A Plan for Managing Walleye/Saugeye in Virginia's Reservoirs and Rivers 2022-2027

VDWR Walleye Committee

Introduction

Walleye

Walleye (*Sander vitreus*) are native to the Big Sandy, Tennessee, and New River drainages of Virginia, and naturalized populations are found in the Roanoke and Nottoway drainages. However, most walleye populations in the Commonwealth are maintained by stocking. These stockings provide notable populations in many impoundments, but in other waters similar stockings do not succeed. Overall, the success of walleye stockings in Virginia meets or exceeds the reported success rate (32 percent) for maintenance stockings utilizing fry and small fingerlings (Ellison and Franzin 1992; Laarman 1978).

For nearly sixty years, fry and small fingerlings were stocked with two goals in mind; 1) to diversify angling opportunities, and 2) to utilize walleyes as forage control agents (Steinkoenig 1997). However, more specific goals and objectives were needed to address the growing demands and dynamic interests of the angling public. Prior to 2000, little emphasis was placed on establishing walleye populations that provided successful angling. Consequently, less than two percent of Virginia anglers listed walleyes as their preferred species, and overall catch rates were extremely low (Steinkoenig 1997).

The decade of the 1990's ushered in a lot of changes for walleye management in Virginia. Angler demand for walleye fishing increased dramatically due to advances in angling gear and techniques and the proliferation of information available through various media (Ellison and Franzin 1997). An internal committee was formed to coordinate research and management activities. Research projects answered questions about angler exploitation and population densities, and documented the seasonal movements and habitat preferences of walleyes in Virginia. Another project identified a unique genetic stock of walleyes in the New River. It was apparent that more specific goals and objectives were needed to address the growing demands and dynamic interests of the angling public.

A prioritized stocking and monitoring plan was developed in 2000 (Hampton 2000). Stocking efforts focused on impoundments that had a demonstrated potential to support walleye populations. The list of walleye impoundments was categorized to identify management goals and objectives, and link those goals and objectives with the stocking strategies that offered the highest probability of success. Standardized stocking rates and monitoring protocols were adopted for each impoundment category. The plan was designed as a working document, with the expectation that it would be refined and improved.

The plan guided walleye stocking practices across the Commonwealth from 2000 to 2004. The walleye committee convened in 2005 for a statewide comparison of sampling data. Relative abundance, angler preference and angler catch rates increased at several impoundments during this period. Objective evaluation of all walleye stockings also revealed poor performance at some impoundments previously thought to be 'good' walleye fisheries. Stockings were discontinued at these impoundments. The resulting surplus of walleye fingerlings provided the opportunity to expand stocking in several rivers and increase stocking rates and frequencies at some impoundments. Monitoring protocols were also modified for efficiency and effectiveness.

Subsequent walleye committee meetings in 2006 and 2007 resulted in more management changes. A five year walleye exploitation study from 2008-2012 on several small and large impoundments along with the New River produced statewide angler exploitation rates and a manuscript (Owens et. al. 2014). This document integrates the changes from the last 20 years of walleye management into a new plan that will guide walleye management from 2020-2025.

Saugeye

In 2013-2015, and 2019 saugeye (a hybrid cross of female walleye x male sauger) were stocked into several walleye fisheries in place of walleye. In some locations saugeye performed well and are now established in these waters and are desired by fisheries managers because of the hybrid vigor demonstrated. In waters where saugeye are stocked they will be managed similar to walleye, treated as walleye in the regulatory process and included in the states walleye management plan. The following conditions will be met in order to stock and manage saugeye in Virginia waters. Saugeye will not be stocked into drainages or waters that have naturally reproducing walleye populations and/or waters that provide walleye brood stock for hatchery production. This will reduce the risk of back crosses occurring in systems that have natural reproduction and prevent unwanted crosses of saugeye and walleye made at hatcheries if saugeyes are mistaken for walleye during brood stock collections. Goals and objectives, stocking rates, evaluation and priority levels for managing saugeyes will be the same as defined for walleye below.

GOALS AND OBJECTIVES

Walleyes are stocked to achieve a variety of management goals. The first step toward creating and maintaining an exceptional walleye fishery is to establish and maintain an abundant population. Higher relative abundance and increased numbers of quality fish provide better catch rates and increased species preference among anglers (Priority Waters). These priority waters can be further separated by management category; research, conservation and brood source, priority fishery and developing waters. Priority "research waters" are currently being studied for a defined time period to enhance and improve walleye management in Virginia while providing excellent walleye fishing opportunities. Priority "conservation & brood source waters" are managed to protect and enhance unique genetic stocks (New River) or to provide brood fish sources for hatchery

production for stocking throughout the state, while providing quality walleye fishing opportunities. Priority "fishing waters" are managed to provide excellent walleye fishing opportunities. Priority "developing waters" are managed to develop additional walleye fishing opportunities. The management goal of simply offering anglers the opportunity to catch a walleye can be achieved across a broad geographical area by establishing populations with lower relative abundance (Diversity Waters). To meet the management goals and objectives for walleye statewide there must be consistent production of walleye fingerlings from hatcheries (Consistent Production).

GOALS:

1) Priority Waters (research, conservation and brood source, priority fishery & developing) - To establish and maintain exceptional walleye populations that encourage angler utilization and appreciation of walleye fisheries and meet management objectives.
2) Diversity Waters - To establish fishable walleye populations that diversify angling opportunities.
3) Consistent Production – To consistently produce walleye fingerlings for annual allocations.

OBJECTIVES:

1) Priority Waters – (research, conservation & brood source, priority fishery, developing) maintain walleye populations that yield a CPE (catch per effort) $\geq$ 10 adults per hour of electrofishing or net night combined and maintain high angler utilization and preference for walleyes. Conservation waters also increase the frequency of target alleles in the walleye population.
2) Diversity Waters - maintain walleye populations that yield a CPE of at least 3 per hour or net night combined, if possible.
3) Consistent Production – to develop and improve hatchery production of walleye fingerlings to fill annual allocations.

MANAGEMENT CATEGORIES

The management emphasis for a particular impoundment or river determines which goals and objectives apply. Several management categories are needed to address the varied interests of a diverse group of anglers. **Priority waters** – (research, conservation & brood source, priority fishery, developing) offer walleyes as a featured species. Walleye populations in priority waters should have high relative abundance and good size structure, as well as documented angler utilization. **Diversity waters** simply provide the opportunity for anglers to catch walleye. This can be accomplished with lower population densities and at many locations across the commonwealth. The following table identifies the 17 waters in Virginia currently managed under this plan by water type and management category.

Waterbody	Type	Management Category
Shenandoah River	Priority Water	Research
Rivanna River	Priority Water	Research
New River	Priority Water	Conservation/Brood
Leesville (Staunton River)	Priority Water	Conservation/Brood
South Holston Reservoir	Priority Water	Conservation/Brood
Lake Chesdin	Priority Water	Priority Fishery
Flannagan Reservoir	Priority Water	Priority Fishery
Hungry Mother	Priority Water	Priority Fishery
Philpott Reservoir	Priority Water	Priority Fishery
Burke Lake	Priority Water	Priority Fishery
Orange Lake	Priority Water	Priority Fishery
Lake Whitehurst	Priority Water	Priority Fishery
Lake Brittle	Priority Water	Priority Fishery
North Fork Pound Lake	Priority Water	Developing Water
Lake Gaston	Diversity Water	Diversity Water
Lake Anna	Diversity Water	Diversity Water
Little Creek Reservoir	Diversity Water	Diversity Water

Stocking

Some of the factors that influence stocking success are source of fish, size at stocking, stocking rate, stocking frequency, and release methods. This plan includes specific stocking strategies tailored to the management goals of each impoundment category. Adopting standardized stocking protocols reduces the number of unknown factors that may influence survival, and allows for comparative evaluation.

SIZE:

1. Small fingerlings (25 to 50 mm TL)
2. Fry

Both sizes are currently available through hatchery production. Fry are cheaper to produce, but must be stocked at higher rates. Small fingerlings can be stocked later, and offer better survival. This plan recommends no change in the size of walleyes stocked. Small fingerlings should remain as the mainstay of the walleyes stocking program.

RATES:

Fingerling walleyes should be stocked at rates of 25, 50 or 100 per acre depending on the size and management category of the impoundment. Fingerling walleyes should be stocked at rates of 500, 1000 or 2000 per river mile depending on the management category of the river. Fry should be stocked at much higher rates to compensate for increased mortality. Fry are typically available as surplus.

FREQUENCY:

Priority waters (research, conservation & brood source, priority fishery, developing) **should be stocked each year to maintain consistent annual recruitment**. The order in which priority waters are stocked will be determined by the walleye committee and updated annually. Diversity waters should be stocked annually, but a staggered stocking schedule (stock two years, skip one year) would minimize the potential for consecutive missing year classes.

RELEASE METHODS:

In general walleye fingerlings should be stocked where foraging opportunity is maximized, predation potential is minimized, and future homing might create enhanced fishing opportunities. It is recommended not to overstock release sites to maintain high survival of stocked walleye (Sutton et al. 2013, Wilson 2004). In most systems this means stocking in the upper portion of the impoundment, where primary production is higher and spring runs bring spawning fish into narrow tributaries. In systems lacking fishable tributaries, stocking near a riprap dam may enhance angling opportunities if spawning fish congregate during the early spring. Pelagic stocking can reduce predation potential by minimizing interaction between walleye fingerlings and littoral-based centrarchids.

Monitoring

An effective monitoring plan is essential to evaluate the success of a stocking plan. Without the ability to relate year class strength to stocking size, rate and frequency it is impossible to evaluate a stocking program beyond the subjective designation as “success” or “failure”. Assessing year class strength early offers punctual feedback on stocking success, and provides the opportunity to predict future population levels.

Because Virginia walleye waters are diverse in size, fertility, and location, a single sampling protocol is not practical. Small impoundments and rivers are typically sampled using boat electrofishing gear, whereas a combination of electrofishing and gill netting is used for larger impoundments. Consistent sampling allows trend analyses and meaningful comparisons can be made among similar resources.

YOY and yearlings

Young-of-the-year walleyes can be collected the first fall after stocking. The most widely used method for collecting fall YOY walleyes in other parts of the United States is nighttime electrofishing. Sampling is effective as soon as water temperatures drop below 20° C. This method will work in Virginia, but the results vary widely among impoundments. YOY walleyes are routinely collected during nighttime electrofishing surveys at Hungry Mother Lake and South Holston Reservoir. Gradually sloping shorelines relatively close to the stocking location yield the highest catch rates. However, nighttime electrofishing for young walleyes is not very effective in some Virginia impoundments. Small mesh gillnets are another option for YOY walleyes. YOY walleyes are typically sampled in 0.75 and 1.0 inch bar mesh.

Yearling walleyes can be collected during spring and early summer by electrofishing. Daytime sampling can be successful, but nighttime samples generally yield more fish. Small mesh gillnets are another option for yearling walleyes. Yearling walleyes are susceptible to 1.25 and 1.5 inch bar mesh.

Young-of-the-year walleye sampling with electrofishing and gill nets may not be applicable in some systems due to very low catch rates. Philpott Reservoir has a very good walleye population but YOY walleye sampling has not been productive. However, walleye are collected in high numbers after age-1 and year class strength can be determined from sampling adults.

Adults

Adult walleyes generally are fully recruited to gillnet sampling at age two. They fully recruit to spring electrofishing at about the same age. These samples are particularly important because they give information about the fishable population. From these samples we will obtain an adult index of relative abundance, population estimates, age-and-growth data and size structure indices.

Electrofishing is an effective method for collecting walleyes when they occupy relatively shallow water. Daytime electrofishing is effective in some systems, but nighttime samples generally yield more fish per hour.

Angler Utilization

Angler utilization is the ultimate measure of success for the stocking program. Without utilization stockings create a population, not a fishery. Routine angler surveys provide a measure of angler utilization through catch rate or species preference data. Peak-season surveys that coincide with periods of concentrated fishing effort are ideal, because they maximize the number of interviews and decrease costs.

Angler exploitation studies (tagging studies) also measure utilization. These studies are particularly useful when traditional angler survey methods are difficult or impractical. For example, exploitation studies are beneficial if night fishing is the favorite method of local anglers. Exploitation studies are also a great way to determine patterns of catch and harvest that can be used to plan future peak-season surveys.

Evaluation

The walleye committee will meet regularly to evaluate the success or failure of walleye stockings. Each impoundment or river will be evaluated to determine if sampling results compare to stated objectives. Priority waters (research, conservation & brood source, priority fishery, developing) will maintain walleye populations that yield a CPE (catch per effort) $\geq$ 10 adults per hour of electrofishing or net night combined and maintain high angler utilization and preference for walleyes. Conservation waters will also aim to increase the frequency of target alleles in the walleye population. Diversity waters will maintain walleye populations that yield a CPE of at least 3 per hour or net night combined, if possible. If sampling results do not correspond with the objectives of the designated management category, the committee may assign a different management category or remove the impoundment or river from the list of stocked waters.

The committee will consider factors that influence stocking success and sampling results. For example, high exploitation rates can impede progress toward goals and objectives by reducing overall abundance or selectively removing older age classes (trophy fish). Reducing creel limits or establishing size restrictions may be necessary to achieve the stated goals and objectives. Since the year 2000, the statewide daily creel limit for walleye in Virginia has been reduced from eight fish to five fish, and a minimum length limit of 18 inches has been established statewide.

Walleye/Saugeye & R3

Recruitment, Retention and Reactivation (R3): Walleye Angling is an Opportunity to expand our Agency's R3 Efforts

Managing Virginia's Walleye populations requires considering time, costs, constituents, and potential fisheries benefits. One potential spinoff benefit of well-managed walleye fisheries is making select fisheries an R3 tool. Successful walleye angling typically requires advanced fishing skills. Walleye are challenging to catch, so using walleye as a recruitment method for beginning anglers may not be effective. However, good walleye fisheries are a great tool to recruit nonresident anglers to Virginia from neighboring areas because walleye populations are not abundant in southern states. Additionally, new residents relocating to Virginia from northern states where walleye fishing is common, are easily recruited into Virginia angling because of the high quality walleye angling opportunities. Moreover, walleye fishing can be used to retain and reactivate anglers as well. Since successful walleye angling requires the development of skills, the key is maintain and sustain high quality fisheries (numbers or size) in a variety of reservoirs and rivers to retain current walleye anglers. Stocking saugeye fingerlings into various impoundments establishes additional fishing opportunities along with increased angler catch rates of this highly aggressive hybrid of the walleye and sauger cross. Success with saugeye fishing opportunities could allow anglers to transition their attention and angling effort to pure strain walleye populations. Providing high quality and trophy walleye fisheries could allow for effective marketing of walleye as a tasty fish that offers a

challenge. Lapsed anglers can be targeted with a challenging fishery as a source of fresh tasting fish for meals to another tasty food source.

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Priority Waters

(Research, Conservation & Brood source, Priority Fishery, Developing)

Definition: Walleyes are a featured species

Goal:

To establish and maintain exceptional walleye populations that encourage angler utilization and appreciation of walleye fisheries. Additionally, these priority waters may be used for research and study, brood source supply, genetically unique stocks conservation or developing new walleye fisheries.

Objectives:

1. Maintain walleye populations that yield 10 or more adult walleyes per net night or per hour of electrofishing combined.
2. Increase exploitation, catch rates and species preference percentages for walleyes

Stocking Strategy:

Size:	small fingerlings
Rate:	(50 per acre or 100 per acre), or (2,000 to 2,500 per river mile)
Frequency:	annually

Sampling Strategy:

Young-of-year	fall night electrofishing fall small mesh gillnets (0.75, 1.0 in. bar) in waters >500 acres fall small mesh gillnets in waters <500 acres if electrofishing fails
Adult	spring (March-April) night electrofishing in waters < 500 acres fall gillnets in waters >500 acres (1.25,1.5,2.0,2.5,3.0 in. bar mesh) collect walleyes during spring bass sample in all featured waters
Angler Utilization	angler survey to determine catch rates and species preference tagging to determine angler exploitation rates

Diversity Waters

Definition: Walleyes are stocked to diversify angling opportunities

Goal:

1. To establish walleye populations that offer angling opportunities

Objective:

1. Maintain walleye populations that yield 3 or more adult walleyes per net night or per hour of electrofishing combined.

Stocking Strategy:

Size:	small fingerlings
Rate:	25/acre in waters >1,000 acres 50/acre in most waters < 1,000 acres 100 per acre in waters < 30 acres
Frequency:	annually

Sampling Strategy:

Young-of-year	not required, however sampling detailed under featured waters is recommended if time allows
Adult	spring (March-April) night electrofishing in waters < 500 acres fall gillnets in waters >500 acres (1.25,1.5,2.0,2.5,3.0 in. bar mesh) collect walleyes during spring bass sample in all stocked waters
Angler Utilization	encouraged but not required

Appendix

Upper New River
Walleye Management Plan
2022 to 2027

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Introduction:

Historically, Claytor Lake was stocked with fingerling Walleye from a variety of sources in the Midwestern United States, with no consideration of the genetic impact of those stockings. During the late 1970's, Brian Murphy provided evidence for a unique Walleye stock in Claytor Lake using enzyme based genetic analysis (Murphy et al 1983). A research investigation into the population genetic structure of Walleye in the Upper New River (upstream from Claytor Lake) from 1997 to 1999 determined that a unique Walleye stock inhabits this section of the New River (Palmer 1999, Palmer et al 2006, 2007). Documenting this unique Walleye stock resulted in a change in Walleye management on the 74 miles of river upstream from Claytor Lake, from Allisonia (Pulaski County - river mile 106) to Fields Dam (Grayson County – river mile 180), with supplemental fingerling stocking exclusively using New River Walleye genetic strain since 2000 by employing genetic marker assisted brood stock selection.

From 2000 to 2002, the trial and error process of the brood stock selection technique resulted in 10,000 New River strain Walleye being stocked in spring 2001. Greater success in brood fish collection and identification resulted in over 1.5 million New River strain Walleye being stocked from 2003 to 2021 (Table 1). Since a small local Upper New River Walleye fishery existed prior to annual stocking due to natural reproduction, no Walleye were stocked in 2012 and 2013 to evaluate the need for continued stocking. Virginia Department of Wildlife Resources fisheries biologists determined that annual fingerling stockings are required to maintain a viable recreational Walleye fishery based on (1) a Walleye population decline in 2014 and 2015 from this skip stocking (indicated by annual electrofishing surveys (Figure 1)); and, (2) collection of extremely limited numbers of naturally reproduced Walleye from 2012 and 2013 in subsequent population sampling. In addition, an Upper New River Walleye tagging exploitation study found that anglers catch approximately 26% of available Walleye annually, further reinforcing the need for annual fingerling stocking to maintain this fishery given Walleye angler propensity for harvesting their catch (Owens et al 2014).

Maintaining the quality of the Upper New River fishery is of particular interest because this river is the premier destination Walleye fishery in Virginia. The current (15 pounds, 15 ounces), previous, and historic (22 pounds, 8 ounces) state record Walleye were caught from the Upper New River. In addition, anglers catch numerous Walleye over 10 pounds from the river each year.

The Upper New River Walleye population is considered a Priority Water in the Virginia Department of Wildlife Resources Walleye Management plan with a Management category of Conservation/Brood. Maintaining a healthy and sustainable Upper New River Walleye population is a featured goal of the statewide Walleye management plan, emphasizing the Upper New River's importance as a Walleye brood stock source for Walleye stocking in multiple waters statewide.

Table 1: Approximate numbers and river area of fingerling stockings of New River strain Walleye from 2001 to 2021. Walleye stocking was not equally distributed throughout the river area stocked. Walleye were not stocked in 2012 and 2013 to evaluate natural reproduction.

Year	**No. Stocked**	**River Area Stocked (RM)**	**No. stocked per Mile**
2001	10,000	Allisonia to Buck Dam (106 to 128)	≈ 455
2003	51,840	Allisonia to Buck Dam (106 to 128)	≈ 2,356
2004	156,200	Allisonia to Fries Dam (106 to 138)	≈ 4,881
2005	90,080	Allisonia to Fries Dam (106 to 138)	≈ 2,815
2006	106,000	Allisonia to Fields Dam (106 to 180)	≈ 1,432
2007	20,000	Allisonia to Buck Dam (106 to 128)	≈ 909
2008	143,000	Allisonia to Fields Dam (106 to 180)	≈ 1,932
2009	67,140	Allisonia to Buck Dam (106 to 128)	≈ 3,051
2010	33,250	Allisonia to Buck Dam (106 to 128)	≈ 1,511
2011	143,000	Allisonia to Fields Dam (106 to 180)	≈ 1,932
2012	**None**		
2013	**None**		
2014	40,612	Allisonia Only (106)	Not applicable
2015	151,912	Allisonia to Fries Dam (106 to 138)	≈ 4,747
2016	26,354	Allisonia Only (106)	Not applicable
2017	150,100	Allisonia to Fries Dam (106 to 138)	≈ 4,691
2018	142,484	Allisonia to Fries Dam (106 to 138)	≈ 4,453
2019	105,000	Allisonia to Fries Dam (106 to 138)	≈ 3,281
2020	90,631	Allisonia to Fries Dam (106 to 138)	≈ 2,832
2021	109,478	Allisonia to Fries Dam (106 to 138)	≈ 3,421

Total: 1,637,081

Regulation Management

The Upper New River Walleye population was governed by a 508 mm minimum size limit with a 5 per day creel limit prior to January 1, 2011, when the regulation was changed to reduce harvest of female Walleye during the peak Walleye spawning season. From January 1, 2011 to December 31, 2020, the regulation was changed to the following: From Buck Dam downstream to Claytor Lake Dam: (1) From February 1 through May 31: All Walleye 483 mm to 711 mm caught must be released unharmed. Anglers may keep 2 Walleye per day less than 483 mm or over 711 mm; (2) From June 1 through January 31: A 508 mm minimum length limit with a five per day creel limit was in effect. On January 1, 2021, the slot limit was modified to require anglers to release all Walleye 483 mm to 711 mm (28 inches) year-round from Buck Dam downstream to Claytor Dam. The daily Walleye creel limit was held at 2 per day either less than 483 mm or over 711 mm.

Until January 1, 2021, from Buck Dam upstream to Fries Dam, the walleye population was governed by a 508 mm minimum size limit with a creel limit of 5 per day, with the intent of protecting the Walleye population in Byllesby Reservoir that runs upstream to Fries Dam. On January 1, 2021, the 508 mm minimum size limit was reduced to 457 mm and the creel limit was kept at 5 per day, in order to match the statewide Walleye size and creel limits.

Upstream from Fries Dam, where Walleye stocking has been limited to 3 years since 2001 and since Walleye are not established, the statewide regulation of 457 mm minimum size limit with a creel limit of 5 per day applies to any Walleye caught.

Current Fishery Status

Spring Electrofishing Sampling

Spring electrofishing is the primary tool used to evaluate the status of the Walleye population in the Upper New River. Results of spring electrofishing from 2000 through 2020 indicate that annual fingerling stocking directly affects the relative abundance of walleye in the Upper New River (Figure 1). The highest spring electrofishing catch rates of Walleye occurred from 2006 to 2013, following years with an average stocking rate of over 94,000 walleye fingerlings per year (2004 to 2011).

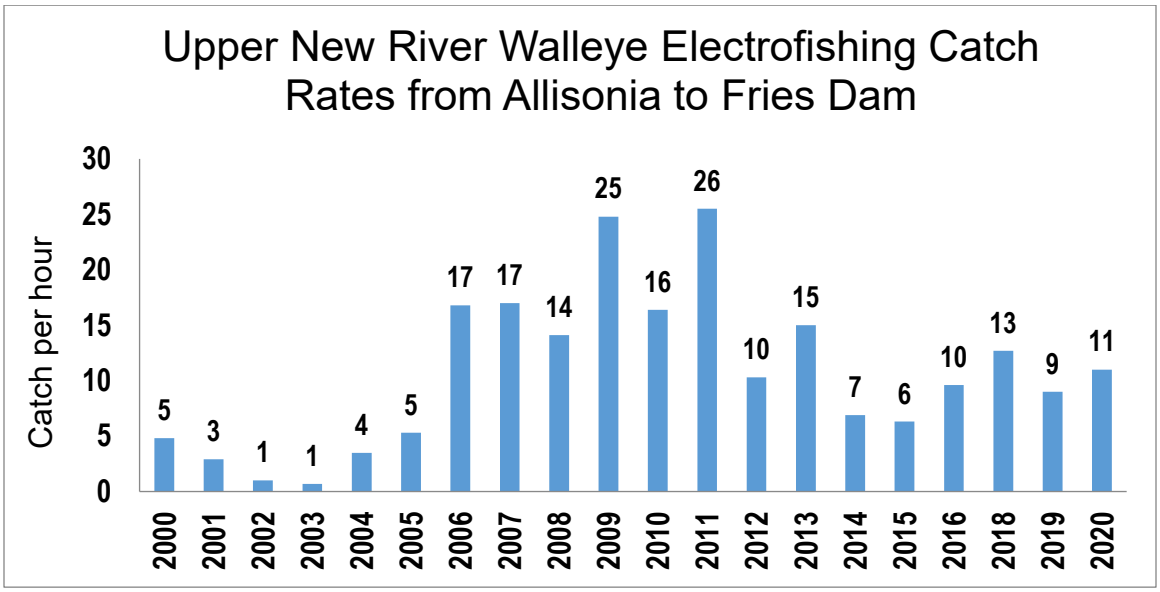

Figure 1: Upper New River walleye electrofishing catch per hour at multiple sites from Allisonia upstream to Fries Dam.

Angler Surveys

Angler surveys are a secondary tool used to evaluate the status of the Walleye population in the Upper New River. Peak season Walleye angler surveys (February to April) were conducted on the Upper New River from Allisonia to Buck Dam in 2007 and 2016. Angler effort varied between these surveys, with anglers expending 7,937 angler-hours in 2007 and 5,851 angler-hours in 2016, a 26% decline in effort. The decline in effort is most likely related to the reduced Walleye population in 2016 (indicated by walleye electrofishing catch rates in 2007 and 2016 in Figure 1). Walleye anglers fish primarily during the months of March and April (84% of 2007 angling effort and 100% of 2016 angling effort), accounting for the majority of the total fishing effort in those months during both survey years. Walleye fishing effort in February is variable. In 2007, February Walleye angling effort comprised 16% of the overall effort, while no walleye anglers were encountered in February 2016. March Walleye catch rates were consistent from 2007 to 2016 with anglers requiring 4 hours to catch a Walleye. April Walleye catch rates declined from 2007 to 2016, with anglers averaging 7 hours and 41 minutes to catch a Walleye in 2007 and 11 hours and

7 minutes in 2016. The overall Walleye catch rate for February to April 2007 of 0.34 per hour was twice the overall Walleye catch rate for February to April 2016 of 0.17 per hour, providing further evidence of a reduced Walleye population in the Upper New River. Harvest rates increased from 2007 to 2016, with 5% of the Walleye catch harvested in 2007 versus 27% of the Walleye catch harvested in 2016. In 2007, the 508 mm Walleye minimum size limit limited harvest of most of the Walleye caught, since most of the available Walleye were from the 2004 to 2006 year classes (Table 1), which were less than 508 mm at the time of that survey. In contrast, the 483 to 711 mm Walleye slot limit in 2016 likely promoted harvest of 356 to 432 mm Walleye in the population from stocking in 2014 and 2015.

Walleye Allele Frequencies

Upper New River Walleye allele frequencies are monitored primarily based on annual brood stock collections using genetic marker assisted brood stock selection. Between 2000 and 2017, allele frequencies at microsatellite loci *SVI-17* (99/99 allele) and *SVI-33* (78 allele) (the primary alleles identified by Palmer (1999)) increased from an average of 53% to an average of 77%, indicating success maintaining and improving the genetic integrity of the New River Walleye stock.

Management Goal, Objectives, and Strategies for 2022 to 2027

Goal: Maintain a genetically unique, naturally reproducing Upper New River Walleye stock that supports a quality recreational fishery over the 74 mile reach from Allisonia to Fields Dam.

Objectives:

1. To stabilize average spring electrofishing catch rates (CPUE) of adult Walleye (>250 mm) between 15 and 20 Walleye per hour.
2. To sustain angler catch rates of adult Walleye (>250 mm) of 1 fish per 4 hours of fishing during the peak Walleye fishing season from February through April.
3. To maintain or increase the allele frequency at microsatellite loci *SVI-17* (99/99 allele) and *SVI-33* (78 allele) of the New River stock Walleye.
4. To increase Walleye spawning stock to adequate levels for natural reproduction to support a viable recreational fishery.

Management Strategies:

a) Use genetic marker assisted brood stock selection of New River Walleye from known Upper New River spawning locations (typically Ivanhoe and Foster Falls) to produce fingerlings for annual stocking to maintain the Walleye population.
b) Evaluate the size and creel restriction on Walleye in the Claytor Dam to Buck Dam section of the Upper New River to assess if the regulation is having the desired effect in achieving the fishery objectives.
c) Negotiate reductions in peak power production at the Buck/Byllesby Hydroelectric Project during the peak Walleye spawning, hatching, and larval season (early March to early May) to reduce flow fluctuation impacts on Walleye spawning success and survival (Ney et al 1993; Mion, Stein, and Marschall 1998).

Monitoring Strategies:

a) Survey the population annually or semi-annually using microsatellite DNA markers at loci *SVI-17* and *SVI-33* and measure the allele frequency, using fin samples collected during annual brood stock collections and other sampling efforts on Claytor Lake and the Upper New River.

b) Conduct spring (early April to mid-June) electrofishing surveys at a variety of sites along the 74 mile section of the upper river. No less than 5 sites should be surveyed, with primary sites at Allisonia, Foster Falls, Shot Tower Falls, Ivanhoe, and Fries. If time and manpower are available, secondary sites at Route 100, Carter's Falls (aka Bertha Shoals), Austinville, and Byllesby Reservoir should be surveyed as well. If possible, a minimum of 1 hour sampling time (four 900 second runs) should be conducted at each site.
c) Conduct fall night electrofishing surveys in upper Claytor Lake and Byllesby Reservoir to evaluate young of the year survival following spring stocking if time and manpower are available.
d) Conduct a peak season (February to April) Walleye angler survey from Allisonia to Buck Dam every 5 to 7 years to document angler catch and harvest of walleye if time and manpower are available.
e) Evaluate the relative contribution of natural reproduction and supplemental stocking using a mark/recapture technique after 5 years of increased female spawning stock due to the year-round protective slot length limit implemented January 1, 2021.

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