

2021 Muskellunge Volunteer Angler Survey Summary:

The Maryland Department of Natural Resources Freshwater Fisheries Program would like to thank all of the 2021 Volunteer Angler Survey participants for providing information. This data assists the department with the management of the upper Potomac Muskellunge fishery. Since the development of our online reporting system in 2019, participation in this program has increased; however, recent results appear that anglers are mainly reporting successful trips. Since the onset of this program, we have used the total number of hours fished compared with the total number of fish caught to obtain an overall catch rate per year. To enable a more accurate comparison and overall understanding of the population trends it is extremely important that all trips are logged.

The Freshwater Fisheries Program has learned that volunteer angling is an efficient means of obtaining data for Potomac River Muskellunge (Figure 1). The program uses volunteer angler survey data to calculate catch rates (catch per hour or hours per fish), size distribution, and mortality estimates on an annual basis. Angler catch data have also provided much larger samples of tagged recaptures to determine movement, growth, and an overall recapture rate (39 percent). These data help indicate the health and density of the population. Consecutive years of lower catch rates and/or decreasing average size would suggest that overfishing or excess mortality/harvest may be occurring. Fisheries managers could then adjust regulations accordingly to assure a high quality fishery is available for the angling public.

Prior to 2019, angler participation in the creel diary program was well below the observed number of anglers targeting Muskellunge on the river. To encourage participation the development of an electronic reporting application was created. Anglers can now save this app to any smartphone or personal computer and enter catch information electronically. For those who choose to continue with the paper copy, it can be printed [here](#).

Additionally, the following incentives exist for each participant:

- 1) Entry into a prize lottery
- 2) A custom Maryland Muskie hat and sticker (upon request; email josh.henesy@maryland.gov)
- 3) An annual summary report that includes the most recent updates on muskie management
- 4) The opportunity to be actively involved in the management/data collection of Potomac River muskies

***To fully participate, all trips must be entered including days where zero fish were caught*
Data obtained from the 2021 creel diary program indicates that anglers are mainly reporting successful outings. Not reporting unsuccessful trips where zero fish are caught artificially inflates the catch rate, which minimizes the ability to detect changes in the population.**

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| # Caught | 205 | 226 | 168 | 212 | 180 | 119 | 110 | 141 | 128 | 94 | 41 |
| Angler Hours | 1413 | 2988 | 2633 | 2839 | 1771 | 1480 | 1546.5 | 1104.5 | 1425 | 839 | 296 |
| Total Catch/Hr | 0.15 | 0.08 | 0.06 | 0.07 | 0.10 | 0.08 | 0.07 | 0.13 | 0.09 | 0.11 | 0.14 |
| # of Trips | 172 | 295 | 321 | 378 | 332 | 286 | 183 | 132 | 192 | 142 | 54 |
| Hours/Fish | 6.7 | 12.5 | 15.7 | 13.5 | 9.8 | 12.4 | 14.1 | 7.8 | 11.5 | 8.9 | 7.2 |
| Participant # | 10 | 15 | 16 | 15 | 13 | 12 | 12 | 11 | 25 | 33 | 21 |
| Recaptures | 19 | 15 | 12 | 20 | 14 | 6 | 14 | 18 | 15 | 8 | 9 |
| Percent Recaptures | 9.3 | 6.6 | 7.1 | 9.4 | 7.8 | 5 | 12.7 | 12.8 | 11.7 | 8.5 | 22 |
| Mean Length | 35.4 | 36 | 36.8 | 36 | 36.1 | 37.1 | 36.5 | 35.2 | 37.2 | 36.5 | 38.25 |

Figure 1. Summary of volunteer angler survey data (2010-2021)

The percentage of adult muskellunge (38-42" and 42-50") reported from the 2021 catch data is above the long-term average (Figure 2), indicating an increase in larger individuals available to the fishery. The proportion of 20-30" fish has been decreasing since 2018 suggesting consecutive years of below average reproduction.

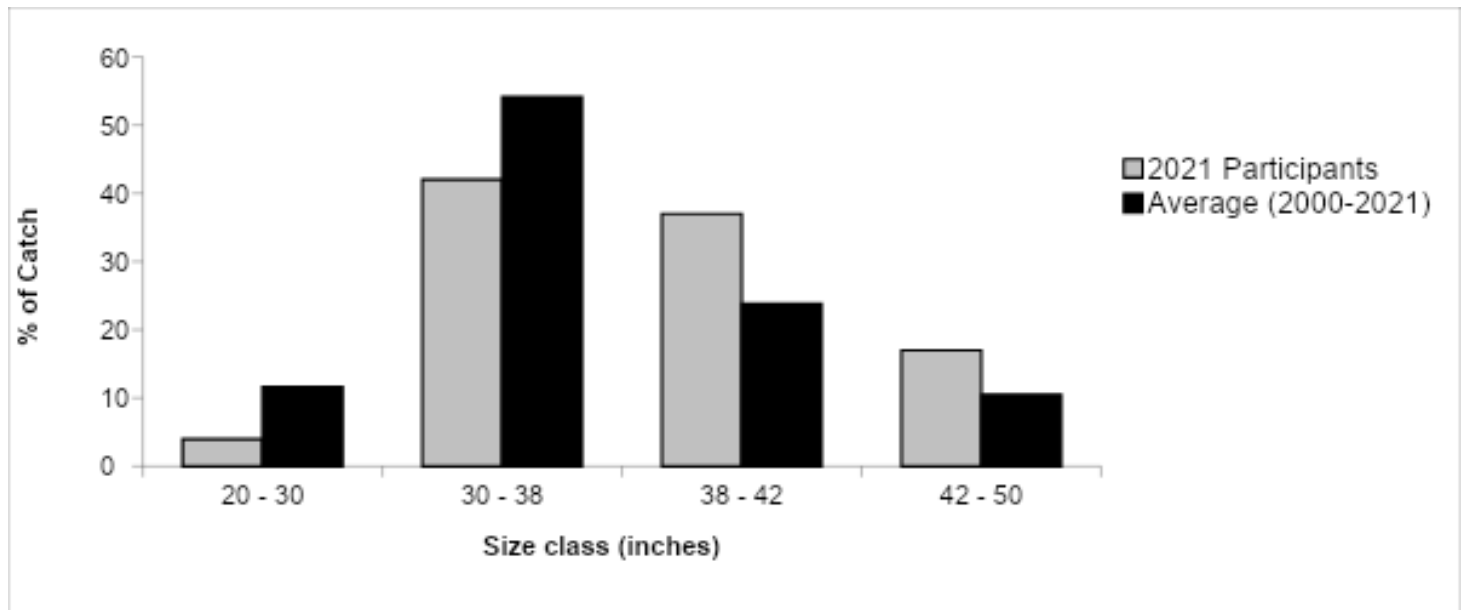


Figure 2. Incremental length-frequency distribution of angled Muskellunge from the volunteer angler diary program 2021 compared to the long-term average (2000-2021)

2021 Management Updates:

Biologists have been investigating seasonal movements and summer time habitat preferences of Potomac River Muskellunge since 2017. Details from this study will be made available through the [Freshwater Fisheries Program website](#). Moving forward, the objectives are to gain a better understanding of how fishing during periods of thermal stress (summer months) may be impacting this species. Results from the Angler Diary Program indicate high angling success when Muskellunge are concentrated in thermal refuge habitats (Figure 3).

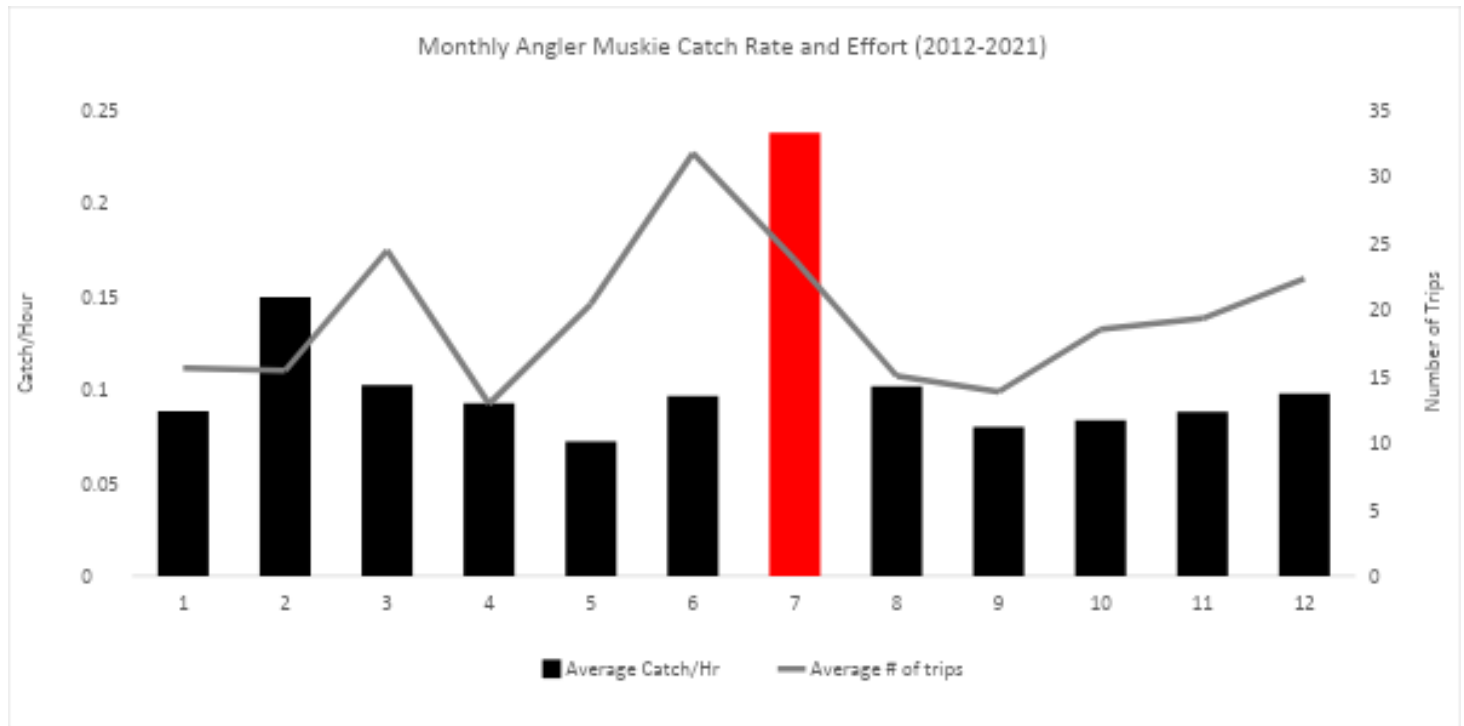


Figure 3. Monthly angler catch rate and effort reported from volunteer angler survey for 2012-2021.

Unique to the Potomac is the unrestricted public access, provided by the C&O Canal, which parallels the non-tidal Potomac in Maryland from Cumberland to Georgetown. Anglers can therefore target refuge habitats during summer months when Muskellunge are concentrated in these locations. In order to better understand how these fish respond to angling during the thermally stressful summer months, angler participation is required. An additional 19 Muskellunge were implanted with radio transmitters in March of 2021 and each transmitter is equipped with a specialized mortality sensor that enables biologists to determine if the fish is still alive. Each fish is marked with two numbered yellow dart tags located along the leading edge of the dorsal fin (Image 1). In addition, a long wire antenna can be observed protruding from the underside of the fish. Anglers who catch these fish should report their catch by recording the four-digit tag number and emailing josh.henesy@maryland.gov or calling 301-898-5443.



Image 1. Two yellow anchor tags are used to identify transmitter tagged Muskellunge in the upper Potomac

Throughout 2020 and 2021, a postcard survey was distributed to individuals actively fishing the freshwater Potomac River to determine a participation rate by anglers. A total of 70 postcards with prepaid postage were handed out and individuals who submitted these were placed into a prize drawing. Results indicate that 79% of Potomac River anglers **DO NOT** participate in surveys. This information will help in adjusting Muskellunge tag return data.

A population estimate was conducted for Muskellunge $\geq 30''$. Multiple sampling efforts were performed where Muskellunge were tagged (marked) and recaptured. This is a common method used in fisheries science where it is impractical to count every individual. The estimate obtained from this survey indicated that there are currently 7-11 adult Muskellunge per river mile.

During the summer of 2022, the transmitter bearing Muskellunge that are angled will be monitored for mortality. This information will then be applied to the overall population estimate to determine population level impacts of summer time angling on Muskellunge within the Potomac River.

***Angler participation is a necessary component of this project. Reporting tagged fish will enable us to best estimate the proportion of fish caught from the population. Freshwater Fisheries will apply angling related mortality estimates to our population estimates to better understand how angling is affecting the fishery at the population level. ***

For information or questions regarding Potomac River Muskellunge contact Josh Henesy:

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