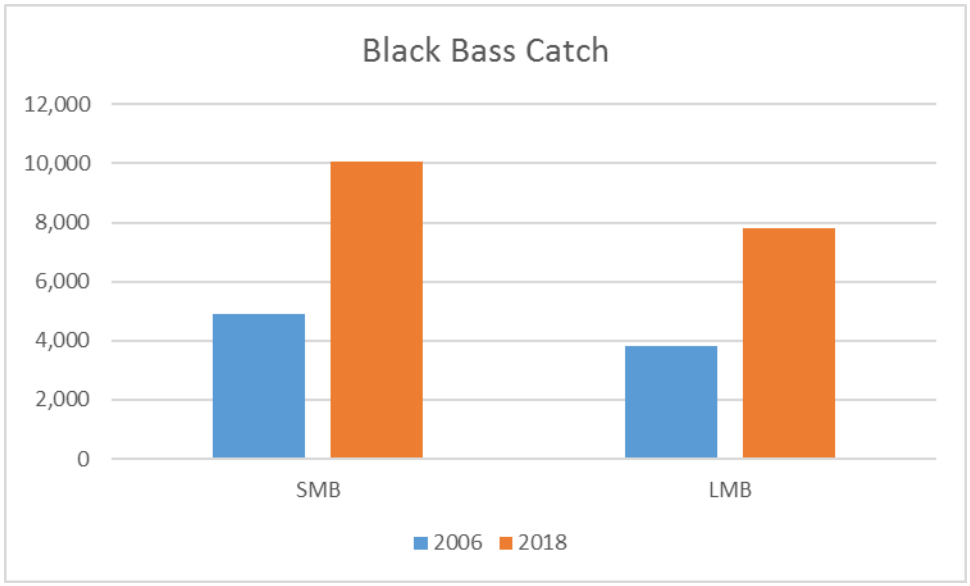


Figure 8. Comparison of black bass caught by anglers in 2006 and 2018.

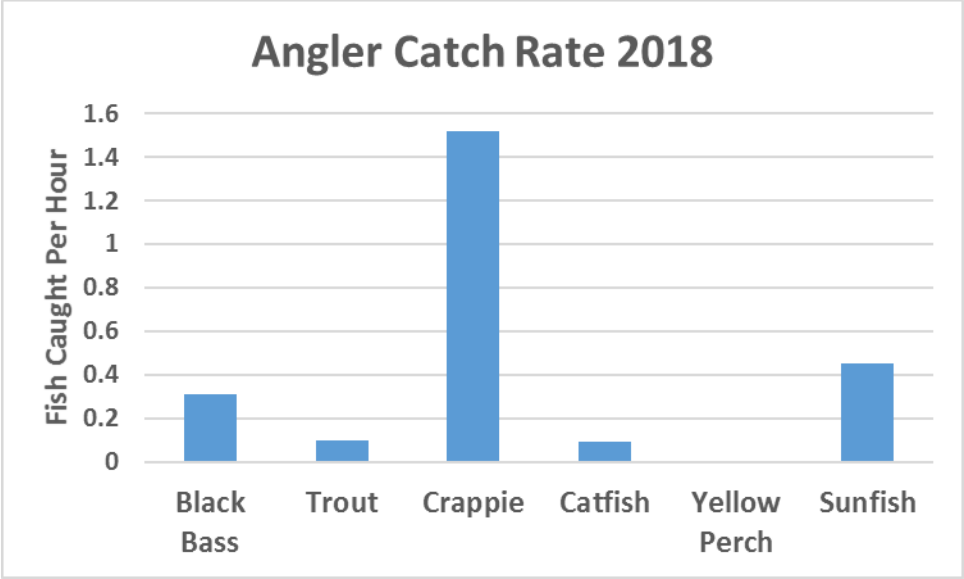


Figure 9. Angler catch rate per species group 2018.

Trout: Historically, several different strains of Brown Trout and McConaughy Strain Rainbow Trout were stocked annually in the lake to provide a coldwater fishery. A 2008 moratorium on the exportation of McConaughy Rainbow Trout eggs from VDGIF's source in Montana required a change in the strain of Rainbow Trout being stocked. Starting in 2009 Chamber's Creek Strain Steelhead Rainbow Trout were stocked in Lake Moomaw and upstream in the Jackson River. Steelhead Rainbows are known to prey upon forage fish more so than other strains of Rainbow Trout. Biologists hoped that Steelhead would take advantage of the abundant alewife population in Lake Moomaw and grow to greater sizes than the McConaughy Rainbows. Between 2009-2017 biologists observed marginal success in Steelhead survival and development of a fishery. Biologists are not able to determine the cause(s) for the poor performance of the Steelhead in Lake Moomaw. Therefore, VDGIF plans to go back to stocking McConaughy Rainbow Trout in 2019. Lake Moomaw historically produced a very good Brown Trout Fishery. The Brown Trout fishery probably reached a climax in the mid 2000's and was still producing trout >10lbs into the early 2010's. Anglers started to report a decline in the Brown Trout fishery around 2014. Only 403 Brown Trout were caught by anglers in 2018 (Figure 10). Approximately 74% were released. Angler catch rate for all trout = 0.10 fish per hour (Figure 9). The Brown Trout fishery appears to have declined dramatically compared to a high point in 2006 when anglers caught ~3,600 fish. However, VDGIF does not have enough angler-creel survey data from sequential years over the past two decades to determine what the "average" annual Brown Trout angler catch should look like. The Brown Trout fishery is comprised of primarily three cohorts of stocked trout. Brown Trout are stocked annually at an "advanced-fingerling" size (6-7"). A stocked cohort of browns generally grow to an average of 13" the first year in

the lake. They average 16-18" in length by their second summer, and grow to 20+ inches the third year. If survival of one stocking (cohort) is poor anglers can experience low catch rates for 2-3 years. Historically anglers caught more Brown Trout than Rainbows Trout in Lake Moomaw. However, a "flip" was observed in 2018 when anglers caught 688 Rainbow Trout. 90% of the Rainbows were released. It should be noted that there is a 16" minimum size regulation for trout in Lake Moomaw and the majority of trout released were <16" in length. Very few browns over 16 inches were released in previous creel surveys. While there were Brown Trout >16" released by anglers in 2018, there were such low numbers caught that biologists are unsure if catch and release rates have decreased. Biologists started stocking sterile (triploid) Brown Trout in Lake Moomaw beginning in 2013. Trout eggs are placed under great pressure at certain temperatures in the hatchery inducing the development of a third set of chromosomes. The adult fish do not look any different than normal fish with two sets of chromosomes (diploid). These triploid trout are thought to grow faster since they do not expend energy into developing eggs and milt. However, survival, behavior, and angler catchability may be different than diploid trout. Biologists will continue to test these theories regarding triploid Brown Trout at Lake Moomaw.

Figure 10. A quality-size Brown Trout from Lake Moomaw.

Yellow Perch: Yellow Perch have a very interesting history at Lake Moomaw. The species was illegally introduced to the reservoir sometime around 1990. Between the late

1990's and the mid 2000's the Yellow Perch population exploded and produced a very popular fishery (Figure 11). Yellow perch became one of the most sought after food fish in Lake Moomaw by the late 2000's, and more citation–size fish were caught from Moomaw than any other water in Virginia. Then the population started a steady decline that began in the early 2010's. For perspective, around 4,100 were caught in 2006 and the 2018 catch was ~500 fish. An angler catch rate could not be calculated in 2018 because there were no anglers surveyed who indicated that they were fishing for Yellow Perch. All the perch were caught by anglers that were targeting other species. To try and stop the population decline, VDGIF imposed a 10 fish/day creel limit on Yellow Perch in 2010. This regulation has not helped increase perch numbers. Biologists have been unable to determine the cause of the population collapse. VDGIF will continue to investigate with hopes of re-building this once popular fishery.

Figure 11. Yellow Perch caught from Lake Moomaw 2016 (Lee Clark)

Sunfish: Lake Moomaw is low in productivity and not ideal habitat for sunfish. Sunfish densities are low compared to other more productive reservoirs in Virginia. There were an estimated 3,434 sunfish caught in 2018. This produced an angler catch rate = 0.45 fish

per hour. Harvest of sunfish was extremely low, as our creel technician did not interview any anglers that harvested a single sunfish.

Channel Catfish: Lake Moomaw has never harbored a significant Channel Catfish population. They were the 4th most sought after species by anglers and an estimated 995 cats were caught in 2018. Only 22% of the Channel Catfish were harvested (221).

Carp and Chain Pickerel: A few anglers indicated that they were specifically fishing for Carp during the 2018 survey. However, a very low number were caught and no harvest was recorded. 315 Chain Pickerel were estimated to be caught in 2018. All would be considered "incidental catch" as these anglers were fishing for other species.

Black Crappie: Only 556 black crappie were caught during the 2018 survey. Lake Moomaw has the ability to produce quality-size black crappie (Figure 12), but their presence in the lake is small compared to trout, bass, and sunfish. Only 5% of the black crappie caught were harvested.

Figure 12. Black Crappie from Lake Moomaw.

Night Fishing: Fishermen were not surveyed at night, but after completing the standard survey questions, anglers were asked if they fished at night. Approximately 38% of those interviewed indicated that they fished after dark. Black bass were most sought after

(76%), followed by catfish (13%) and trout (9%). The remaining night anglers fished for black crappie (Figure 13). Warm weather months, particularly June, July, and August were the most heavily fished at night. Nighttime anglers are quite dedicated indicating that they fished at night an average of fifteen days a year at Lake Moomaw. Night angler catch was quite high with anglers catching an average of six fish per trip. However, harvest by night anglers was low at just 0.4 fish per trip.

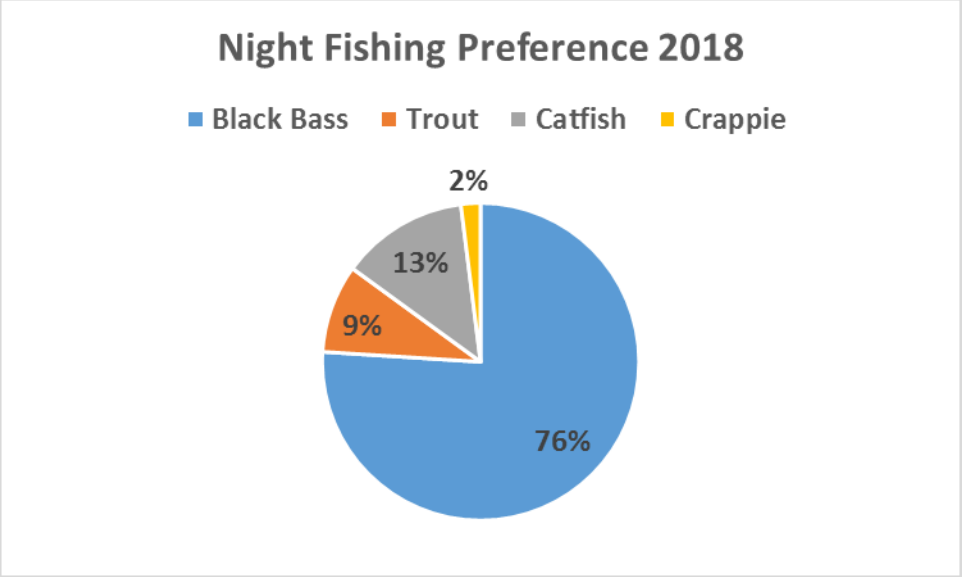


Figure 13. Night angler species preference in 2018 at Lake Moomaw.

Historic Comparisons: Tables 2 - 5 compare some of the metrics from past creel surveys at Lake Moomaw with 2018. Before comparing these numbers with too much scrutiny, consider that survey methodology has changed over time. Also, notice that anglers were not allowed to select that they were fishing for "anything" in 2018. This is why there are no hours in the GENERAL angling effort category and most likely the reason for increased effort for Black Bass in 2018 (Table 2). Regardless, fishing pressure has declined since the early days of the lake. Explanations for changes in angler catch and harvest metrics can be tied to abiotic and biotic factors. Most large reservoirs like Lake Moomaw become less productive over time. Reservoirs produce the most fish biomass and fish see the fastest growth rates the first 10-15 years after the waters are impounded. After this "surge" in productivity, reservoirs gradually become "cleaner" and less fertile. On the biotic side, additions of new fish species to the reservoir can also alter the populations of other species, dramatically changing those fisheries. The introduction and establishment of Yellow Perch and Carp in Lake Moomaw could be the cause for some of these observed changes. Weather and reservoir conditions can also play a role in affecting angler success. Lake Moomaw is operated as a flood control impoundment and routinely experiences fluctuations in the pool level of the lake. Water temperature and

clarity can also change significantly due to rainfall events. 2018 was a very "wet" year and reservoir conditions were constantly changing, and the lake height was not constant particularly during the April-June period (Figure 14). These reservoir conditions could have attributed to decreased angler catch rates for both black bass and trout in 2018. Catch and release has increased dramatically at Lake Moomaw over the past 37 years (Table 4). VDGIF has documented this same trend at other lakes across the Commonwealth.

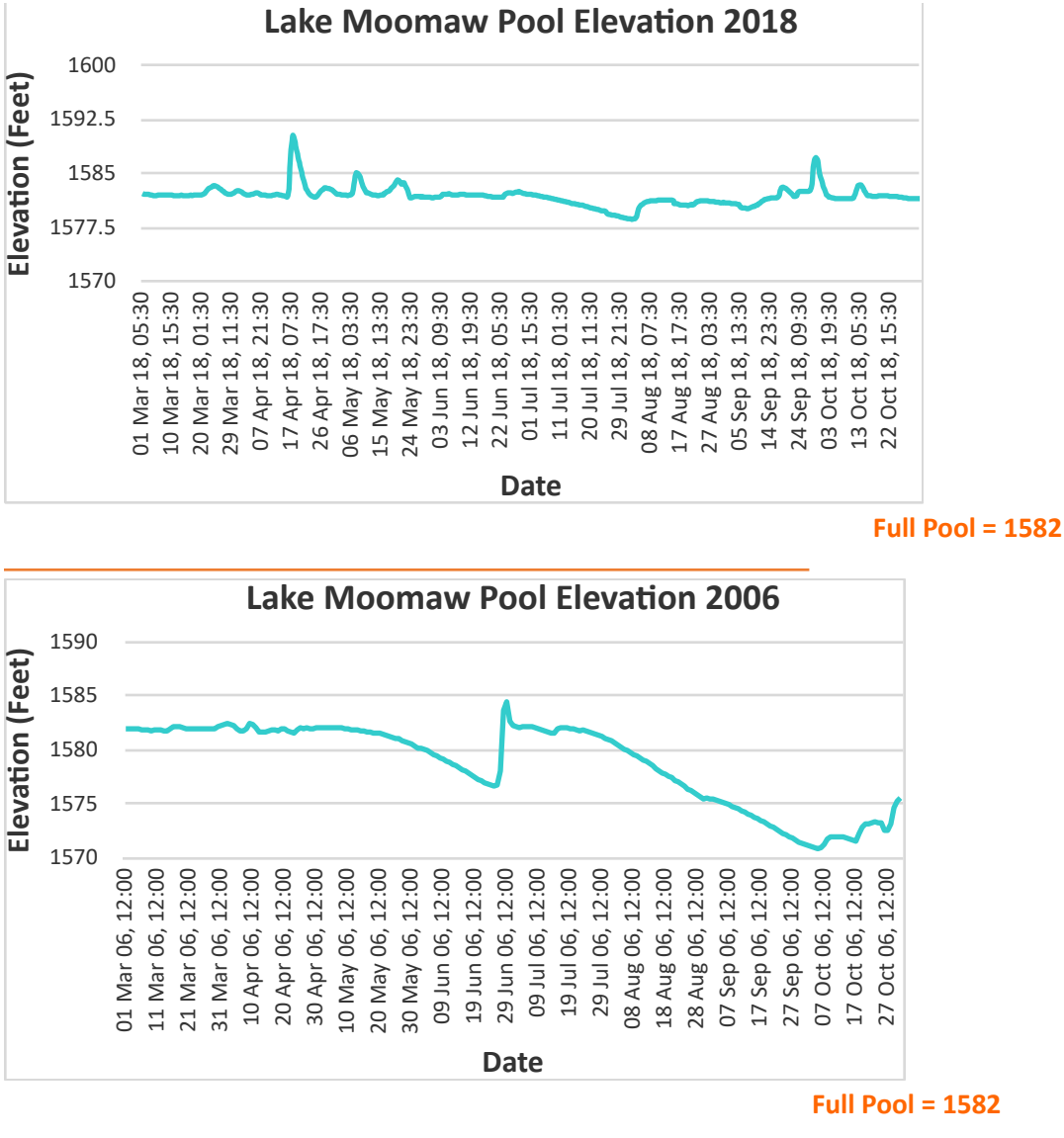


Figure 14. Lake Moomaw pool elevation 2018 and 2006.

Table 1. Abbreviations for fish caught at Lake Moomaw in 2018.

Abbrev.	Fish Name
BRT	Brown Trout
RBT	Rainbow Trout
LMB	Largemouth Bass
SMB	Smallmouth Bass
BLC	Black Crappie
SUN	Sunfish (Bluegill, Redear Sunfish, Rock Bass, Warmouth
CHP	Chain Pickerel
YEP	Yellow Perch
CAP	Common Carp, Mirror Carp, Leather Carp
CCF	Channel Catfish

Table 2. Historic comparison of angling effort at Lake Moomaw

Angling effort (hours)	**1983**	**1992**	**2006**	**2018**
Total	141,438	85,503	33,299	54,846
Black bass	37,528	29,071	12,204	43,910
Crappie	0	1,026	279	30
Catfish	12	1,710	206	1,182

Yellow perch	0	0	2,221	267
Trout	2,703		8,144	7,410
Sunfish	8,446		537	1,589
Chain pickerel	500		0	0
Rock bass	0		0	0
General	92,249		9,160	unk

Table 3. Historic comparison of fish harvest from Lake Moomaw

Harvest (no. of fish)	**1983**	**1992**	**2006**	**2018**
Total	89,166	6,532	5,386	893
Black bass	11,284	2,296	979	450
Crappie	122	517	140	25
Catfish	3,499	215	39	221
Yellow perch	0	31	2,088	0
Trout	1,747	2,012	1,439	174
Sunfish	64,186	1,338	613	0
Chain pickerel	1,845	69	88	23
Rock bass	2,130	54	0	unk

Table 4. Historic comparison of catch rates from Lake Moomaw

Catch rate (no/hour)	**1983**	**1992**	**2006**	**2018**
Total	0.57	0.08	0.41	
Black bass	0.08	0.16	1.10	0.31
Black crappie	0.00	0.01	1.18	1.52
Channel catfish	0.03	0.01	0.25	0.09
Yellow perch	0.00	0.00	0.65	0.00
Trout	0.01	0.03	0.66	0.10
Sunfish	0.44	0.01	0.85	0.45
Chain pickerel	0.01	0.01	0.00	0.00
Rock bass	0.00	0.00	0.00	unk

Table 5. Historic comparison of directed effort from Lake Moomaw

Percent Effort	**1983**	**1992**	**2006**	**2018**
General fishing	65.0	46.5	28.0	unk
Black bass	26.5	34.0	37.3	80.1
Black crappie	0.0	1.2	0.9	0.10
Channel catfish	0.1	0.2	0.6	2.2
Yellow perch	0.0	0.0	6.8	0.5
Trout	2.0	16.8	24.9	13.5
Sunfish	6.0	0.0	1.6	2.9
Chain pickerel	0.4	0.6	0.0	unk
Rock bass	0.0	0.0	0.0	unk

Summary

- The two main fisheries that attract anglers to Lake Moomaw are black bass (smallmouth & largemouth) and trout (brown & rainbow).

- Fishing pressure has remained stable over the past decade.
- The majority (75%) of anglers reside within 100 miles of the reservoir and fish there often (Avg. = 28 trips/year).
- Angler satisfaction was marginal in 2018.
- Fishing in tournaments and at night are important to Lake Moomaw anglers.
- % Catch and Release was high for all species in 2018.
- Anglers caught more Smallmouth Bass than Largemouth Bass in 2018 and that matches the black bass proportions in the lake.
- Angler catch rate (fish/hour) for black bass was lower than observed in 2006, but higher than measured in 1992.
- More Rainbow Trout were caught than Brown Trout in 2018.
- Overall, a significantly lower number of trout were caught or harvested in 2018 compared to 2006.
- The low number of Yellow Perch reported by anglers in 2018 validates the collapse of the population that began in the late 2000's.
- Lake Moomaw harbors only marginal Sunfish, Black Crappie and Channel Catfish fisheries.

Acknowledgements:
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Appendix 1.

LAKE MOOMAW
ANGLER INTERVIEW FORM 2018

"Hello, I'm doing an angler survey for the Dept. of Game and Inland Fisheries. I'd like to ask you some questions about your fishing trip here today. Is that OK?"

Date: _____/_____/_____(month/day/year) Time of Interview: _____(military time) Interview Number: _____

Access Point (1-3) _____ (1 = Fortney, 2 = Bolar, 3 = Coles)

No. of Anglers in Party: _____ Interviewed previously this year? _____

1) **When did you begin fishing today?** _____ (military time)

2.) **What county, state and zip code did you travel from to go fishing here?**

County:_____ State:_____ Zip:_____

3.) What species are you fishing for today? (must pick one – if two, list them both, but the first one mentioned is the main one)

_____ (choose from 3- letter codes below)

4.) **How many fish have you caught and <u>released</u> today?** None_____ or

Get them to name species, and length according to the following:

Largemouth Bass	<12"	12-20"	>20"
Smallmouth Bass	<12"	12-20"	>20"
Brown Trout	<12"	12-16"	>16"
Rainbow Trout	<12"	12-16"	>16"
Yellow Perch	<8"	8-12"	>12"

Other (approximate length and number caught)

Species Caught & Released						
	No.					
	Length					
	No.					
	Length					
	No.					
	Length					
	No.					

	Length					

5) **Would you rate your fishing success <u>today</u> as:** *(only for the person being interviewed)*

1 2 3 4 5 6 7 (circle one)

Poor Fair Good Excellent

6.) Do you participate in fishing tournaments at Lake Moomaw? No Yes How many per year_____

7.) How many days per year do you typically fish Lake Moomaw? _____ or First time fishing the Lake _____

Fish Species Codes

LMB LARGEMOUTH BASS **SMB** SMALLMOUTH BASS **BLC** BLACK CRAPPIE **RBT** RAINBOW TROUT
BNT BROWN TROUT **YEP** YELLOW PERCH **CAT** CATFISH, GENERAL
CHP CHAIN PICKEREL **CAP** COMMON CARP **SUN** SUNFISH, GENERAL (Bluegill, Green Sunfish etc.)

The next few questions deal with night fishing at Lake Moomaw.

8.) **Do you fish here at night?** Yes No *(If Yes, ask #9 through #10e – If no, go to fish harvested section)*

9.) **What species do you fish for at night?** _____ (use 3-letter fish codes)

10a.) **What months do you typically fish at night?**

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (circle all that apply)

10b.) **In a year how many nights do you typically fish Lake Moomaw?** _____nights

10c.) **How many anglers typically fish with you on a night fishing trip**?_____

10d.) **What time do you usually start and finish night fishing?** Start_____(military time) Finish_____(military time)

10e.) **How many and what species do you typically catch on a night fishing trip?**

Species caught	Number caught	Harvested?

"That concludes the interview portion of this survey. At this point, I'd like to measure any fish you've harvested today. Is this o.k.?"

Fish Species Harvested						
	No.					
	Length					
	No.					
	Length					
	No.					
	Length					
	No.					
	Length					

Fish Species Codes

LMB LARGEMOUTH BASS **SMB** SMALLMOUTH BASS **BLC** BLACK CRAPPIE **RBT** RAINBOW TROUT
BNT BROWN TROUT **YEP** YELLOW PERCH **CAT** CATFISH, GENERAL
CHP CHAIN PICKEREL **CAP** COMMON CARP **SUN** SUNFISH, GENERAL (Bluegill, Green Sunfish etc.)

Thank you for participating in this survey. Have a nice day.