

## **AGENDA**

Board of Wildlife Resources  
7870 Villa Park Drive  
Henrico, Virginia 23228

October 28, 2021  
9:00 am

Call to Order and Welcome –

1. Recognition of Employees and Others
2. Approval of the August 19, 2021 Board Meeting Minutes
3. Public Comments – Non Agenda Items
4. Committee Meeting Reports:

**Final Action**

### **Law Enforcement Committee:**

- Introduction
- Accreditation
- Recognitions

### **Wildlife and Boat Committee:**

- Fishing Regulation Cycle – 2022 - 2023
- Fish Management Plans
- Outreach and Education on Hampton Roads Bridge Tunnel Sea Bird Colony
- RAWA Readiness Assessment
- Sunday Hunting Presentation

**Action**

**Action**

**Action**

### **Finance, Audit, & Compliance Committee:**

- First Quarter Finance Report for Fiscal year 2021-2022

**Education, Planning, and Outreach Committee:**

- Diversity, Equity, and Inclusion Plan
- Relevancy Roadmap Project
- Board Member Remote Participation Policy
- Recap of 2021 SEAFWA Conference

**Action**

5. Director's Report
6. Chairman's Report
7. Additional Business/Comments
8. Next Meeting Date: Thursday, January 20, 2022
9. Closed Session
10. Adjournment

Draft Board Minutes

Board of Wildlife Resources  
7870 Villa Park Drive  
Henrico, VA 23228

August 19, 2021  
9:00 am

**Present:** Mr. Brian Vincent, **Chair**, Mr. G. K. Washington, **Vice Chair**; **Board Members:** Mr. Leon Boyd, Ms. Karen Terwilliger, Dr. Mamie Parker, Mr. Frank Adams, Mr. Rovelie Brown, Ms. Tammy Jo Grimes, Mr. Tom Sadler, and Mr. G. K. Washington; **Absent:** Ms. Catherine Claiborne; **Executive Director:** Mr. Ryan Brown; **Director's Working Group:** Ms. Becky Gwynn, Mr. Tom Guess, Dr. Gray Anderson, Dr. Mike Bednarski, Mr. Darin Moore, Ms. Paige Pearson, Ms. Rebecca Lane, Major Milt Robinson, and Major Ryan Shuler.

Kelci Block, Assistant Attorney General attended the Board meeting.

The Chair called the meeting to order at 9:00 am. The Chair welcomed everyone to the “in-person” meeting. The Chair announced Mr. Sadler was Virtual.

The Chair noted for the record that a quorum was present.

The Chair welcomed the 2 new Board members, Tammy Jo Grimes and Rovelie Brown.

The Chair called on Ms. Terwilliger to read the Mission Statement.

The Chair called for a roll call vote. The board secretary took a roll call vote for Attendance: Ayes: Daniel, Vincent, Terwilliger, Adams, Boyd, Parker, Sadler, Brown, Washington and Grimes, Absent: Catherine Claiborne

**Recognitions of Employees and Others:** The Chair called on Director Ryan Brown for Recognitions of Employees.

The Director called on Major Ryan Shuler who introduced Major Milt Robinson as the new Major.

The Director called on Major Ryan Shuler who recognized Captain Tony Fisher. Captain Fisher recognized Officer Brandon Harris as the 2021 Boating Officer of the year.

The Director called the Past 2 Board Chairs to the podium and presented them with their Board Plaques, Dr. Mamie Parker and Mr. John Daniel.

The Director introduced Mr. Mike Roberts who attended the Board meeting to present a beautiful Elk Print to the Board members.

**Approval of the May 27, 2021 and June 28, 2021 Board Meeting Minutes:**

The minutes of the May 27, 2021 minutes have been distributed and posted to the website for review. The Chair called for a motion to approve the minutes. Mr. Washington made a motion to approve the May 27, 2021 Board minutes. It was seconded by Dr. Parker.

The board secretary took a roll call vote. Ayes: Daniel, Washington, Vincent, Terwilliger, Adams, Boyd, Grimes, Parker, Brown, Sadler

The minutes of the June 28, 2021 minutes have been distributed and posted to the website for review. The Chair called for a motion to approve the minutes. Mr. Sadler made a motion to approve the June 28, 2021 Board minutes. It was seconded by Mr. Washington.

The board secretary took a roll call vote. Ayes: Daniel, Washington, Vincent, Terwilliger, Adams, Boyd, Grimes, Brown, Parker, and Sadler

**Public Comments – Non-Agenda Items:**

The Chair called for Public Comments – Non Agenda Items:

- Mr. Judge Charlton of Charlotte, VA spoke regarding Deer Hound Hunting
- Mr. Kirby Burch of Powhatan, VA spoke regarding Field Trials
- Ms. Megan Spencer of Charlotte, VA spoke regarding Deer Hound Hunting

The Chair thanked the speakers for their comments.

**Committee Reports:**

**Law Enforcement Committee:** The Chair called on Mr. Brown to give an update on the August 18, 2021 Law Enforcement Committee meeting.

Mr. Brown gave an update on the August 18, 2021 Law Enforcement Committee meeting.

The Chair asked if there were any comments or questions from the public or the Board.

The Chair thanked Mr. Brown for his Committee update.



**Wildlife and Boat Committee:**

The Chair called on Ms. Karen Terwilliger for an update on the August 18, 2021 Wildlife & Boat Committee meeting.

Ms. Terwilliger gave an update on the Wildlife and Boat Committee meeting.

The Chair called on Mr. Cale Godfrey for a presentation of Proposed CWD Regulations in response to the Montgomery County positive.

Mr. Godfrey gave his presentation of the Proposed CWD Regulations in response to the Montgomery County positive.

After comments and questions, the Chair thanked Ms. Terwilliger for her update and Mr. Godfrey for his presentation.

The Chair called for a motion. Ms. Terwilliger made a motion. Mr. Chair, I move that the Board of Wildlife Resources adopt the amendments to the chronic wasting disease regulations for Disease Management Area 3 as presented by staff. It was seconded by G. K. Washington.

The board secretary took a roll call vote. Ayes: Daniel, Washington, Vincent, Terwilliger, Adams, Boyd, Grimes, Parker, Brown, Sadler

**Finance, Audit, and Compliance Committee Report:**

The Chair called on Mr. G. K. Washington to give an update on the May 20, 2021 Finance, Audit, and Compliance Committee meeting.

Mr. Washington gave an update on the August 18, 2021 Finance, Audit, and Compliance Committee meeting.

The Chair called on Mr. Darin Moore for an overview of the FY 2021 Finances.

Mr. Moore gave an overview of the FY 2021 Finances and the completed Federal Audit.

The Chair asked if there were any comments or questions from the public or the Board.

After comments and questions, the Chair thanked Mr. Moore for his updates and presentations.

### **Education, Planning, and Outreach Committee Report:**

The Chair called on Mr. Sadler to give an update on the August 18, 2021 Education, Planning, and Outreach Committee meeting.

Mr. Sadler gave an update on the August 18, 2021 Education, Planning, and Outreach Committee meeting.

The Chair asked if there were any comments or questions from the public or the Board.

The Chair thanked Mr. Sadler for his report on the committee meeting.

**Director's Report:** The Board Chair called on Executive Director Ryan Brown for his report.

Mr. Brown Reported:

- DWR to host SEAFWA Conference in Roanoke in October 17-20, 2021
- The Director called on Becky Gwynn to report on the HRBT
- Run For the Wild Update
- Explore the Wild Update
- Fall hunting Season approaching
- Dove Season begins September 4
- Governor's Fishing Challenge on October 2
- DWR has taken part in Outdoor Sportsman Show and the VA Big Game Show
- Green Top Event will be on October 2, 2021
- The Director called on Becky Gwynn to report on 3 CWD meetings around the state
- Becky Gwynn reported that 2 new grants have been awarded for use with the CWD situation
- DWR was selected to be a part of the Relevancy Road Map
- Boating Access Group is meeting to work on Funding needs
- Inclusion Plan by George Braxton has been approved and he will be submitting at the October Board meeting

### **Chair's Report:**

The Chair thanked all presenters and staff for their work. The Chair reported he enjoyed being on this board and was looking forward to being the Chair for next year ahead. He reported that listening to the public comments helps the board move ahead and make DWR able to move forward.

The Chair presented the 2022 Schedule of Board meeting dates.

The Chair asked for a motion to approve. Mr. Boyd made a motion, Mr. Chair, I make a motion to approve the 2022 Schedule of Board meeting dates. It was seconded by Mr. Washington.

The board secretary called a roll call vote: Ayes: Daniel, Terwilliger, Adams, Vincent, Washington, Boyd, Grimes, Parker, Brown, Sadler

**The Next Regular Board Meeting Date:**

The Chair announced that the next meeting date would be Thursday, October 28, 2021

**Closed Session:**

The Chair announced there would be a Closed Session. A motion was made by Tammy Jo Grimes and seconded by Mr. Sadler. The Chair called for a roll call vote: Ayes: Daniel, Terwilliger, Adams, Vincent, Washington, Boyd, Grimes, Parker, Brown, and Sadler

*Closed Meeting Motion  
August 19, 2021*

*Mr. Chair,*

*I move that the Board go into a closed meeting for:*

*(1) First, pursuant to Section 2.2-3711.A.3 of the Code of Virginia, for discussion or consideration of the acquisition of real property for a public purpose, or of the disposition of publicly held real property, where discussion in an open meeting would adversely affect the bargaining position or negotiating strategy of the Board, with respect to real property located in Scott and Highland Counties;*

*(2) Secondly, pursuant to Section 2.2-3711.A.8, for consultation with legal counsel employed or retained by a public body regarding specific legal matters requiring the provision of legal advice by such counsel; and*

*(3) Finally, pursuant to Section 2.2-3711.A.1 of the Code of Virginia for discussion or consideration of employment, assignment, appointment, promotion, performance, demotion, salaries, disciplining, or resignation of specific public*

*officers, appointees, or employees of the Department of Wildlife Resources specifically regarding the performance of the Director.*

*This closed meeting will be attended only by members of the Board. However, pursuant to Section 2.2-3712(F), the Board requests legal counsel, the Department Executive Director, the Department Deputy Director, the Legal Compliance Officer, and the Real Property Manager to also attend this meeting, as it believes their presence will reasonably aid the Board in its consideration of topics that are the subject of the meeting.*

The board secretary took a roll call vote. Ayes: Daniel, Vincent, Terwilliger, Adams, Washington, Boyd, Grimes, Parker, Brown and Sadler

The Board went into Closed Session at: 11:25 am

The Board reconvened from the Closed Session at 1:05 pm.

The Chairman called on Mr. Brown to read the Certification of Closed Meeting.

*Certification of Closed Meeting  
August 19, 2021*

*WHEREAS, the Board of Wildlife Resources conducted a closed meeting on this date pursuant to an affirmative recorded vote and in accordance with the provisions of the Virginia Freedom Information Act; and*

*WHEREAS, Section 2.2-3712.D of the Code requires a certification by this Board that such closed meeting was conducted in conformity with Virginia law;*

*NOW, THEREFORE, BE IT RESOLVED that the Board of Wildlife Resources hereby certifies that, to the best of each member's knowledge, only public business matters lawfully exempted from open meeting requirements by Virginia law were discussed in the closed meeting to which this certification resolution applies, and only such public business matters as were identified in the motion convening the closed meeting were heard, discussed or considered by the Board.*

It was seconded by Mr. Washington.

The Chair called for a roll call vote. Ayes: Daniel, Vincent, Terwilliger, Adams, Washington, Boyd, Grimes, Parker, Brown and Sadler

The Chair called for a motion. Dr. Parker made a motion. Mr. Chair, I move that the Board authorize the Director to acquire approximately 190+ acres of land in Highland County, Virginia, and such authorization shall be according to state procedures. It was seconded by Mr. Sadler.

The board secretary took a roll call vote. Ayes: Daniel, Terwilliger, Adams, Vincent, Washington, Boyd, Grimes, Parker, Brown and Sadler.

The Chair called for a motion. Mr. Brown made a motion. Mr. Chair, I move that the Board authorize the Director to acquire approximately 10+ acres of land in Scott County, Virginia, and such authorization shall be according to state procedures. It was second by Mr. Sadler.

The Chair called for a roll call vote. Ayes: Daniel, Terwilliger, Adams, Vincent, Washington, Boyd, Grimes, Parker, Brown, and Sadler.

The Chair asked if there were any comments or questions from the Board.

The Chair announced the next Board meeting will be October 28, 2021 and thanked the Executive Director and staff for making today's meeting in person possible.

The Chair adjourned the meeting at 1:15 pm.

Respectfully Submitted,

Frances Boswell

/s/

# Channel Catfish Management Plan

## VDWR Small Impoundments Committee

October 2021



## Introduction

Across the United States 8.1 million anglers fish for catfish (USFWS 2016). Channel Catfish are popular sport and food fish that can be pursued by anglers in many small impoundments (Neal and Willis 2012). Stocked at a moderate level, Channel Catfish can complement existing fisheries resources that generally include Largemouth Bass and Bluegill without impacting productivity or growth of those existing populations. Most stocked Channel Catfish have been found to be vulnerable to angling (Masser et. al 1993) and as a result have become quite popular for use in urban fishing programs and kid’s fishing events. A nationwide emphasis on R3 (recruitment, retention, reactivation) can also utilize Channel Catfish as both a recruitment tool for new anglers as well as retaining/reactivating current or former anglers.

Generally, in small ponds and lakes with limited aquatic vegetation, juvenile Channel Catfish rarely recruit to the adult population as a result of predation by Largemouth Bass and Bluegill (Neal and Willis 2012). As a result of predation, Channel Catfish must be periodically stocked to maintain fishable populations (Neal and Willis 2012). Put-grow-take fisheries are less costly than stocking catchable catfish, but predation must be considered. Studies have shown that stocked Channel Catfish should be 250mm or greater in length to avoid predation by Largemouth Bass (Howell and Betsill 1999; Jackson and Francis 1999; Odenkirk 2002; Neal and Willis 2012). Results from the most recent Virginia Statewide Angler Survey (2016) found that 54% of Virginia anglers specifically fished for catfish in the last twelve months (VDGIF 2016 Angler Survey). Virginia anglers pursued catfish in a variety of habitats including: small impoundments (23%), large impoundments (27%), warmwater streams (38%), and private lakes (12%).

The Virginia Department of Wildlife Resources (VDWR) has been managing a variety of small impoundments throughout the Commonwealth by stocking sub-catchable and catchable Channel Catfish. Channel Catfish are obtained from commercial hatcheries at considerable cost (up to \$120K/year). Many anglers pursuing Channel Catfish stated that they only fished DWR managed or owned small impoundments (27%), documenting the popularity of these intensively managed resources.

## Methods

Past research has led to the development of Channel Catfish (CCF) stocking guidelines for managing DWR owned or managed small impoundments (Table 1). These rates serve as a general guide and target for stocking – fish may be stocked at lower rates when circumstances (budget, impoundment status) require.

Table 1. Channel Catfish stocking Guidelines for waters managed by DWR.

| <b>Waterbody</b>                | <b>Stocking Rate</b> |
|---------------------------------|----------------------|
| Standard non-DWR Impoundment    | 10/acre              |
| DWR Impoundment                 | 15/acre              |
| DWR Impoundment w/high pressure | 20/acre              |
| CLIP Ponds                      | 100/acre             |
| Urban                           | 250/acre             |

Stocking rates are tailored towards angling pressure, public access, and catchability. General CCF stockings utilize a fish that average about a half pound (~10”), while fish used in the Urban Fishing Program average about 1 pound. Standard impoundments are managed less intensively and stocked at lower rates than DWR owned lakes. Many of these waters may have a lower degree of angler use and in many cases more restrictive access. These standard impoundments are stocked in the fall at a rate of 10 CCF/acre (Table 2).

Table 2. Channel Catfish allocations for impoundments stocked at the standard rate (10/acre). The minimum allocation is 50 fish. Stocking Rate = SR.

| Region | County                | Waterbody                         | Size (acres) | SR (#/acre) | Allocation |
|--------|-----------------------|-----------------------------------|--------------|-------------|------------|
| 1      | Chesapeake            | Oak Grove Lake                    | 70           | 10          | 700        |
| 1      | Hampton               | Sandy Bottom Park Pond            | 12           | 10          | 120        |
| 2      | Amherst               | Mill Creek Lake                   | 189          | 10          | 1890       |
| 2      | Appomattox/Buckingham | Holliday Lake                     | 145          | 10          | 1450       |
| 2      | Brunswick             | Great Creek Lake                  | 212          | 10          | 2120       |
| 2      | Buckingham            | Slate River Reservoir             | 38           | 10          | 380        |
| 2      | Buckingham            | Bear Creek Lake                   | 42           | 10          | 420        |
| 2      | Buckingham            | James River State Park Ponds (3)  | 3            | 10          | 150        |
| 2      | Cumberland            | Cumberland State Forest Lakes (4) | 28           | 10          | 280        |
| 2      | Fort Pickett          | Beavertrail Pond                  | 2.4          | 10          | 50         |
| 2      | Fort Pickett          | Wonju Pond                        | 2.5          | 10          | 50         |
| 2      | Fort Pickett          | Dearing Pond                      | 7            | 10          | 70         |
| 2      | Fort Pickett          | Butterwood Pond                   | 9            | 10          | 90         |
| 2      | Fort Pickett          | Engineers Pond                    | 12.8         | 10          | 128        |
| 2      | Fort Pickett          | Lewis Pond                        | 12           | 10          | 120        |
| 2      | Henry                 | Martinsville Reservoir            | 175          | 10          | 1750       |
| 2      | Lunenburg             | Victoria Reservoir/Lunenburg Lake | 15           | 10          | 150        |
| 2      | Lunenburg             | Nottoway Falls Lake               | 60           | 10          | 600        |
| 2      | Lunenburg             | Modest Creek Lake                 | 29           | 10          | 290        |
| 2      | Nottoway              | Fort Pickett Reservoir            | 384          | 10          | 3840       |
| 2      | Prince Edward         | Goodwin Lake                      | 15           | 10          | 150        |
| 2      | Prince Edward         | Prince Edward Lake                | 36           | 10          | 360        |
| 2      | Prince Edward         | Wilcks Lake                       | 30           | 10          | 300        |
| 3      | Carroll               | Lovill's Creek Lake               | 45           | 10          | 450        |
| 3      | Dickenson             | Laurel Lake                       | 14           | 10          | 140        |
| 3      | Pulaski               | Gatewood Reservoir                | 162          | 10          | 1620       |
| 3      | Smyth                 | Sugar Hollow Pond                 | 1            | 10          | 50         |
| 3      | Smyth                 | Glade Mountain Ponds (4)          | 8            | 10          | 200        |



|   |                           |                            |     |    |      |
|---|---------------------------|----------------------------|-----|----|------|
| 3 | Tazewell                  | Lincolnshire Lake          | 23  | 10 | 230  |
| 3 | Tazewell                  | Witten Lake                | 52  | 10 | 520  |
| 3 | Wise                      | Wise Reservoir             | 46  | 10 | 460  |
| 3 | Wise                      | Big Cherry Reservoir       | 132 | 10 | 1320 |
| 3 | Wise                      | North Fork Pound Reservoir | 154 | 10 | 1540 |
| 3 | Wise (City of Norton)     | Norton Reservoir (upper)   | 9   | 10 | 90   |
| 3 | Wythe                     | Wytheville C.C. Pond       | 3   | 10 | 50   |
| 4 | Albemarle                 | Beaver Creek               | 104 | 10 | 1040 |
| 4 | Albemarle                 | Chris Green Lake           | 62  | 10 | 620  |
| 4 | Albemarle                 | Mint Springs Lake          | 8   | 10 | 80   |
| 4 | Albemarle                 | Totier Creek Lake          | 66  | 10 | 660  |
| 4 | Albemarle                 | Walnut Creek Lake          | 60  | 10 | 600  |
| 4 | Alleghany                 | Clifton Forge Reservoir    | 9   | 10 | 90   |
| 4 | Augusta                   | Elkhorn Lake               | 50  | 10 | 500  |
| 4 | Augusta                   | Hearthstone Lake           | 14  | 10 | 140  |
| 4 | Augusta                   | Sherando Lake (lower)      | 20  | 10 | 200  |
| 4 | Augusta                   | Sherando Lake (upper)      | 8   | 10 | 80   |
| 4 | Bath                      | Douthat Lake               | 52  | 10 | 520  |
| 4 | Bath                      | Rec Pond Lower             | 32  | 10 | 320  |
| 4 | Bath                      | Rec Pond Upper             | 40  | 10 | 400  |
| 4 | Fairfax                   | Fairfax Lake               | 28  | 10 | 280  |
| 4 | Fairfax                   | Huntsman Lake              | 27  | 10 | 270  |
| 4 | Fairfax                   | Royal Lake                 | 35  | 10 | 350  |
| 4 | Fauquier                  | Germantown Lake            | 109 | 10 | 1090 |
| 4 | Frederick                 | Clearbrook Lake            | 3   | 10 | 50   |
| 4 | Louisa                    | Gordansville Lake          | 81  | 10 | 810  |
| 4 | Louisa                    | Northeast Reservoir        | 187 | 10 | 1870 |
| 4 | Loudon                    | Sleeter Lake               | 101 | 10 | 1010 |
| 4 | Page                      | Arrowhead Lake             | 34  | 10 | 340  |
| 4 | Page                      | Bealer's Ferry Pond        | 7   | 10 | 70   |
| 4 | Page (Town of Shenandoah) | Big Gem Pond               | 1   | 10 | 50   |
| 4 | Prince William            | Silver Lake                | 23  | 10 | 230  |
| 4 | Rockingham                | Briery Branch Lake         | 9   | 10 | 90   |
| 4 | Rockingham                | Hone Quarry Lake           | 6   | 10 | 60   |
| 4 | Rockingham                | Silver Lake                | 10  | 10 | 100  |
| 4 | Rockingham                | Slate Lick Lake            | 10  | 10 | 100  |
| 4 | Shenandoah                | Tomahawk Pond              | 2   | 10 | 50   |
| 4 | Shenandoah                | Lake Laura                 | 44  | 10 | 440  |
| 4 | Spotsylvania              | Motts Run Reservoir        | 160 | 10 | 1600 |
| 4 | Stafford                  | Abel Lake                  | 185 | 10 | 1850 |

DWR owned and managed impoundments are intensively managed for multiple species of fish and receive higher stocking rates than non-DWR impoundments. Most DWR impoundments offer boat access, adequate parking, night-time fishing, shoreline access, and at many locations a handicapped accessible fishing pier. DWR owned small impoundments are stocked in the fall at a rate of 15 CCF/acre (Table 3).

Table 3. Channel Catfish allocations for impoundments stocked at the DWR rate (15 fish/acre). The minimum allocation is 50 fish. Stocking Rate = SR.

| Region | County      | Waterbody             | Size (acres) | SR (#/acre) | Allocation |
|--------|-------------|-----------------------|--------------|-------------|------------|
| 2      | Amelia      | Amelia Lake           | 100          | 15          | 1500       |
| 2      | Brunswick   | Brunswick Lake        | 150          | 15          | 2250       |
| 2      | Buckingham  | Horsepen Lake         | 19           | 15          | 285        |
| 2      | Halifax     | Connor Lake           | 110          | 15          | 1650       |
| 2      | Mecklenburg | Gordon Lake           | 157          | 15          | 2355       |
| 2      | Nelson      | Lake Nelson           | 40           | 15          | 600        |
| 2      | Nottoway    | Nottoway Lake         | 188          | 15          | 2820       |
| 3      | Lee         | Keokee Lake           | 92           | 15          | 1380       |
| 3      | Washington  | Hidden Valley Lake    | 61           | 15          | 915        |
| 3      | Wythe       | Rural Retreat Lake    | 90           | 15          | 1350       |
| 4      | Albemarle   | Lake Albemarle        | 35           | 15          | 525        |
| 4      | Fairfax     | Burke Lake            | 218          | 15          | 3270       |
| 4      | Fluvanna    | Fluvanna Ruritan Lake | 50           | 15          | 750        |
| 4      | Frederick   | Frederick Lake        | 117          | 15          | 1755       |
| 4      | Powhatan    | Powhatan Lake (lower) | 36           | 15          | 540        |
| 4      | Powhatan    | Powhatan Lake (upper) | 35           | 15          | 525        |
| 4      | Powhatan    | Powhatan Ponds        | 20           | 15          | 300        |
| 4      | Stafford    | Curtis Lake           | 91           | 15          | 1365       |

DWR owned impoundments that receive high angling pressure are stocked in the fall at a higher rate (20 CCF/acre) than normal to provide better catch rates (Table 4). Some of the heaviest fished DWR impoundments are also fertilized to increase fish production and may offer concessions that include boat rentals, bait, and snacks.

Table 4. Channel Catfish allocations for impoundments stocked at the DWR-High Pressure rate (20 fish/acre). The minimum allocation is 50 fish. Stocking Rate = SR.

| Region | County     | Waterbody          | Size (acres) | SR (#/acre) | Allocation |
|--------|------------|--------------------|--------------|-------------|------------|
| 1      | James City | Woodstock Pond     | 7.5          | 20          | 150        |
| 3      | Smyth      | Hungry Mother Lake | 108          | 20          | 2160       |
| 4      | Augusta    | Braley Pond        | 5            | 20          | 100        |
| 4      | Fauquier   | Lake Brittle       | 77           | 20          | 1540       |
| 4      | Fauquier   | Phelps Pond        | 3            | 20          | 60         |
| 4      | Orange     | Lake Orange        | 124          | 20          | 2480       |
| 4      | Rockbridge | Lake Robertson     | 26           | 20          | 520        |
| 4      | Rockingham | Shenandoah Lake    | 36           | 20          | 720        |

Small ponds that are intensively managed that receive heavy fishing pressure in developed areas are managed under CLIP (Community Lake Improvement Program). These small ponds receive 100 CCF/acre and are stocked in the fall (Table 5).

Table 5. Channel Catfish allocations for impoundments stocked at the CLIP rate (100 fish/acre). The minimum allocation is 50 fish. Stocking Rate = SR.

| Region | County             | Waterbody                     | Size (acres) | SR (#/acre)  | Allocation |
|--------|--------------------|-------------------------------|--------------|--------------|------------|
| 1      | Ashland            | DeJarnette Park Lake          | 1            | 50(1/2 CLIP) | 50         |
| 1      | City of Petersburg | Willcox Lake                  | 22           | 50(1/2 CLIP) | 220        |
| 1      | Hanover            | Courthouse Pond               | 3            | 50(1/2 CLIP) | 150        |
| 1      | Henrico            | Crump Park Lake               | 2            | 100          | 200        |
| 1      | Henrico            | Deep Run Park Pond - lower    | 2            | 100          | 200        |
| 1      | Henrico            | Deep Run Park Pond - upper    | 2            | 100          | 200        |
| 1      | Henrico            | Echo Lake Park                | 12           | 50(1/2 CLIP) | 600        |
| 1      | Henrico            | Three Lake Park (Lake #1)     | 7            | 50(1/2 CLIP) | 300        |
| 1      | Richmond (City)    | Bryan Park Lake (Youngs Pond) | 6            | 50(1/2 CLIP) | 300        |
| 1      | Richmond (City)    | Forest Hill Park Lake         | 5            | 3/10 CLIP    | 150        |
| 1      | Richmond (City)    | Swan Lake                     | 23           | 1/4 CLIP     | 300        |
| 2      | Franklin           | Gilly's Pond                  | 2.5          | 100          | 250        |
| 2      | Franklin           | Woody's Pond                  | 2.5          | 100          | 250        |

|   |                |                           |     |     |     |
|---|----------------|---------------------------|-----|-----|-----|
| 4 | Albemarle      | Scottsville Lake          | 2   | 100 | 200 |
| 4 | Fairfax        | EC Lawrence Pond (Walney) | 1   | 100 | 100 |
| 4 | Fairfax        | Mason Neck Pond           | 2   | 100 | 200 |
| 4 | Fairfax        | Woodglen Lake             | 3   | 100 | 300 |
| 4 | Fauquier       | Sky Meadows SP Pond       | 1   | 100 | 100 |
| 4 | Fauquier       | WARF (Warrenton)          | 1.5 | 100 | 150 |
| 4 | Loudon         | Banshee Reeks Pond        | 1   | 100 | 100 |
| 4 | Loudon         | Claude Moore Lower Pond   | 1   | 100 | 100 |
| 4 | Loudon         | Claude Moore Upper Pond   | 1.5 | 100 | 150 |
| 4 | Loudon         | Franklin Park Pond        | 1   | 100 | 100 |
| 4 | Prince William | Merrimac Farm Pond        | 1   | 100 | 100 |
| 4 | Spotsylvania   | Anna State Park Pond      | 1   | 100 | 100 |

Virginia's Urban Fishing Program began in the 1990's and includes both a winter trout stocking program in addition to a late spring CCF stocking program. This program has functioned with a goal of providing anglers a catch rate of 1 fish/hour. These urban waters were developed with the hope of recruiting new anglers in the more developed areas of Virginia. Most of the urban sites are located in county or municipal parks that offer ample parking, restroom facilities, and other amenities that are family friendly. Urban waters are stocked in the spring with CCF averaging one pound at a rate of 250/acre (Table 6).

Table 6. Channel Catfish allocations for impoundments stocked at the Urban rate (250 fish/acre). The minimum allocation is 50 fish. Channel Catfish are stocked during the spring. Stocking Rate = SR.

| Region | County                 | Waterbody            | Size (acres) | SR (#/acre) | Allocation |
|--------|------------------------|----------------------|--------------|-------------|------------|
| 1      | Chesapeake             | Northwest River Park | 3            | 250         | 425        |
| 1      | City of Hampton        | Lake Armisted        | 3            | 250         | 1000       |
| 1      | Henrico                | Dorey Park Pond      | 5            | 250         | 1750       |
| 1      | Richmond (City)        | Shields Lake         | 7            | 250         | 1750       |
| 2      | City of Lynchburg      | Clemmons Lake        | 1.4          | 250         | 350        |
| 4      | Alexandria             | Cook Lake            | 4            | 250         | 1000       |
| 4      | Prince William         | Locust Shade         | 8            | 250         | 2000       |
| 4      | City of Fredericksburg | Old Cossey Pond      | 3            | 250         | 750        |

## Regulations

Channel Catfish regulations for small impoundments fall under three categories that vary from the standard statewide regulation of 20 per day with no length limit. Costs associated with purchasing and stocking catchable size catfish have necessitated a more restrictive set of regulations that creates more of a put-grow-take program versus put and take with the exception of the urban sites. Urban sites are managed with a 4 fish/day regulation with no minimum length that allows for immediate harvest. Biologists may opt to manage the other stocked waters under either a 5 fish/day 15 inch minimum length or 5 fish/day 18 inch minimum length. These regulations are in place to allow for at least a year's growth prior to legal harvest after stocking.

## Program Effectiveness

Any program should be evaluated for effectiveness, particularly a program that is a large budget item. Channel Catfish stockings have been periodically evaluated at sites around the Commonwealth to look at fishing pressure, catch rates, harvest, and angler satisfaction. Angler surveys are the easiest and most cost effective means to evaluate success of a Channel Catfish stocking program in terms of angler success, angler recruitment/retention, and program popularity. Past surveys have evaluated the Channel Catfish stockings at our Urban Fishing Sites as well as many of our DWR impoundments (i.e. Lake Orange). Channel Catfish tend to rank as the second to third most popular fish species at many of our public fishing lakes. Channel Catfish also tend to provide for the highest harvests by anglers at many of our sites. As an example, Lake Orange has had an annual creel survey for over 20 years offering the best small impoundment data set in Virginia. In 2020, Channel Catfish were the second most abundant species harvested by anglers (N = 1009; WT = 1073 kg; Mean WT = 1.1 kg). It is important to note that Lake Orange only receives an annual stocking of 2,480 Channel Catfish, while anglers are harvesting over 1,000 fish per year out of this put-grow-take fishery. This resource is highly utilized by anglers and the cost effectiveness of the program is clearly evident. Additional waters around the Virginia need to be evaluated as funding and staff time allows.

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# Virginia's Muskellunge Management Plan

2020 – 2025



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VDWR Warmwater Streams Committee

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## **Introduction**

Muskellunge (*Esox masquinongy*) have been stocked in many waters throughout Virginia and have developed into popular sport fisheries that provide anglers the opportunity to catch a trophy fish. Although native Muskellunge populations exist in the upper Tennessee River drainage, this historical distribution is not thought to include Virginia (Jenkins and Burkhead 1994). Therefore, the presence of Muskellunge in Virginia is considered to be solely the result of hatchery introductions, including waters within the Tennessee River, Big Sandy River, and New River drainages as well as waters throughout the remainder of the state. The purpose of this plan is to summarize the current status of Muskellunge management in Virginia and to provide goals, objectives, and strategies to manage Muskellunge populations into the future.

The Virginia Department of Wildlife Resources (VDWR), formerly the Virginia Department Game and Inland Fisheries, began stocking Muskellunge in various waters throughout the state in 1963. VDWR currently recognizes 19 waters as having existing muskellunge populations, which include 9 rivers and 10 impoundments (Table 1). These populations are maintained by annual stocking or through natural reproduction following previous introductions.

Wingate (1986) identified four primary goals that have historically been pursued in the management of Muskellunge in North America. These goals include 1) producing trophy fisheries, 2) providing diversity to angling opportunities, 3) providing top-down predator control of fish populations, and 4) protecting and restoring endemic Muskellunge populations. With the exception of the final goal listed, these are the same



goals that have been, and continue to be, followed in the management of Muskellunge in Virginia.

Most naturalized populations of Muskellunge in Virginia exhibit low population density and are primarily managed as Class C fisheries with the goal of adding diversity to angling opportunities (Table 1). These waters do not receive annual stockings and are managed under relatively liberal length limits. The two exceptions to this are the James and New River populations both of which are self-sustaining and relatively dense in terms of Muskellunge abundance. Additionally, these waters exhibit great trophy potential and have become destination fisheries and as such are considered Class A Muskellunge waters. The Shenandoah River and the South Fork Shenandoah River are also considered Class A Muskellunge waters, but require stocking to maintain these fisheries. The remainder of stocked waters are considered Class B Muskellunge waters and are managed to provide diverse or trophy angling opportunities or, in the case of Rural Retreat Lake and Lake Shenandoah, for top-down predator control of a stunted Black Crappie (*Pomoxis nigromaculatus*) fishery.

## **Biology**

Muskellunge inhabit both lakes and rivers where they prefer cover such as vegetation, woody debris, bars, and rock outcroppings. In rivers, Muskellunge prefer deep pools or other areas with slower-moving water. The optimal temperature range for Muskellunge is 62° - 77°F with reduced feeding occurring at temperatures above 84°F (Jenkins and Burkhead 1994).

Muskellunge typically reach sexual maturity at 3-4 years for males and 4-5 years for females. Spawning generally occurs in mid-April to early May, although pre-spawning movements may begin in late March (Younk et al. 1996). Spawning generally occurs at water temperatures of 55 – 62°F.

Muskellunge are top aquatic predators with diets composed primarily of other fish species. Although recently hatched fry will prey upon zooplankton and other invertebrates, they quickly switch to minnows and other small fish. As the Muskellunge grows it will switch to preying on larger and larger fish. Diets of adult Muskellunge may also include small birds, mammals, and amphibians. It is this aggressive, predatory nature that has often left other stakeholders with the perception that Muskellunge have a negative impact on native game fish species. Despite the popularity of Muskellunge fishing among many anglers, the development of these fisheries in Virginia has not been without similar conflict. In the case of the New River, as the Muskellunge fishery expanded anglers targeting Smallmouth Bass grew concerned that large Muskellunge were feeding heavily upon Smallmouth Bass and negatively impacting catch rates. To specifically address these concerns, VDWR contracted research aimed at assessing the potential impact of Muskellunge predation on Smallmouth Bass in the New River.

Brenden et al. (2004) found that, although Smallmouth Bass were found in the stomachs of New River Muskellunge, that Smallmouth Bass comprised just 4% (by weight) of Muskellunge diets overall. This study did find that Smallmouth Bass comprised a higher percentage (11% by weight) of the diet for larger Muskellunge ( $\geq 32$  inches). However, this was still less than the percentages contributed by suckers (22%), minnows (24%), or sunfish (20%). These findings were consistent with other

Muskellunge diet evaluations (Deutsch 1986, Bozek et al. 1999) and, as a result, Brenden et al. (2004) concluded that predation by Muskellunge likely did not have a major impact on the New River Smallmouth Bass population. These authors did warn, however, that if VDWR altered their Muskellunge stocking protocols in a way that increased post-stocking survival of Muskellunge then the potential for a negative impact on Smallmouth Bass may be greater.

With changes to the management of Muskellunge in the New River (increased minimum length limit and increased stocking length) beginning in 2006 and a concurrent decline in New River Smallmouth Bass abundance, concerns over Muskellunge predation were raised again. Doss (2017) found that despite a fourfold increase in the abundance of adult Muskellunge since 2006, the contribution of Smallmouth Bass to Muskellunge diet was lower (3%) compared to that observed by Brenden et al. (2004). The importance of other species (suckers, minnows, sunfish) to the diet of Muskellunge was similar between the two studies.

Muskellunge growth can vary substantially among locations and is highly dependent on the availability of suitable prey (Cook and Solomon 1987). A strong sex-dependent difference in growth is apparent in Muskellunge with females growing faster and reaching a larger size than males. Growth estimates for Muskellunge in Virginia are limited to just two river systems, the Shenandoah River and the New River (Table 2). Brenden (2005) estimated that both male and female Muskellunge reached 30 inches by Age 3. At Age-6 the differences in growth became more apparent with males averaging 40 in and females averaging 43 in. By Age-8, females had reached a length exceeding 45 in while males averaged 41 in. Following the implementation of a 42-inch

minimum length limit (MLL) in 2006, however, Doss (2017) observed reduced growth for Muskellunge in the New River. Both male and female Muskellunge were found to take an additional year to reach a particular length when compared the Brenden (2005) study. The author attributed this to increased intraspecific competition for forage resulting from higher Muskellunge density under the higher length limit.

In general, advanced age at maturity and low population density can make Muskellunge populations particularly vulnerable to exploitation and can limit the potential for trophy production (Casselman et al. 1996; Crane et al. 2015). Brenden (2005) estimated the annual exploitation rate of New River Muskellunge to be 14%, which was substantially lower than the rate (25%) suggested by Hanson (1986) as a maximum threshold for quality Muskellunge management. More recent investigations indicate that while angler utilization in terms of catch is high (defined as percentage of tagged fish caught; James River  $\geq 50\%$  and New River  $\geq 40\%$ ), exploitation in terms of harvest is low (James River  $\leq 5\%$  and New River = 0%; VDGIF unpublished data).

## **Regulations**

Nearly all Muskellunge fisheries in Virginia are managed under a 30-inch minimum length limit and a 2-fish daily creel limit. The only exceptions to this are regulations developed for the New River and Lake Shenandoah aimed at reducing harvest and increasing the abundance of large Muskellunge. The Muskellunge population in Lake Shenandoah is managed under a 40-inch MLL and 1 fish per day creel limit. In 2006, the MLL for the New River fishery was increased from 30 in to 42 in and the daily creel limit was reduced to 1 fish per day. Doss (2017) concluded that the 42-in MLL resulted

in an increased abundance of larger ( $\geq 42$  in) Muskellunge in the lower New River (Claytor Dam to the WV state line). Concurrent with the increase in large Muskellunge, however, was a reduction in growth and condition of fish between 35 and 40 in, likely due to stockpiling. As a result of this research, VDWR implemented a seasonal 40 to 48 in protected slot limit (PSL) in 2017 with the intent of reducing intraspecific competition for fish  $< 40$  in through harvest while at the same providing additional protection for larger fish. From June 1 through the last day of February, no Muskellunge between 40 and 48 inches may be harvested. During the spawning period (March 1 – May 31) the regulation switches to a 48-in MLL to protect more spawning adults. The 1 fish per day creel limit remains in effect year-round for Muskellunge on the lower New River. Muskellunge in the upper New River (Fields Dam downstream to, and including, Claytor Lake) are still managed under the 42-in MLL.

### **Monitoring**

Differences among the various systems where Muskellunge are present make it difficult to establish standardized sampling protocols and none will be included in this plan. However, biologists managing waters that receive annual or periodic stockings of Muskellunge should make an effort to evaluate stocking efficacy. In particular, relative post-stocking survival and growth should be determined. Priority fisheries that are maintained through natural reproduction should be sampled annually to provide an indication of recruitment. Most creel surveys currently conducted by VDWR on Muskellunge waters do not accurately capture levels of directed effort, catch, or harvest for this species. Typically, creel surveys are conducted only during the peak spring-

summer fishing season. However, much of the targeted effort for Muskellunge occurs fall – spring.

### **Production & Stocking**

Initially, VDWR obtained Muskellunge eggs or fry from a number of states (New York, Pennsylvania, Tennessee, and West Virginia) for introduction into Virginia waters. Over the years, the agency has shifted to collecting brood fish from Virginia waters for in-house production of Muskellunge fingerlings. Additional eggs or fingerlings have been periodically obtained from other states (New Jersey and North Carolina) in years in which in-house production was not sufficient to meet the requested allocation. With the implementation of more stringent biosecurity measures by VDWR, New Jersey and North Carolina are now the only states from which VDWR may obtain surplus Muskellunge.

The mean length of Muskellunge fingerlings produced for stocking was initially 4-6 in for all state resources. Standard stocking rates at this size were established at 1-3 fish/acre of surface area for impoundments and approximately 1-2 fish/acre of pool habitat for rivers. In 2007, the VDWR Aquaculture Science Team made the decision to switch to stocking advanced fingerlings (8-12 in) with the goal of increasing survival and reducing strain on hatcheries. By switching to advanced fingerlings, hatchery staff could stock less fish and require less hatchery pond space in the process. As a result of this decision, river and impoundment stocking rates were reduced by half to account for improved survival (0.5-1.0 fish/acre of pool habitat for rivers and 0.5-1.5 fish/acre of surface area for impoundments).

The current number of advanced fingerlings needed for statewide stocking is approximately 1,780 fish annually. Despite the relatively low number of fingerlings needed, these fish can be incredibly challenging and costly to raise. Limited hatchery tank or pond space, the high cost of forage for fingerlings, and unpredictable environmental conditions and resulting variable survival of fingerlings in rearing ponds can greatly affect the final number of fingerlings produced as well as the cost per individual fish. Table 3 provides a general breakdown of costs associated with the production of advanced Muskellunge fingerlings by VDWR. Total annual production cost is estimated at just over \$30,000 with the purchase of minnows for feeding the fingerlings after they are stocked into the rearing pond accounting for nearly 60% of the total cost. This value is based on a single 5-acre pond with a maximum fingerling production of about 1,500 fish. If the pond is successful and the maximum number of fingerlings are produced, the production cost is around \$20.36/advanced fingerling. As pond success decreases the cost per fingerling increases and can be about \$40.73/advanced fingerling if the pond only produces half of the maximum.

Biologists and hatchery staff work together to collect broodstock muskellunge in March and April with a target of three ripe females and about 2 to 3 males per female. The primary muskellunge brood source for VDWR is currently the James River, although alternate sources (e.g. New River, Rural Retreat Lake, and Hungry Mother Lake) have been used historically and are still available if needed. Brood fish are transported directly to Vic Thomas Fish Hatchery (VTFH) due to its nearness to the James River and the availability of large holding tanks at VTFH. The availability of the large holding tanks allows for Muskellunge to be held and periodically checked for

ripeness. Fertilized eggs (typically 150,000–200,000) are transported to Buller Fish Hatchery (BFH) for hatching and grow-out. The transfer to BFH is necessary because rearing Muskellunge at VTFH would conflict with Striped Bass (*Morone saxatilis*) production at that facility. The need to strip and fertilize eggs at VTFH is necessary because holding space for adult fish is limited at BFH. Currently, just one 5-acre pond is allocated for Muskellunge production at BFH with a maximum production capacity of approximately 1,500 advanced fingerlings. As a result, current VDWR production capacity for advanced Muskellunge fingerlings is insufficient to cover annual stocking requests for existing waters and prohibits the development of new Muskellunge fisheries.

Given the potential for insufficient hatchery production, it is imperative that VDWR establishes stocking priorities each year prior to the Muskellunge production season. These priorities will be established by the Muskellunge working group within the VDWR Warmwater Streams Committee and will be maintained in a “living” spreadsheet that will accompany this plan. The working group includes both hatchery personnel and field biologists. Class A waters (lower New River, James River, Shenandoah River, and South Fork Shenandoah River) will be assigned the highest stocking priorities each year based on the popularity of these fisheries. However, with the self-sustaining nature of the lower New River and James River fisheries, stocking will only be necessary when problems with recruitment become apparent through annual monitoring. If stocking is not necessary in the New River or James River, then the remaining Class A waters will receive the highest stocking priority followed by Class B waters. Whether or not a particular Class B water received Muskellunge fingerlings the previous year as well as



the proximity of a particular water to a population center will be the primary criteria used to establish annual stocking priorities within the Class B management category.

Logistic constraints associated with the harvest and transport of fingerlings can be used to adjust priorities annually as needed.

### **Program Justification**

Given the challenges and costs associated with maintaining Virginia's Muskellunge fisheries, it is imperative that these efforts are in line with, and contribute to, VDWR's overall mission. More specifically, it is important to consider how Muskellunge fisheries contribute to the agency's efforts aimed at recruiting, retaining, and reactivating (R3) participation in outdoor recreation.

Muskellunge are a challenging and exciting species for anglers to target, but fishing for them is not for everyone. Known as "the fish of 10,000 casts", it takes dedication, research, and some specialized equipment and techniques for anglers to be successful. Costly, complex, and extreme types of fishing are generally considered barriers to recruitment of new anglers to fishing (Aquatic Resource Education Association 2016). For new anglers, the opportunity for relaxation is a strong driver for participation and as a result may not be attracted to the challenges associated with Muskellunge angling (American Sportfishing Association 2012a; Recreational Boating and Fishing Foundation and the Outdoor Foundation 2015). However, more experienced or avid anglers generally seek greater excitement and challenge and may become more specialized in their angling activity. Additionally, Muskellunge are one of the few sport fish in Virginia that are actively feeding during the winter months and most dedicated

Muskellunge anglers believe that this is the best time of year to target these fish. The additional wintertime angling opportunities provided by Virginia's Muskellunge fisheries have the potential to increase angler retention and reduce churn rate by increasing the number of days per year a person fishes (Aquatic Resource Education Association 2016).

Therefore, while VDWR's Muskellunge program may not serve as a primary option for recruiting new anglers, this program has tremendous potential to advance the other two components of R3, retention of existing anglers and reactivation of lapsed anglers. While VDWR focuses substantial effort toward recruiting new anglers through events like free fishing weekends and kids fishing days, there are few programs solely devoted to retaining and reactivating anglers. The Muskellunge program could function as one of the tools used to prevent angler lapse and serve as a blueprint for other programs ill-suited for recruitment. By marketing the program to current and lapsed anglers, we have the opportunity to reduce churn rate (the annual level of anglers that lapse in the activity) and reactivate disinterested anglers.

### **Evaluation**

The Muskellunge working group will meet regularly to evaluate the effectiveness of current Muskellunge management practices. If evaluations of specific waterbodies yield poor results a change of the classification of a given fishery will be considered. The working group may make recommendations to increase sampling effort or change stocking rates in an effort to improve an ailing population. Hatchery production will also

be routinely evaluated and fine-tuned to improve yields. If yields improve, efforts will be made to increase muskellunge fishing opportunities.

The committee will critically evaluate success in meeting stakeholder related goals as well as the success or failures of outreach efforts related to R3. Changes will be discussed and enacted as deemed appropriate by the Muskellunge working group.

## Goals

### **Goal 1: Maintain and enhance recreational fishing opportunities for Muskellunge with consideration of associated fish assemblages and aquatic communities.**

Objective 1. - Maintain and protect existing self-sustaining Class A Muskellunge fisheries.

#### Strategies

- Closely monitor populations to detect potential problems with recruitment, growth, or mortality.
- If problems with recruitment are detected, divert hatchery production of advanced fingerlings to these fisheries in accordance with the prioritized stocking list outlined in this plan.
- Implement regulations as needed to maintain a sustainable level of exploitation ( $\leq 25\%$ ).

Objective 2. – Maintain and protect existing self-sustaining Class B Muskellunge fisheries.

#### Strategies

- Adhere to the prioritized stocking list outlined in this plan to most effectively utilize hatchery production of fingerlings.
- Implement regulations as needed to maintain a sustainable level of exploitation ( $\leq 25\%$ ).

Objective 3. - Insure sufficient hatchery production of advanced Muskellunge fingerlings sufficient to maintain stocked fisheries.

#### Strategies

- Adhere to the prioritized stocking list and stocking rates outlined in this plan to most effectively utilize hatchery production of fingerlings.
- Explore potential for tank rearing of advanced fingerlings as a means to reduce variability in annual hatchery production and reduce costs.
- Work with VDWR Veterinarian to identify additional states that may serve as a source for Muskellunge fingerlings.
- Review existing Muskellunge stocking rates to insure optimal utilization of annual hatchery production.
- Support overall efforts to improve VDWR's statewide hatchery production capacity.

Objective 4. – Increase Muskellunge fishing opportunities statewide through development of new waters or enhancement of existing Muskellunge fisheries.

Strategies

- Evaluate the potential of more restrictive regulations such as higher minimum length limits to increase Muskellunge density in existing self-sustaining Class C waters.
- Create list of potential new Muskellunge waters that could be created if hatchery surplus is available. These waters would only be stocked after all other existing waters are stocked.

**Goal 2: Use science-based management for Virginia’s Muskellunge fisheries.**

Objective 1. – Establish a standing Muskellunge working group to assist the Fisheries Chief in addressing management issues. This group will be a sub-committee under the Warmwater Streams Committee.

Strategies

- Conduct a review of Muskellunge stocking rates currently employed by VDWR.
- Evaluate the feasibility of implementing an angler diary program for estimating Muskellunge catch rates and size structure on particular waters or statewide.
- Develop a list of research and information needs for maintaining Virginia’s Muskellunge fisheries.

Objective 2. – Improve current monitoring efforts directed at existing Muskellunge fisheries.

Strategies

- Design future creel surveys conducted on major Muskellunge fisheries to cover the important fall-winter period to allow for improved estimation of directed effort as well as catch and harvest rates.
- If feasible, implement an angler diary program for estimating Muskellunge catch rates and size structure.
- Monitor exploitation rates on major Muskellunge waters through tagging studies.
- Conduct directed annual sampling on Class A Muskellunge fisheries, especially those that are sustained through natural reproduction.
- Collaborate with Muskies Inc. Chapter 76 (Virginia) to assist with monitoring and research efforts.
- Develop and maintain a list of fishing guides targeting Muskellunge in Virginia. This list could serve as an important source of

information such as catch and usage, economic impact, and other issues related to these fisheries.

**Goal 3: Foster improved communication to promote the recreational value of Virginia’s Muskellunge fisheries and minimize conflict among stakeholder groups.**

Objective 1. – Improve communication efforts relating to Muskellunge fisheries in Virginia.

Strategies

- Maintain most current Muskellunge information on VDWR website. <https://www.dgif.virginia.gov/wildlife/fish/muskellunge/>
- Promote Muskellunge webpage and “Musky 101” video through social media and email campaigns.
- Collaborate with Muskies Inc. Chapter 76 (Virginia) to assist with communication efforts.

Objective 2. – Promote Virginia’s Muskellunge fisheries as a means to maximize utilization of these resources.

Strategies

- Market the Muskellunge program to anglers as a way to extend their fishing season.
- Utilize targeted marketing in population centers with nearby Muskellunge fisheries to inform the public about trophy fishing opportunities available to them.
- Promote the Muskellunge webpage and “Musky 101” video through social media and email campaigns as a means to attract anglers to the sport of Musky fishing.
- Collaborate with neighboring states to create a “Southern Musky Trail” and market to northern anglers to fish southern waters in the winter when their resources are iced over or in spring when they are closed to fishing.

Objective 3. – Utilize Muskellunge fishing as an integral part of VDWR’s efforts to retain current anglers and re-activate lapsed anglers.

Strategies

- Market the Muskellunge program to current anglers as a way to extend their fishing season.
- Promote the Muskellunge webpage and “Musky 101” video through social media and email campaigns as a means to attract anglers to the sport of Musky fishing.
- Collaborate with neighboring states to create a “Southern Musky Trail” and market to northern anglers to fish southern waters in the winter when their resources are iced over or in spring when they are closed to fishing.

- Email link to VDWR's Muskellunge webpage directly to lapsed anglers in an effort to reactivate them by offering a new angling challenge.
- Collaborate with Muskies Inc. Chapter 76 (Virginia) to assist with recruiting new anglers, educating the public, and participating in ongoing research.

Table 1. – List of existing Muskellunge waters in Virginia. Class A waters are considered trophy Muskellunge destination waters. Class B waters provide good fishing opportunities for Muskellunge, although catch rates and trophy potential is generally lower than Class A waters. Class C waters support fishable Muskellunge populations, although they do not contribute a significant part to the overall fishery.

|                            | <b>Area<br/>(acres)</b> | <b>Stocked/<br/>naturalized</b> | <b>Management<br/>classification</b> | <b>Stocking<br/>allocation</b> | <b>Regulations</b> |
|----------------------------|-------------------------|---------------------------------|--------------------------------------|--------------------------------|--------------------|
| <i><u>Rivers</u></i>       |                         |                                 |                                      |                                |                    |
| Clinch River               | 790                     | naturalized                     | C                                    | **                             | statewide          |
| Cowpasture River           | **                      | stocked                         | C                                    | **                             | statewide          |
| Jackson River              | **                      | stocked                         | C                                    | **                             | statewide          |
| James River                | 1,644                   | naturalized                     | A                                    | 822-1,644                      | statewide          |
| New River                  | 3,064                   | naturalized                     | A                                    | 1,202-2,403                    | special            |
| Powell River               | **                      | naturalized                     | C                                    | **                             | statewide          |
| SF Shenandoah River        | 828                     | stocked                         | A                                    | 414-828                        | statewide          |
| NF Shenandoah River        | 196                     | stocked                         | B                                    | 98-196                         | statewide          |
| Shenandoah River           | 384                     | stocked                         | A                                    | 192-384                        | statewide          |
| <i><u>Impoundments</u></i> |                         |                                 |                                      |                                |                    |
| Burke Lake                 | 218                     | stocked                         | B                                    | 109-327                        | statewide          |
| Claytor Lake               | 4,475                   | naturalized                     | C                                    | **                             | statewide          |
| Flannagan Reservoir        | 1,143                   | naturalized                     | C                                    | **                             | statewide          |
| Hungry Mother Lake         | 108                     | stocked                         | B                                    | 54-162                         | statewide          |
| Lake Shenandoah            | 36                      | stocked                         | B                                    | 18-54                          | special            |
| North Fork Pound Lake      | 154                     | naturalized                     | C                                    | **                             | statewide          |
| Ragged Mountain Reservoir  | 170                     | stocked                         | B                                    | 85-255                         | statewide          |
| Rural Retreat Lake         | 90                      | stocked                         | B                                    | 45-135                         | statewide          |
| Smith Mountain Lake        | 20,600                  | naturalized                     | C                                    | **                             | statewide          |
| South Holston Reservoir    | 1,600                   | naturalized                     | C                                    | **                             | statewide          |



Table 2. – Mean length-at-age (inches) for Muskellunge from two Virginia rivers. Populations in the New River (2000-2003) and Shenandoah (2014) were managed under a 30-inch minimum length limit (MLL) at the time of data collection while the New River (2013-2016) population was managed under a 42-inch MLL.

| Age | New River <sup>1</sup><br>(2000-2003) |      | New River <sup>2</sup><br>(2013-2016) |      | Shenandoah River <sup>3</sup><br>(2014) |
|-----|---------------------------------------|------|---------------------------------------|------|---|
|     | Female                                | Male | Female                                | Male | Combined                                |
| 2   | 27                                    | 29   | 20                                    | 23   | 25                                      |
| 3   | 33                                    | 34   | 27                                    | 28   | 30                                      |
| 4   | 38                                    | 37   | 32                                    | 32   | 34                                      |
| 5   | 41                                    | 39   | 37                                    | 35   | 37                                      |
| 6   | 43                                    | 40   | 40                                    | 37   | 40                                      |
| 7   | 44                                    | 41   | 43                                    | 39   | 42                                      |
| 8   | 45                                    | 41   | 45                                    | 40   | 43                                      |

<sup>1</sup> from Brenden (2005)

<sup>2</sup> from Doss (2017)

<sup>3</sup> VDWR (unpublished data)

Table 3. – General costs of producing and stocking advanced Muskellunge fingerlings by VDWR. Values given are based on a single 5-acre pond with a maximum fingerling production capacity of 1,500 fish.

| Category                      | Cost            |
|-------------------------------|-----------------|
| Labor (416 hours @ \$20/hour) | \$8,320         |
| Supplies                      | \$3,078         |
| Forage (minnows)              | \$17,900        |
| Transportation                | \$1,248         |
| <b>Total</b>                  | <b>\$30,546</b> |

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## **Appendix 1 – Detailed Muskellunge Egg Collection & Fertilization Procedures**

### **1) Collecting Brood Fish**

- a) Collect three females 35 to 45 inches in total length when river temperature reaches about 55°F, preferably during a warming trend.
- b) If a ripe female is found skip to step 6.
- c) Unripe fish will be injected with Common Carp Pituitary Gland powder (CCP).

### **2) CCP Preparation**

- a) Remove cap from specimen cup and place it on the table face up (outside of lid touching table). Weigh out 0.15g (150mg) CCP powder using sterile spoon to scoop CCP powder directly into sterile specimen container. Replace cap and label specimen cup. Store at room temperature and avoid light.

### **3) Reconstitution of CCP**

- a) Attach an 18 gauge (green) needle to a 35ml syringe. Fill syringe with 20ml sterile water. Remove cap from specimen cup and place it face up (outside of lid touching table). Add sterile water to specimen cup with CCP powder. Put the needle in sharps container. Replace specimen cup lid and shake. Use within one hour of reconstitution. Discard remainder of reconstituted CCP in the regular trash.

### **4) Intracoelomic (IC) Injection**

- a) Use anesthesia gloves to control females during injection.
- b) Weigh the fish you plan to inject
- c) Use 12ml syringe with 20 gauge needle (Pink) for fish injections. Fill syringe with amount of CCP solution based upon the injection chart (Column C). Place fish on dorsum. Insert needle at 45 degree angle just off the midline anywhere between the following landmarks: halfway between the pelvic and anal fins but proximal to the anal pore. (Inject in the pocket behind the pelvic fin). Plunger should be easy to depress if the needle is in the body cavity. If difficult to depress, re-insert the needle to find the body cavity. Discard needle in sharps container.
- d) Place fish into musky holding pen. Check ripeness in 3 days.

### **5) Collecting Milt**

- a) Collect 3 males 35-40" for each female in holding.
- b) Use anesthesia gloves to control fish
- c) Disinfect the fish's vent with a 1:100 (10ml per liter) iodophor solution and wipe the vent surface dry with a clean paper towel.

- d) Express male and collect milt using sterilized plastic syringe. Deposit milt in sterile vial. Avoid collecting urine in sample.

## 6) General Procedure for Fertilization and Egg Disinfection

- a) For spawning use three people, one to control the head, one to anesthetize the fish, and the other to strip the female.
- b) Disinfect the fish's vent with a 1:100 iodophor solution (10ml per liter) and wipe the vent surface dry with a clean paper towel. Spawn eggs into a clean, dry pan and add milt from 2-3 males to fertilize the eggs. Gently stir the eggs with a clean turkey feather to ensure full distribution of the milt throughout the mass of eggs. Add de-chlorinated distilled water and mix to ensure milt activation (1-2 minutes). Keep eggs in an ice bath to keep eggs cool (15 degrees C).
- c) Rinse excess milt and any blood or feces off the eggs with a large amount of de-chlorinated distilled water.
- d) If the eggs are adhesive and require use of a de-adhesive agent (i.e., walleye), add tannic acid or Fullers earth from a stock solution and mix gently, but thoroughly. Stir for approximately 2 minutes. Caution: Fuller's earth and tannic acid have been commonly used as an anti-clumping agent for cool water species. Published research suggests that when tannic acid is combined with iodophor, tannic acid destroys the ability of either compound to effectively inhibit VHS, Type IVB. Thorough rinsing of both de-adhesive agents is required to ensure that it does not interfere with the disinfectant properties of iodophor. We typically do not use Fullers Earth or Tannic Acid in the spawning process, clumping has not been a huge issue
- e) Gently pour off the solution and gently rinse eggs with clean, de-chlorinated distilled water.
- f) Immediately but gently add the prepared solution of 50 ppm iodophor (5ml per liter of distilled water) and gently mix to ensure even distribution of iodine to the egg mass. Disinfect for 30 minutes out of light. Keep eggs in an ice bath to keep eggs cool – match the temperature of the water used to hold brood fish (typically 15 C).
- g) Gently rinse eggs with de-chlorinated distilled water into waste bin. Place eggs into de-chlorinated distilled water to complete water-hardening. Pour into transport bag and add air for shipping. Ship in dry cooler with a few cubes of ice to hatchery.
- h) Clean, disinfect and dry all potentially contaminated equipment used in the disinfection process.

## 7) Equipment Disinfection

- a) Remove organic debris from equipment using tap water, detergent, and scrubber or sponge.
- b) Fill plastic container with desired amount of water. Add enough Chlorhexadine to turn water sky blue color.
- c) Let equipment sit for 10 minutes, then rinse and dry.

### Equipment Checklist

- Plastic syringes for milt extraction
- Syringes for CPP injection
- 3 egg pans
- Musky holding pen, 4 weights, 8 ropes, 4 floats. Sign.
- Anesthesia Gloves
- Musky Socks / Musky Nets
- Measuring Cups
- Feathers
- Premeasured CPP
- Distilled water
- Iodophor
- Timers
- Oxygen Tank, Banding Tool, Bands, Egg Bags, Large Cooler
- Biohazard Container

## **Appendix 2 – Detailed Muskellunge Hatchery Rearing Procedures**

### **Egg Transfer and Acclimation**

Musky are strip spawned at Vic Thomas Fish Hatchery. Fertilized eggs are then placed in plastic bags with water and compressed oxygen and sealed with rubber bands. Eggs water harden during the 3 hours it takes to transport them to Buller Fish Hatchery. Once eggs are received they are poured into plastic containers to start the water temperature acclimation process. Well water at 54F is poured into each plastic container gradually to slowly cool down eggs. Temperature is monitored as well water is added to each container. The acclimation process takes approximately 30 minutes to get the water temperature down to 54F.

### **Egg Incubation, Enumeration, Treatment, and Hatch**

Once acclimation is complete musky eggs are poured into McDonald jars and are separated by spawning batches. Initial volume of eggs in each jar is recorded after eggs settle to the bottom of the jars. Water flow is then adjusted for each jar until the eggs are rolling properly. Water flow is usually set between 1gpm and 1.5gpm depending on the amount of water needed to roll eggs. Eggs are continuously monitored throughout the incubation process to make sure they are moving appropriately in each jar.

The next day eggs are sampled from each jar to determine an estimation of the number of eggs per ounce. Eggs are collected by using a siphon tube with a bulb on the end, they are then transferred to a Von Bayer trough where 3 inches of eggs are placed in a line and counted. Three inches is then divided by the number of eggs in the count, this will give a diameter or measurement of each egg. For example, if you have 35 eggs within 3 inches in the trough, the egg diameter is .085. This number is then used to look up how many eggs you have per ounce using the Von Bayer egg chart. Musky eggs generally range between 1900-2100 per ounce depending on the size of the female. To get the total estimation of eggs per jar, the number of eggs per ounce is multiplied by the total ounces in each jar. Fertilization estimates are also taken 4 days post fertilization by counting good eggs and the total number of eggs in a clear tube and a percentage of viable eggs is calculated.

Treatment of eggs is initiated two days after they are received. Hydrogen peroxide is used at 500ppm to reduce or eliminate saprolegnia fungus that will cover eggs if left untreated. Eggs are treated every other day for 15 minutes using a flow through treatment. Treatment is calculated by using the following formula [water flow (gpm) X treatment duration (min) X treatment concentration (mg/L) / % Active Ingredient x Correction factor/ specific gravity]. For example, treatment of musky eggs, water flow 1 gpm for 15 minutes at 500 ppm [1gpm x 15 x 500ppm/ .35 AI x .003785 CF / 1.132 SG]

= 72 ml hydrogen peroxide. Dead eggs are siphoned from jars daily throughout the incubation period to help reduce fungus.

A few Eggs will begin to hatch at 8 to 9 days at 54F post fertilization. Once hatch is observed egg treatment is discontinued and eggs are transferred to wire mesh trays placed in 300 gallon rectangular tanks. Hatching will continue for up to 15 days or 342 temperature units. The water temperature in the rectangular tanks is the same temperature 54F. Any fungus clumps or unfertilized eggs should be removed from the screen tray platform to help reduce the spread of fungus to sac fry. Sac fry that hatch on the wire mesh tray are fanned using a turkey feather to encourage them to swim off the screen tray. Once the majority of live sac fry have swam off the platform the platform trays are removed.

### Fry Tank Production

Fry generally take 7-10 days to absorb their yolk sac and swim up. During this time frame, and throughout the fry tank production period, musky are treated prophylactically every other day with a formalin static bath at 150 ppm. This is done to reduce fungus. Temperature is gradually increased via inline heater to 68F. Water flow is set between 1 and 3 GPM in each tank.

Once fry are observed swimming, brine shrimp are cultured. Brine shrimp are hatched using six 15 gallon culture units. Artificial light is left on 24 hours per day. A space heater in the brine shrimp room heats water to 84F and salinity is adjusted to 28 ppt. Brine shrimp will hatch, and are harvested, 24 hours after setup. Only one 15 gallon brine shrimp cone is used per 24 hour hatch period. Water is always filled 24 hours before eggs and salt are added to allow time for the water to heat.

Musky are hand fed Brine shrimp 7 to 8 times per day per tank. Otohime feed is mixed with brine shrimp at each feeding. Musky are fed for the last time in the evening around 9 pm, belt feeders are setup to feed otohime feed overnight. Each tank has a 4 foot led shop light left on 24 hours per day to help with visual feeding. Fry are fed otohime and brine shrimp for 14 days post swim up.

Tanks are cleaned twice per day once in the morning and once in the afternoon. Cleaning tanks is labor intensive and requires patience. Tanks are swept with a broom to concentrate leftover feed to one end of the tank, unfortunately musky are also swept with the leftover feed. When the waste is siphoned so are musky fingerlings and they have to be picked out with a net. Water exchanges should also be done once a week. The sides and bottoms of the tanks should also be wiped daily with a wash cloth to remove fungus and slime. The standpipe area of the tank should also be siphoned and wiped twice a week.

Fry are fed for approximately two weeks before they are sampled and transferred to a 5 acre production pond. If fry are held longer than two weeks in tanks, cannibalism



causes major fry loss. Fry are acclimated to pond water and are spread out in different locations throughout the pond. The pond should be stocked with 5,000 musky fry per acre.

### Pond Production and Fertilization

Pond #2 (5 acres) is filled around the 1<sup>st</sup> week in March. Brood minnows are ordered (500lbs.) and delivery is scheduled for the last week in March or the 1<sup>st</sup> week in April. Brood minnows are fed 3 times per week with small trout feed pellets. Two weeks prior to stocking musky fry, the pond is fertilized with 50lbs. of soybean meal, 50lbs of Alfalfa meal and 8 lbs. of granular pond fertilizer per acre. Fertilization is done to provide a zooplankton bloom to fathead minnow fry and musky fry. The fertilization regimen should continue once a week through the end of June, then should be switched to 5lbs of granular pond fertilizer per acre until harvest in September.

The second shipment of fathead minnows should be delivered around the 3<sup>rd</sup> week in June. The minnows should be small in size (700lbs.). The third shipment of fathead minnows should be delivered during the third week in July. The minnows should be pond run (700lbs.). The fourth shipment of minnows supplied by King and Queen Fish Hatchery should be delivered by the third week in August (300lbs.).

### Harvest

Musky are generally harvested during the second or third week in September. The 5 acre production pond takes 7-8 days to drain, heavy boards are pulled one at a time. Water flow is decreased but maintained throughout draining. Musky are drained into two concrete spillways with screens placed in the back slots of each spillway. Boards are placed in slots behind the screens to maintain water level in the spillway. Many musky have to be picked up by hand in the pond because they get stuck in aquatic vegetation and don't make it to the drain channels. Musky that have been picked up by hand are placed in 5 gallon buckets with bait aerators and then transferred to a fish hauling truck. Harvesting musky is very labor intensive and requires a crew of 10-12 staff. Harvested musky are counted from the hauling truck to the hatchery building and are separated by stocking locations. Musky are allowed to rest overnight in the hatchery building before being sampled and shipped to stocking locations throughout the state.

### Cost Analysis of Musky Production

#### **LABOR ESTIMATE**

Collection and Spawning= 48 hours

Transport of eggs= 10 hours

Tempering and setting eggs= 3 hours  
Egg Treatment= 6 hours  
Egg checks, fertilization rates etc. = 4 hours  
Tank Setup heater, pumps and screens= 4 hours  
Treatment of Musky Fry= 4 hours  
Cleaning and feeding @3weeks =110 hours  
Pond prep, setup and draining= 40 hours  
Pond fertilization and feeding minnows= 32 hours  
Administrative, planning, ordering minnows, data etc. = 10 hours  
Harvesting Musky= 105 hours  
Stocking Musky= 40 hours  
Total Hours= 416 @ \$20 per hour Average labor rate without benefits.  
Total Labor Cost= \$ 8,320

## **FORAGE COST**

Brood Fathead Minnows- 500 lbs. \$8.50/lb. = \$4,250  
Small Fathead Minnows- 700 lbs. \$11.00/lb. = \$7,700  
Pond Run Fathead Minnows- 700 lbs. \$8.50/lb. = \$5,950  
Total Forage Cost= \$17,900

## **TRANSPORTATION COST**

### **Hauling trips**

**Trip #1- Shenandoah Lake, SF Shenandoah, NF Shenandoah, Main Stem Shenandoah.** Round Trip (Verona-Buller-stops-Verona) 576 miles

**Trip #2- Ragged Mountain Res, Burke Lake.** Round Trip (Front Royal-Buller-stops-Front Royal) 660 miles

**Trip #3- Hungry Mother, Rural Retreat Lake.** Round Trip (Buller-HM-RR-Buller) 54 miles

**Egg transfer- VTFH to Buller, 2 trips** 374 miles

Total Mileage= 1664 miles @ \$.75 per mile = \$1248

### **SUPPLY COST**

Soybean meal- 1500 lbs. @ \$.217 lb. = \$325.50

Alfalfa meal- 1500 lbs. @ \$.319 lb. = \$478.50

Pond Max- 640 lbs. @ \$1.60 lb. = \$1,024

Minnow Feed- 500 lbs. = \$300

Chemicals hormones, formalin etc. = \$250

INAD= \$700

Total Supply Cost= \$ 3,078

**TOTAL COST MUSKY PRODUCTION 5 ACRES (1500 MAX PRODUCTION) =  
\$30,546**

**1,000 fish- cost per fish= \$30.55**

**1,250 fish- cost per fish= \$24.44**

**1,500 fish- cost per fish= \$20.36**

**TOTAL COST MUSKY PRODUCTION 10 ACRES (3000 MAX PRODUCTION) = \$  
54,114**

Extra Cost to add 5 acres of production

Minnows=\$17,900

Labor 177 HRS (pond setup, draining, harvesting, and fertilizing) = \$3,540

Fertilizer and Feed= \$2,128

**2,000 fish- cost per fish= \$27.05**

**2,500 fish- cost per fish= \$21.64**

**3,000 fish- cost per fish= \$18.04**

Striped Bass and Hybrid Striped Bass Management Plan for Virginia Reservoirs

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## Introduction

Striped Bass *Morone saxatilis* are an anadromous fish native to Virginia. Their annual spring migrations occur in all major Atlantic slope river drainages with fish ascending from the ocean to tidal freshwater below the fall line to spawn (Jenkins and Burkhead 1994). They have tremendous economic value fueling substantial recreational and commercial fisheries. Striped Bass and their hybrids (typically a female Striped Bass crossed with a male White Bass *M. chrysops* in a hatchery) are widely stocked into Virginia reservoirs (for purposes of this management plan, “reservoirs” are those impoundments exceeding 500 acres vs. “small impoundments”). This management plan encompasses the use of Striped Bass and Hybrid Striped Bass (hereafter referred to simply as “hybrids”) in Virginia reservoirs.

Striped Bass and hybrids have historically been stocked in Virginia reservoirs to provide a diversification of the fishery and exploit unused or marginally used habitat (pelagic zone) and forage (clupeid species; typically Gizzard Shad *Dorosoma cepedianum* and herrings of genus *Alosa*). All Striped Bass populations in Virginia are maintained entirely through stocking (put-grow-and-take fisheries) with the exception of Kerr Reservoir which has some natural reproduction (Jenkins and Burkhead 1994). However, Kerr’s natural reproduction and highly variable year classes are not capable of supporting the current recreational fishery.

Striped Bass have been stocked in numerous Virginia reservoirs for decades with fish sourced from both Chesapeake Bay and Roanoke River broodstock. Striped Bass have fairly stringent habitat requirements and require adequate levels of oxygen and thermal regimes within tolerance levels. These requirements change as the fish grows – a phenomena known as

an ontogenetic shift. These parameters during summer months frequently limit Striped Bass habitat in thermally stratified southeastern U.S. reservoirs in a scenario known as “temperature-oxygen squeeze” (Coutant 2013). Generally, this condition is more common in eutrophic systems (e.g., Lake Anna) and less so in mesotrophic reservoirs such as Smith Mountain Lake. In severe situations, acute fish kills can occur; as Striped Bass are sequestered into a thin marginally suitable habitat layer near the thermocline separated from forage. For example, summer Striped Bass kills occurred at Claytor Lake several years between 2002 and 2016 and were attributed to a temperature-oxygen squeeze exacerbated by drought and low flows in the New River.

Striped Bass fish kills have been rare in Virginia. However, even without overt fish kills; poor habitat conditions manifest in reduced growth rates, poor body condition and lowered immunity to fungal, bacterial, and viral infections. Although many studies have described suitable habitat for Striped Bass and hybrids in reservoirs, findings have been generally consistent with regards to the needs of adult Striped Bass. For example, Young and Isely (2004) found Striped Bass avoided temperatures above 25C and dissolved oxygen concentrations below 2.3 mg/l in a South Carolina reservoir, while Cheek et al. (1985) found adult Striped Bass were confined to water with temperature below 24C and dissolved oxygen greater than 4 mg/l in a Tennessee reservoir. All reservoirs exhibit different hydrological conditions and summer thermal stratification patterns. Stocking Striped Bass into reservoirs without adequate summer habitat for adult fish is not recommended. Striped Bass are currently stocked in Lake Anna, Smith Mountain Lake, Leesville Reservoir, Kerr Reservoir, Claytor Lake and the “tidewater lakes”

(Western Branch, Prince and Meade) among others (Table 1). There are several small impoundments also stocked with Striped Bass and hybrids that are not listed in this report.

In reservoirs with marginal or poor habitat, hybrids may be more suitable; as they are more tolerant of degraded water quality conditions and may display “hybrid vigor”. However, hybrids are not functionally sterile; and care must be given to ensure stocked fish do not escape into Atlantic slope river systems and corrupt the genetic integrity of anadromous stocks. Thus, hybrids have not historically been stocked in Atlantic slope reservoirs due to concern over escapement, downstream migration, and mixing of *Morone* sp. in tidal waters (this was observed below Occoquan Dam in the tidal Occoquan River in 1989 following hybrid stocking of Occoquan Reservoir). In 2014, hybrids were stocked in Lake Anna (York River drainage) for the first time after VDWR consulted with VMRC and determined that the probability of hybrid escapement from Lake Anna was low. Other stockings followed in subsequent years, and no escapement has been observed (the North Anna River is sampled annually by Dominion Power as part of their North Anna operating permit). Lake Anna remains one of two Atlantic slope reservoirs receiving hybrids and joins Claytor Lake, Carvins Cove and Flannagan Reservoir (Tennessee River drainage) as Virginia reservoirs receiving annual stockings of hybrids. Carvins Cove is the other Atlantic slope reservoir, but any escapees would have to negotiate an extremely unlikely passage through 5 downstream dams to reach tidal water.

As water quality parameters change over time, hybrid stocking may supplement or even replace Striped Bass in some reservoirs. Lake Anna is gradually becoming warmer (Via 2012),

and if trends continue; Striped Bass will not survive. Lake Anna and Claytor Lake have the distinction of being the only two Virginia reservoirs stocked with both Striped Bass and hybrids.

### Production/Stocking

Waters stocked, and stocking rates have varied over time; thus production has fluctuated. Some of this was due to rate adjustments in efforts to determine the most appropriate stocking density in a given water (typically standardized as number of fish per acre), as reservoirs differ in productivity, forage base and habitat. One stocking rate does not fit all scenarios. Even within reservoirs, stocking rates are often adjusted based on predator growth rates and/or forage abundance estimates. It is imperative to not overstock predators and deplete clupeid forage and/or reduce abundance of forage species (e.g., Gizzard Shad) within preferred size ranges. Correlations have been documented in Smith Mountain Lake between Gizzard Shad abundance and size structure and Striped Bass abundance. Striped Bass and hybrids are not stocked in reservoirs without clupeid forage. Current stocking rates are listed in Table 1. Striped Bass stocking typically precedes hybrid stocking which may play a role in limited dietary overlap between juveniles during the growing season (Rash and Ney 2013).

Production efforts for Striped Bass are centralized at King and Queen and Vic Thomas Fish Hatcheries. Striped Bass broodstock are typically collected from Chesapeake Bay and Roanoke River drainages in April with resulting progeny stocked into appropriate waterbodies within these watersheds. Historically, hybrids were occasionally produced at DWR hatcheries



when fry were available following fish trades with other states (providing pond space was available), but recently hybrids needed to fill stocking requisitions have been procured via the private sector for approximately \$0.40 per 2-3" fish. This trend appears likely to continue.

Current Striped Bass production appears to satisfy statewide demand but is at the upper limit of hatchery capabilities given other warm water production needs and a precarious pond situation at King and Queen Hatchery. There needs to be a plan implemented for putting 11 of 18 dormant ponds back into operation, and input from staff aquaculture personnel should be considered in every step of the planning, bidding and construction processes. Providing adequate maintenance of existing pond space and initiatives to meet deficiencies outlined above, Striped Bass production should meet demand until at least 2026.

In 2020, over 1.63 million Chesapeake Bay and Roanoke strain Striped Bass fingerlings were produced at the King and Queen and Vic Thomas Hatcheries surpassing the requisition of 1.01 million. Two ponds repaired at King and Queen Hatchery in 2020 facilitated the boost in production, and repairs to two others are pending. Use of larger, Phase II fingerlings should theoretically improve survival and may be a useful tool to improve recruitment in some waters. Requests for these fish has been variable (but typically low), and their use is still being evaluated in Region 2. Future production needs for Striped Bass are likely to be stable, as waters with available habitat and forage are already stocked; and new reservoir construction is unlikely. However, demand for hybrids is likely to increase due to popularity and possible expansion of hybrid stocking into Chesapeake Bay drainage reservoirs and small impoundments

with limited emigration potential. In 2020, there were 155,000 hybrids requested and stocked statewide.

Stocking rates in Virginia reservoirs have fluctuated but have generally been between 5 and 30 fish/acre. Fingerling stockings of Striped Bass are usually conducted in spring at multiple locations (boat ramps) based on reservoir size. For larger systems, three to five stocking locations at mid to upper lake sites are used to better disperse fish and maximize productivity gradients in tributary storage impoundments. Stocking success can be highly variable and has been linked to various biotic and abiotic variables (Sutton et al. 2013). Hybrid stocking usually occurs in summer due to production and bid procurement logistics. When both fish are stocked in the same reservoir, it is beneficial to have stockings temporally separated to maximize survival.

### Sampling

Striped Bass and their hybrids are typically sampled during late fall or winter months with monofilament horizontal gill nets in reservoirs (McRae et al. 2013). Some biologists use experimental (multi-panel) nets, while others use (previously standardized) mono-panel nets of various mesh sizes designed to capture young-of-year (YOY) and adult fish. Catch rates are expressed as number of fish caught per net night which will obviously vary based on gear selection. For example, the Lake Anna pelagic fishery is sampled annually with 36 net nights of 200' experimental gill nets with a resulting Striped Bass mean catch rate of 4.6 fish/net night

(CV=38% in 2018,  $n=22$ ). Over the past five years, hybrids added an additional 1.2 fish/net night increasing the overall *Morone* catch rate. Alternatively, Kerr Reservoir was sampled with 18 net nights of 200' mono-panel gill nets in 2018 with a resulting catch rate of 11.7 fish/net night and a CV of 46%. Care must be taken when interpreting catch per effort results to specify gear, as "net night" has not been historically standardized. The term has been equally applied to 100' and 200' nets as well as other lengths.

Otoliths are usually removed from sampled fish for exact age determination to elucidate year class contribution, growth, survival and mortality rates. Growth rates vary substantially among Virginia reservoirs and are largely driven by summer habitat and individual reservoir hydrographic conditions. In a recent study of Striped Bass growth rates in 15 southeastern U.S. reservoirs, Virginia populations ranked from near lowest (Lake Anna) to near highest (Leesville and Claytor Lakes) (Wilson et al. 2013). After age-0, high variability of length at age generally precludes the use of age-length keys.

Creel surveys have documented the importance of *Morone* fisheries to Virginia anglers and local economies. For example, a recently conducted one-year Lake Anna creel survey (2018-2019) estimated 15% of 331,183 angler hours targeted *Morone* populations. Previous surveys at Lake Anna suggested over 20% of users targeted Striped Bass. Seasonal rates were even higher with 83% of directed effort in December targeting *Morone* – popular winter fisheries at many Virginia reservoirs. This same survey demonstrated an overall economic impact of \$7.76 million from the 12-month period. Another survey technique - angler diaries -

has been successfully used at Smith Mountain Lake to supplement standard fishery dependent and independent data (Wilson 2013).

Smith Mountain Lake could be called the crown jewel of Virginia reservoir Striped Bass fisheries due to excellent habitat, and a creel survey during a portion of 2014 indicated nearly 40% of all anglers were targeting Striped Bass resulting in an estimated 141,000 hours in just 8 months at this reservoir. However, anglers targeting Striped Bass at Claytor Lake declined from 19% to 6% over the past decade with changes in regional fish populations. It is believed pressure at Claytor Lake was higher when Smith Mountain Lake's Striped Bass fishery experienced a downturn during the early 2000s, and anglers turned their attention to a relatively local alternative. A 2017 9-month creel survey at Kerr Reservoir documented 10% of anglers targeted Striped Bass resulting in an estimated 18,000 hours of angling time. Historically, this figure was higher at Kerr, but the fishery is recovering from a depressed status. The balance of these surveys clearly implicates the great importance of this fisheries across the Commonwealth.

Many, if not most, Striped Bass anglers on Virginia reservoirs are highly specialized (for example; many use high-end electronics, catch their own live bait and troll multiple rigs with planer boards). As specialization increases, dependency on a particular resource also increases; and anglers demonstrate high knowledge and commitment to a resource (Bryan 1977). Thus, these anglers are intuitively valuable candidates to keep satisfied under the agency's "R3" initiative.

## Plan Implementation/evaluation

This plan has been, and will continue to be, implemented by District Biologists under supervision of Regional Aquatic Managers (RAMs) amid concurrent oversight of the Reservoir Technical Committee. Success of this reservoir *Morone* management plan will be measured using fisheries-dependent data (primarily fall/winter gill net surveys) to monitor stocking success and population dynamics combined with creel surveys to evaluate angler satisfaction. This plan will be revisited biannually by the Reservoir Technical Committee beginning in 2023.

Table 1. Annual Stocking Rates of Striped Bass and hybrids in Virginia reservoirs.

| Reservoir      | Size (acres) | VDWR Region | STB/acre | HSB/acre |
|----------------|--------------|-------------|----------|----------|
| Chesdin        | 3100         | 1           | 25       |          |
| Little Creek   | 947          | 1           | 25       |          |
| Western Branch |              | 1           | 25       |          |
| Prince         |              | 1           | 25       |          |
| Meade          |              | 1           | 25       |          |
| Kerr           | 48900        | 2           | 5        |          |
| Gaston         |              | 2           |          |          |
| Carvins Cove   | 800          | 2           |          | 6.2      |
| Smith Mountain | 20600        | 2           | 15-18    |          |
| Leesville      | 3270         | 2           | 15       |          |
| Claytor        | 4363         | 3           | 15       | 7.5      |
| Flanagan       | 1143         | 3           |          | 15       |
| Anna           | 9600         | 4           | 15       | 10       |

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# **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.

| <b>Waterbody</b>           | <b>Type</b>     | <b>Management Category</b> |
|----------------------------|-----------------|----------------------------|
| 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**

**Prepared by:**

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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 | <b>None</b> |                                      |                      |
| 2013 | <b>None</b> |                                      |                      |
| 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.

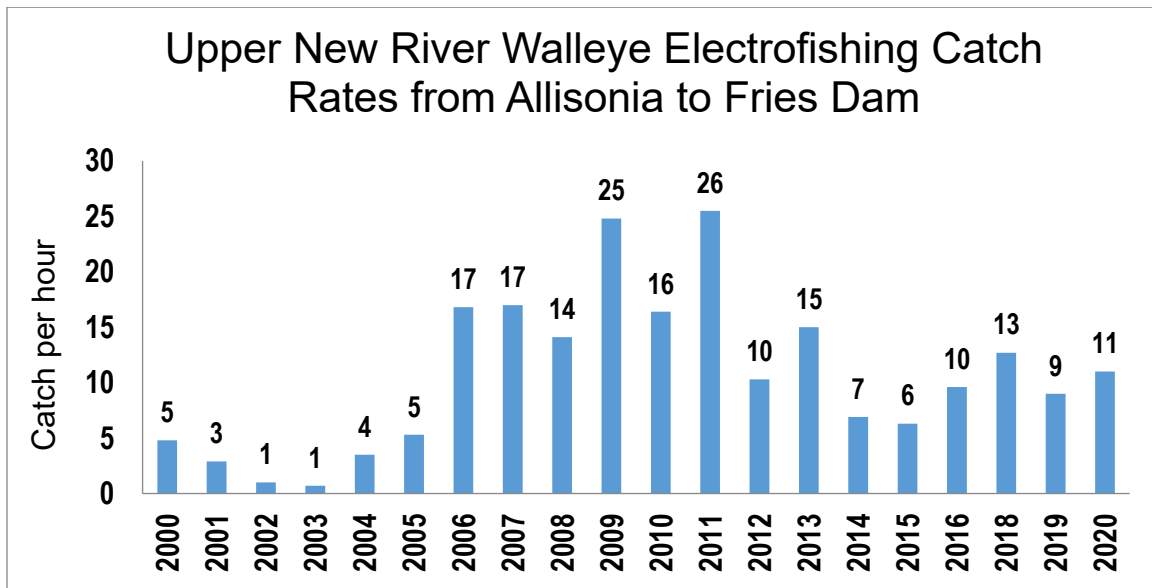
Until January 1, 2021, from Buck Dam upstream to Fries Dam, the walleye population was governed by a 508 mm minimum size limit with a creel limit of 5 per day, with the intent of protecting the Walleye population in Byllesby Reservoir that runs upstream to Fries Dam. On January 1, 2021, the 508 mm minimum 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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# Inclusive Excellence Strategic Plan 2021-2025







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# MESSAGE FROM THE DIRECTOR

The Commonwealth has changed dramatically since the birth of this agency in 1916. Along with the evolution of successes and new challenges in wildlife conservation, Virginia’s rich geographic and biological diversity is now matched by its demographic diversity. Preservation of species, habitat, and promotion of wildlife-based recreation for the generations to come depends on our ability to reach both new and traditional constituencies and to serve the needs of all Virginians.

Accordingly, I am pleased to present the Department of Wildlife Resources’ 2021-2025 Inclusive Excellence Strategic Plan. This Plan, which was developed with input from staff throughout the agency via our Inclusive Excellence Council, outlines our goals and initiatives to build a workforce that will deliver on our mission to “CONSERVE. CONNECT. PROTECT.”

Implementing the Inclusive Excellence Strategic Plan will increase our capabilities; promote diversity, equity and inclusion among the agency’s staff; make the outdoors available, accessible, and safe for all Virginians; and help ensure that wildlife and outdoor recreation are enjoyed and supported by generations to come. To paraphrase President John F. Kennedy’s memorable speech, we choose this undertaking not because it is easy, but because it is hard; because these goals will serve to organize and measure the best of our energies and skills, because this challenge is one that we are willing to accept, one we are unwilling to postpone, and one we intend to accomplish.

Each of us is responsible for ensuring the success of this Plan and I look forward to working with colleagues and constituents to achieve these important objectives.



Ryan Brown  
Executive Director,  
Department of Wildlife Resources

# INCLUSIVE EXCELLENCE TERMS

If an organization is going to move towards Inclusive Excellence, there must be alignment of goals and mutual intentionality. This is not achievable without a shared vocabulary. To that point, some of the terms below can be found in the Governor's ONE Virginia Plan and will be repeated throughout the Virginia Department of Wildlife Resources' (DWR) journey.

## DIVERSITY

is defined broadly as all of the characteristics that make individuals unique. It is used to describe the various combinations of group/ social differences (e.g., race/ethnicity, class, gender, gender identity, sexual orientation, country of origin, and ability, as well as cultural, political, religious and other affiliations) and human differences (e.g., personality, learning style, and life experiences). DHRM's working definition of diversity is to foster a collaborative work environment that is inclusive of every employee by recognizing and effectively utilizing their talent, skills, and perspectives to create a unified and high-performance workforce.

## EQUITY

refers to the creation of opportunities for historically underrepresented populations to have equal access and equitable opportunity. Equity is also the process of allocating resources, programs, and opportunities to employees, customers, and residents, to address historical discrimination and existing imbalances. Therefore, equity requires an organizational commitment that all employees, customers, and residents will be provided equitable access to opportunities, resources, and the ability to fully contribute to the agency's mission and goals.

## **INCLUSION**

is used to describe the active, intentional, and ongoing engagement with diverse people, practices, and communities (intellectual, social, cultural, geographical) in ways that increase one's cultural affirmation and respect, content knowledge, cognitive sophistication, and empathetic understanding of the complex ways individuals interact with and within systems and organizations. More importantly, genuine and full inclusion fosters a sense of belonging and respect for the differences and uniqueness that all employees bring to the workplace, without the impact of inequities.

## **INCLUSIVE EXCELLENCE**

requires that we establish a welcoming and productive community that engages all of its diversity in the service to an organization, for both internal and external stakeholders. It requires affirmation and respect for cultural, social, racial, religious, gender, and ability differences among the organization's stakeholders. It includes organizational improvements in access/success, climate/culture, education/training, infrastructure/accountability, and community engagement.

## **INTENTIONALITY**

is the characteristic of an individual's or organization's acts that requires them to:

- 1) have goals;
- 2) select behaviors that are in the service of attaining the goals; and
- 3) to call into conscious awareness a desired future state. It is this philosophy that will move DWR towards Inclusive Excellence.

## **UNDERREPRESENTED**

refers to populations that are disproportionately lower in number relative to their number in the national/state population.



# DWR's INCLUSIVE EXCELLENCE VISION

The Virginia Department of Wildlife Resources (DWR) will strive to create a work environment that provides all employees equal access to information, development and opportunity. By building an inclusive work environment, we will promote, then leverage, the diversity of people, talent and ideas. As a public agency, our ability to understand, embrace and operate in a multicultural Commonwealth — both among our stakeholders and our employees — is critical to our long-term sustainability and specifically impacts our ability to meet DWR's mission.



# **INCLUSIVE EXCELLENCE**

## **CORE PRINCIPLES**

Below are the four core principles of Inclusive Excellence at DWR. Each has a specific Goal(s) that is to be accomplished by executing on specific Strategic Initiatives. It is anticipated that this list of initiatives will continue to grow over the four-year lifespan of this plan and such additions will be noted in the annual report on progress.

Too often, strategic plans require certain “outputs” from organizational components. In order to be intentional in our efforts, the plan features Targeted Outcomes which will ultimately determine success. While creating a diverse, equitable, and inclusive workplace is the responsibility of every employee, some divisions are more responsible for the execution of specific initiatives than others.

The Accountable Divisions charts assign responsibility for each initiative. The accountable divisions for each strategic initiative are requested to collaborate in the submission of proposed metrics for each of the strategic initiatives within 90 days of the final approval of this plan, as they possess the subject-matter expertise to execute more efficiently.

- Recruiting
- Culture
- Awareness
- Connecting



# RECRUITING

- Using a broad spectrum of talent acquisition best practices to attract a diverse and highly skilled applicant pool.
- To manage a process free from artificial barriers that would discourage the hiring of underrepresented candidates.

## GOALS

- Complete transparency of the recruitment and selection process allowed within federal and state law and Department of Human Resource Management (DHRM) policy.
- Elimination of all reasonable artificial barriers to hiring.

## STRATEGIC INITIATIVES

1. Create a college and university recruitment plan featuring internships and mock interviews that is inclusive of historically Black colleges and universities in the Commonwealth and contiguous states.
2. Develop enhanced relationships with college administrators and proficiency with HANDSHAKE[1] technology to assist in recruitment.
3. Track applicant flow data for various demographics. Provide a semi-annual report to leadership for action and accountability consideration.
4. Engage diverse recruiting venues, websites, magazines, business publications, and professional and college outdoors-oriented affinity organizations.

[1] HANDSHAKE is an online employment solution for college students used by more than 500,000 employers.

5. Provide clear applicant preferred education qualifications and certification requirements to all colleges and universities.
6. Engage subject matter expert(s) to review interview processes to ensure objectivity in candidate selections.
7. Establish an employer branding strategy which includes images of underrepresented and underserved populations.
8. Develop a centralized Internship Program for all divisions with one point of contact, a start-to-finish participation plan, and a way to capture participant and division feedback with the goal of full-time employment.
9. Foster an environment in which interns are paid a wage that will allow them to live independent of other income during the internship.
10. Review the LawFit[2] measurables and water swimming requirements to ensure that they are appropriate and/or can be obtained at the conclusion of a CPO academy.
11. Offer training to ensure that individuals conducting background investigations are doing so equitably and the process is free from bias.
12. Expand advertisements through all avenues that will attract a diverse population such as radio, billboards, social media sites, LinkedIn, Indeed, etc.
13. Communicate and follow hiring timelines including the requirements for completing the Conservation Police Officers academy.
14. Standardize the sharing of information regarding perquisites and conditions of positions to all interviewing candidates.
15. Perform salary studies to ensure equity in all offers of employment.
16. Avoid including minimal requirements in a position description that can be obtained after employment.

[2] The LawFit LLC is an initial physical fitness assessment tool developed by the National Center for Public Safety Fitness of James Madison University. After this assessment is complete the candidate is expected to complete several hours of physical fitness training leading to optimal performance, endurance, and strength with the management of disease, fatigue, and stress and reduced sedentary behavior. Candidates are tested periodically over a 26-28 week training period.

**RECRUITING****TARGETED OUTCOMES**

- Increased number of underrepresented applicants in the pool.
- Increased rate of underrepresented candidates interviewed and hired.
- Increased the number of interns from underrepresented groups.
- Increased rate of underrepresented interns entering the conservation field and working for DWR.

**ACCOUNTABLE DIVISIONS**

|    | DIVERSITY INCLUSION | EXECUTIVE OFFICE | FINANCE PLANNING | FISHERIES | HUMAN RESOURCES | LAW | OUTREACH | WILDLIFE |
|----|---------------------|------------------|------------------|-----------|-----------------|-----|----------|----------|
| 1  |                     |                  |                  |           | X               |     |          |          |
| 2  |                     |                  |                  |           | X               |     |          |          |
| 3  | X                   |                  |                  |           | X               |     |          |          |
| 4  | X                   |                  |                  |           | X               |     | X        |          |
| 5  |                     |                  |                  |           | X               |     |          |          |
| 6  | X                   |                  |                  |           | X               |     |          |          |
| 7  | X                   |                  |                  |           |                 |     | X        |          |
| 8  | X                   |                  |                  |           | X               |     |          |          |
| 9  | X                   |                  | X                |           | X               |     |          |          |
| 10 | X                   |                  |                  |           | X               | X   |          |          |
| 11 | X                   |                  |                  |           | X               | X   |          |          |
| 12 | X                   |                  |                  |           |                 |     | X        |          |
| 13 |                     |                  |                  |           | X               | X   |          |          |
| 14 |                     |                  |                  |           | X               |     |          |          |
| 15 |                     |                  |                  |           | X               |     |          |          |
| 16 |                     |                  |                  |           | X               |     |          |          |

# CULTURE

- To promote and sustain a workplace that is inclusive of all people, talents and ideas so that members of the workplace may achieve their highest level of engagement and full occupational potential.

## GOALS

- Develop a workforce that resembles the diverse racial, gender, and cultural differences of the Commonwealth.
- Value non-traditional approaches and skill sets that can further DWR's mission.
- Adopt a "best idea wins" approach to decision-making.
- Treat others as THEY wish to be treated and not as YOU wish to be treated.

## STRATEGIC INITIATIVES

1. Challenge and ensure accountability for unacceptable cultural behaviors by both employees and customers.
2. Conduct an annual climate survey of the workforce. Track progress and course correct towards a more inclusive work environment.
3. Move beyond the "rites of passage" approach to starting a career in conservation to one which does not present barriers based on means.
4. Allow employee work profiles and screening criteria to include bonafide and relevant non-career activities when measuring an applicant's qualifications and interests.

5. In the employment process, when not in contradiction with any state, federal or local law or regulations, consider how an applicant's views and past actions align with the vision, mission and values of DWR.
6. Develop an Ombudsman Program that provides a safe space for those who have difficulty in the workplace.
7. Develop an Employee Appreciation Program and demonstrate authentic appreciation that is communicated to the entire staff. Ensure that recognition awards are given annually.
8. Establish a standardized on-boarding process that includes a presentation on "Inclusive Excellence at DWR" and agency-wide introduction of new staff.
9. Challenge seemingly innocuous office practices that could ultimately exclude certain members of the workforce.
10. Conduct a standardized exit interview/survey of all departing staff members with data reported annually to leadership for future action.
11. Emphasize non-traditional/practical experience as a proxy for academic credentials whenever possible.
12. Require specialized cultural awareness education for all customer-facing personnel.
13. Encourage participation and transparency in career development practices for all DWR employees.
14. Conduct all policies, practices, and procedures to ensure alignment with Inclusive Excellence goals.
15. Create a framework for the development of employee resource groups where employees with similar backgrounds and interests may network, mentor, and create a safe space consistent with DWR's policies.

# TARGETED OUTCOMES

- Reduction in grievances.
- Reduction in EEO/discrimination claims.
- Reduction in customer complaints.
- Increased employee retention rates.
- Increased employee engagement.
- Increased applicants.
- Increase scores on annual climate surveys.

## ACCOUNTABLE DIVISIONS

|    | DIVERSITY INCLUSION | EXECUTIVE OFFICE | FINANCE PLANNING | FISHERIES | HUMAN RESOURCES | LAW | OUTREACH | WILDLIFE |
|----|---------------------|------------------|------------------|-----------|-----------------|-----|----------|----------|
| 1  | X                   | X                | X                | X         | X               | X   | X        | X        |
| 2  | X                   | X                | X                | X         | X               | X   | X        | X        |
| 3  |                     |                  |                  | X         | X               | X   |          | X        |
| 4  |                     |                  |                  | X         | X               | X   |          | X        |
| 5  |                     | X                | X                | X         | X               | X   |          | X        |
| 6  |                     | X                |                  |           | X               |     |          |          |
| 7  |                     | X                |                  |           | X               |     |          |          |
| 8  | X                   |                  |                  |           | X               |     |          |          |
| 9  | X                   | X                | X                | X         | X               | X   | X        | X        |
| 10 | X                   |                  |                  |           | X               |     |          |          |
| 11 |                     |                  |                  | X         | X               |     |          |          |
| 12 | X                   | X                |                  | X         | X               | X   | X        | X        |
| 13 |                     | X                | X                | X         | X               | X   | X        | X        |
| 14 | X                   | X                | X                | X         | X               | X   | X        | X        |
| 15 | X                   | X                |                  |           |                 |     |          |          |

# AWARENESS

- To develop learning opportunities to equip members of the workforce with the ability to promote inclusive excellence and be active and accountable in building an inclusive work environment.

## GOALS

- Initiate Agency-wide, mandatory Inclusive Excellence training.
- Integrate Inclusive Excellence principles in all policies, practices and procedures going forward.
- Build training to accommodate diverse learning styles.

## STRATEGIC INITIATIVES

1. Offer regular training on Inclusive Excellence, cultural competency and awareness.
2. Regularly communicate information that raises awareness and promotes civility in the workplace.
3. Hold agency leadership accountable, via 360 reviews, for creating an environment within their divisions that promotes inclusive excellence.
4. Develop training courses that are tailored appropriately for employee's roles and responsibilities.
5. Bring broader perspectives with the use of third-party trainers with experiences beyond DWR.

6. Offer training specifically for hiring managers that emphasizes development of job descriptions, bias recognition and elimination, panel selection, etc.
7. Focus training and awareness opportunities on integrating Inclusive Excellence concepts into all aspects of the agency.
8. Educate outreach personnel, conservation police officers, and other public facing personnel, on cultural competency and building relationships across cultures.
9. Require management training of all new managers within one (1) year of hiring/promotion.
10. Produce annual report on advancement of Inclusive Excellence by Chief Diversity and Inclusion Officer.
11. Maintain an engaged Inclusive Excellence Council composed of members of each division who will champion Inclusive Excellence throughout the agency.

## **AWARENESS**

# **TARGETED OUTCOMES**

- Increased hiring and promotion of those from underrepresented populations.
- Improved communication between employees from different backgrounds.
- Improved support for Inclusive Excellence.
- Reduction in EEO/discrimination claims.



# ACCOUNTABLE DIVISIONS

|    | DIVERSITY INCLUSION | EXECUTIVE OFFICE | FINANCE PLANNING | FISHERIES | HUMAN RESOURCES | LAW | OUTREACH | WILDLIFE |
|----|---------------------|------------------|------------------|-----------|-----------------|-----|----------|----------|
| 1  | X                   |                  |                  |           |                 | X   |          |          |
| 2  | X                   |                  |                  |           |                 |     |          |          |
| 3  |                     | X                |                  |           | X               |     |          |          |
| 4  | X                   |                  |                  |           | X               |     |          |          |
| 5  | X                   |                  |                  |           |                 |     |          |          |
| 6  |                     |                  |                  |           | X               |     |          |          |
| 7  | X                   | X                |                  |           | X               |     |          |          |
| 8  | X                   |                  |                  | X         |                 | X   | X        | X        |
| 9  |                     | X                |                  |           | X               |     |          |          |
| 10 | X                   |                  |                  |           |                 |     |          |          |
| 11 | X                   | X                | X                | X         | X               | X   | X        | X        |

# CONNECTING

- Utilizing resources and strategies to make the outdoors available, accessible, and safe for all Virginians.

## GOALS

- Increase education about, and access to, Virginia's wild spaces and the fish and wildlife that live in them.
- Provide targeted, direct outreach to underrepresented and underserved populations.
- Expand partnership with outdoor-oriented affinity organizations.

## STRATEGIC INITIATIVES

1. Create DWR branded content that highlights DWR's mission and ways to get involved to be distributed at parks, schools and colleges.
2. Create branded content for the Project WILD educational program.[3]
3. Establish strategic relationships with outdoor affinity organizations to better understand their views on outdoor activities and conservation.
4. Include more diverse images in both print and electronic media.

[3] The Project WILD program is an interdisciplinary conservation and environmental education curriculum that focuses on wildlife and conservation for all educators -- pre-service, formal and non-formal, pre-K through high school. DWR provides in-service training for educators in support of the wildlife-related Science Standards of Learning as well as essential skills in math and language arts. The activities in the guides aid in developing students' critical thinking, problem-solving, and decision-making skills through the use of cross-curricular lessons that can be used individually, sequentially, or in units.

5. Provide digital content in the four (4) most prevalent languages for the relevant parts of the state.
6. Update website with images and languages that are inclusive of those in the Commonwealth.
7. Partner with other Virginia outdoor organizations to create synergy in messages to diverse audiences.
8. Seek opportunities to acquire and develop lands and waters that will assist in promoting high-quality outdoor wildlife experiences closer to our urban communities.
9. Seek to convert or expand the usage of DWR's current lands and waters to accommodate activities in which underrepresented groups participate. [4]
10. Host events that target underrepresented populations.
11. Seek sponsorships and participation in outdoor programs and events that are held by, or target, underrepresented populations.
12. Develop a Community Engagement Plan and dedicate an employee to its execution.
13. Share Inclusive Excellence awareness content on website and social media.

## CONNECTING

# TARGETED OUTCOMES

- Increased participation of underrepresented populations at outreach and community engagement events.
- Increased visitation at Wildlife Management Areas (WMA), and other wild spaces, by underrepresented populations.
- Increased allowable alternative use of WMAs.[5]
- Increased participation in events designed to introduce underrepresented populations to outdoor activities.

[4] & [5] This plan in no way promotes interference with WMAs' primary purpose as wildlife habitat. Any use must be consistent with the purposes for which the property was purchased or compatible with management objectives.

# ACCOUNTABLE DIVISIONS

|    | DIVERSITY INCLUSION | EXECUTIVE OFFICE | FINANCE PLANNING | FISHERIES | HUMAN RESOURCES | LAW | OUTREACH | WILDLIFE |
|----|---------------------|------------------|------------------|-----------|-----------------|-----|----------|----------|
| 1  |                     |                  |                  |           |                 |     | X        |          |
| 2  |                     |                  |                  |           |                 |     | X        |          |
| 3  | X                   |                  |                  |           |                 |     | X        |          |
| 4  | X                   |                  |                  |           |                 |     | X        |          |
| 5  |                     |                  |                  |           |                 |     | X        |          |
| 6  |                     |                  |                  |           |                 |     | X        |          |
| 7  |                     | X                |                  |           |                 | X   | X        |          |
| 8  |                     |                  |                  | X         |                 |     |          | X        |
| 9  |                     |                  |                  | X         |                 |     |          | X        |
| 10 | X                   |                  |                  | X         |                 | X   | X        | X        |
| 11 | X                   |                  |                  | X         |                 | X   | X        | X        |
| 12 | X                   | X                |                  |           | X               |     | X        |          |
| 13 | X                   |                  |                  |           |                 |     | X        |          |

# CONCLUSION

The Inclusive Excellence Council (IEC) is composed of the representatives from each DWR division and led by the Chief Diversity and Inclusion Officer.

Primary among the IEC's charges were developing an Inclusive Excellence Strategic Plan that would address the Agency's need to evolve both internally and externally. The IEC utilized the following plan development process:

- **Defined parameters of Diversity, Equity, and Inclusion**

We studied the Agency's mission and R3 Strategic Plan and worked within the Commonwealth's ONE Virginia Plan for diversity, equity and inclusion which clearly defines the Governor's vision for an inclusive Commonwealth.

- **Developed a Vision Statement**

The developed vision was vetted and approved by the Director's Working Group.

- **Assessed Needs**

We reviewed areas of improvement highlighted in previous diversity studies, Joint Legislative and Review Commission (JLARC) study and Office of State Inspector General (OSIG) audit. The IEC also retained a third-party facilitator to perform a qualitative assessment through meetings with members of the workforce.

- **Reviewed Best Diversity, Equity and Inclusion Practices in Conservation**

While relatively a new area, we were able to study industry trends and challenges.

- **Established Priorities**

Once the Core Principles were determined, the IEC divided into teams to establish goals, initiatives and targeted outcomes for each one.

- **Determined Accountability and Measures**

The final and most important task to insure success was assigning accountability to agency divisions to devise measures and produce outcomes.

In developing the Plan, the IEC believes it has given DWR a roadmap to becoming an employer of choice among the Commonwealth's agencies and a model steward in making Virginia's outdoor spaces available, accessible and safe for its diverse population. We look forward to working toward the continued growth of the Agency through Inclusive Excellence.

**2020-23 DWR Inclusive Excellence Council**

George P. Braxton, J.D., C.D.E. (Chair)

Sgt. Michael Hill (Vice-Chair)

Lester Brantley, MPA

Sgt. Jessica Fariss

Karen Horodysky, MS

Ronald Hughes

Lindsay Kagalis

CPO Amanda Nevel

Doreen Richmond

Jaime Sajecki

Jeffrey Trollinger

# Virginia DWR Relevancy Project

An Agency Path Forward: Designing Effective Engagement and Building Capacity for Relevancy



CONSERVE. CONNECT. PROTECT.



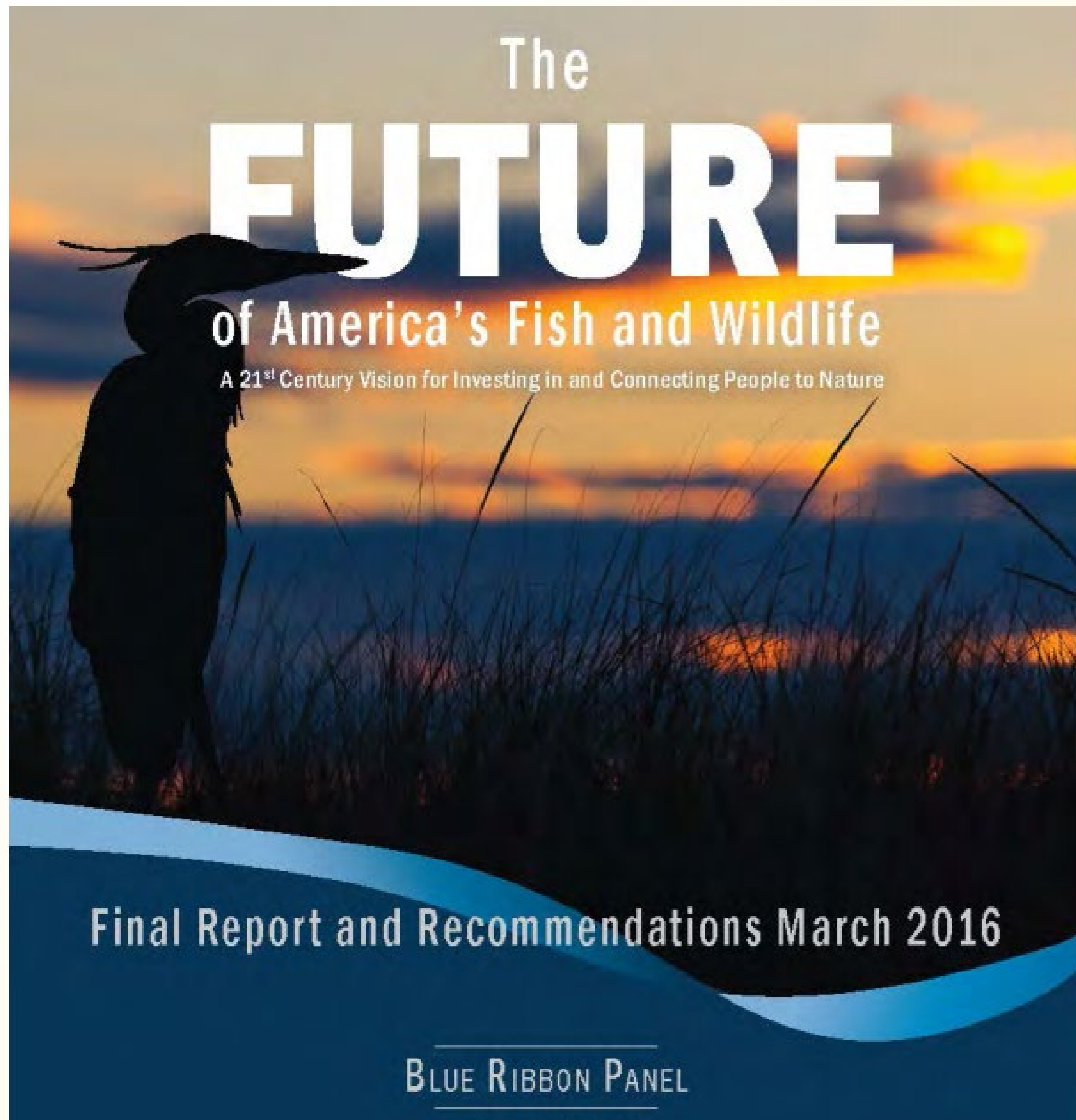
## Project Goals and Objectives

Based on the guidance of the [Fish and Wildlife Relevancy Roadmap](#), and recommendations from the Future of America's Fish and Wildlife Blue Ribbon Panel report and related discussions at national and regional conferences, this project proposes three related goals:

1. significantly enhance a state agency's ability to engage new constituencies,
2. cultivate agency relationships with priority new constituencies, and
3. increase these constituencies' engagement with, connection to, and support for the agency and conservation.







## Where it all started

# Blue Ribbon Panel

In September 2014, John Morris, Founder of Bass Pro Shops and David Freudenthal, former governor of Wyoming asked business and conservation leaders to join them on the Blue Ribbon Panel on Sustaining America's Diverse Fish and Wildlife Resources. The Panel was charged with examining the current system of conservation funding and recommending a new mechanism that will conserve all fish and wildlife. After three meetings and consideration of nearly two dozen potential funding options, the Panel agreed on two recommendations that will help set a new course for fish and wildlife conservation in this country.



## Recommendation #1

Congress dedicate up to \$1.3 billion annually in existing revenue from the development of energy and mineral resources on federal lands and waters to the Wildlife Conservation Restoration Program



## Current Situation

State Wildlife Grants must be reauthorized every year.

Virginia receives approximately \$1 million/year for conservation of Species of Greatest Conservation Need (SGCN) as outlined in the State Wildlife Action Plan.

### What would this change?

Virginia could receive dedicated funding of up to \$21 million per year for conservation of SGCN with potential for some of this funding to help with Outreach and Wildlife Viewing programs.

### Where are we now?

The Restoring America's Wildlife Act was reintroduced to Congress on April 22, 2021.

## Recommendation #2

The Blue Ribbon Panel will examine the impact of societal changes on the relevancy of fish and wildlife conservation and make recommendations on how programs and agencies can transform to engage and serve broader constituencies.

### **Current Situation**

The Relevancy Roadmap was developed beginning in 2018 with input from state and federal fish and wildlife agencies from across the country to identify barriers that make it difficult for agencies to engage and serve broader constituencies.

### **What did this accomplish?**

The Relevancy Roadmap was published in 2019 and identified 19 barriers in 5 areas, along with 5 overarching recommendations.

### **Where are we now?**

The Wildlife Management Institute (WMI) received a Multi-state Grant to identify one test state (Virginia) to develop a set of tools to address increasing relevancy with the thought that these tools could be used across states to address the identified barriers.





# List of Barriers to Engaging and Service Broader Constituencies

| Category | Agency Culture   | Agency Capacity   | Constituent Culture   | Constituent Capacity  | Political & Legal Constraints   |
|----------|--|---|---|---|---|
| Barriers | Agency culture and values do not align with nature-based values and outdoor interests of broader constituencies. | Agency lacks sufficient and diverse funding to provide programs and services to broader constituencies.             | Perception by broader constituencies that fish and wildlife agency only cares about and serves hunters and anglers.                       | Broader constituencies' outdoor recreation pursuits are limited by real and perceived barriers such as economics, cultural norms, nature-based values, outdoor interest and access limitations. | Agency decision-making processes are used and influenced by a limited number of constituencies.                             |
|          | Agency is not adaptive to the changing nature-based values and outdoor interests of broader constituencies.      | Agency lacks capacity to identify, understand, engage with, and serve the needs of broader constituencies.          | Constituents may have fears, concerns, or beliefs that prevent them from engaging with nature.  | Broader constituencies do not value the benefits nature provides.   | Lack of higher-level executive support for agency engagement with broader constituencies.                                   |
|          | Agency has a competitive and siloed culture that inhibits collaboration.   | Agency lacks capacity to develop and implement plans that engage and serve broader constituencies.                  | Constituents may not recognize the threats facing fish and wildlife, their habitats, and humans, or how to engage to address the threats. |   | Agency governing bodies may not represent the nature-based values and outdoor interests of broader constituencies.          |
|          |  | Agency lacks capacity to create and sustain effective partnerships to serve broader constituencies.                 | Some constituents are resistant to an agency engaging and serving broader constituencies.   |   | Lack of legislative support to engage and serve broader constituencies.   |
|          |  | Agency lacks expertise and knowledge to provide outdoor recreational experiences that serve broader constituencies. |   |   | Policies, practices, legal authorities, and funding restrictions limit an agency's ability to serve broader constituencies. |



## Five Recommendations That Impact All or Most of the Barriers

1. Agency leadership and governing bodies **must recognize the need for conservation agencies to adapt to changing societal conditions** and demonstrate support for adaptation efforts.



2. Agency leadership and governing bodies need to **demonstrate commitment to being more inclusive of diverse perspectives and interests** in fish, wildlife, their habitats and outdoor recreation activities.





## Five Recommendations That Impact All or Most of the Barriers

3. Agencies need to **increase acquisition and application of social science information** (stakeholder engagement, stakeholder inquiry, marketing, education, outreach, communications, economics, and evaluation) to identify, better understand, engage, and serve broader constituencies.



4. Agencies need to **commit to assessing, evaluating, and improving agency structures, processes, practices, and programs and to share lessons learned** about their experiences in engaging and serving broader constituencies.

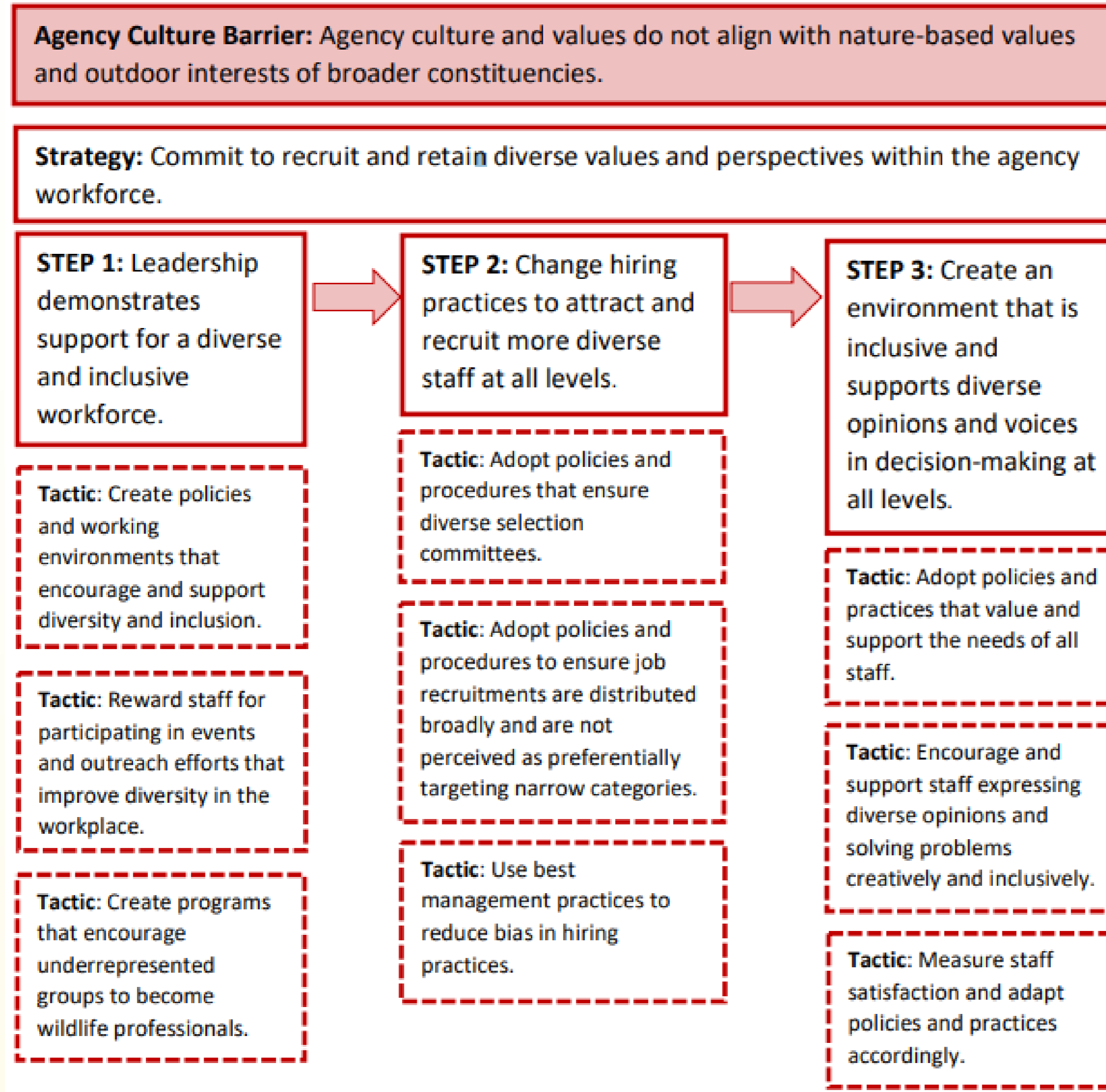


## Five Recommendations That Impact All or Most of the Barriers

5. Agencies need to **commit to increased and improved partnering and collaboration** to increase engagement with, and service to, broader constituencies.



# Each Barrier has a set of Strategies, Steps and Tactics



Look Familiar??

The Agency's Inclusive Excellence Council is addressing these same issues in our Agency Diversity and Inclusion Strategic Plan

The Governor's [One Virginia Plan](#) set a July 1 deadline for all agencies to have a plan developed.

**RELEVANCY** touches every aspect of an Agency's culture, structure, workforce and outreach efforts.





# The Relevancy Project - NOW

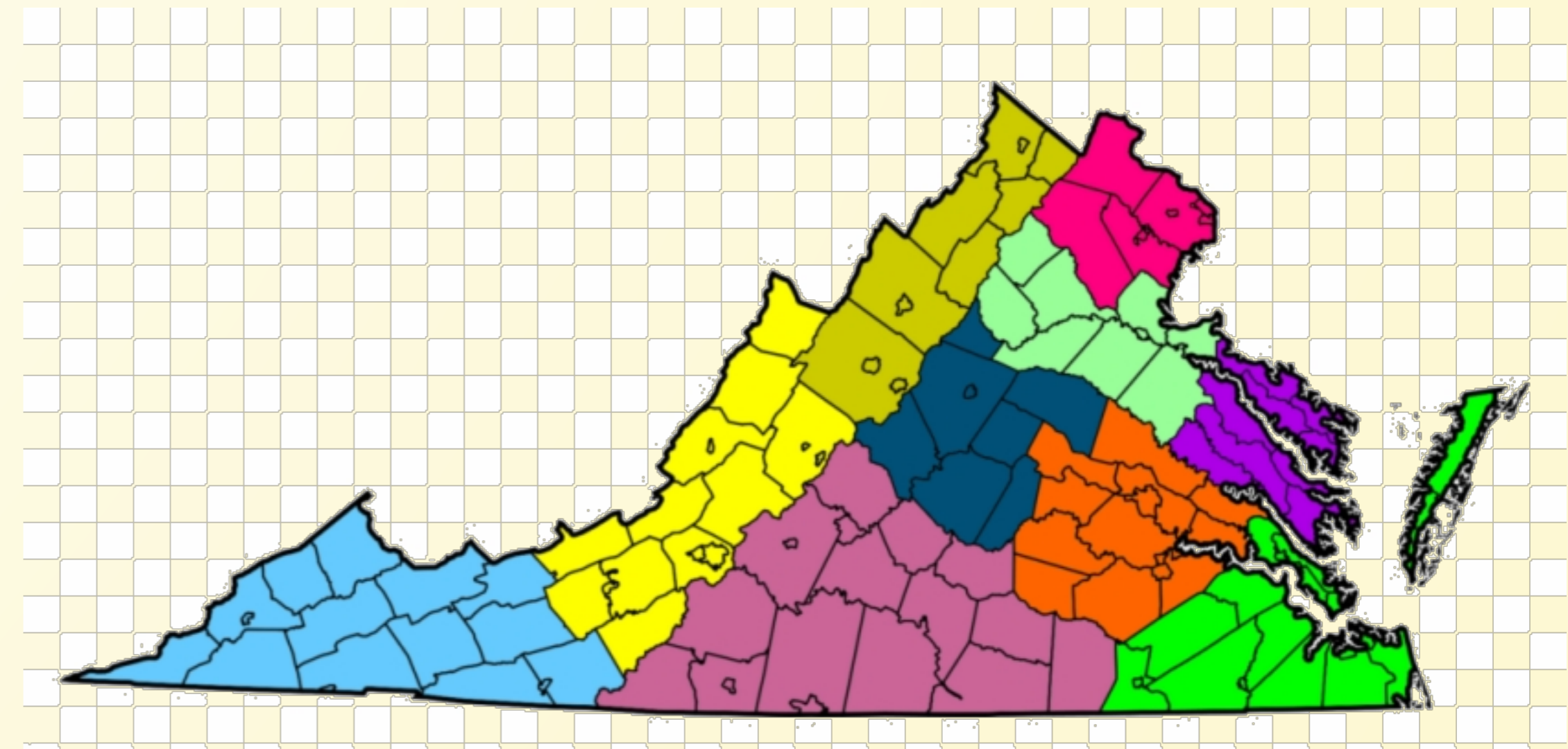
## The Virginia Team

- WMI and their contractor Metropolitan Group interviewed several states as potential test cases



## Virginia is the focal or test state

- Urban and Rural
- Culturally diverse
- Hunters, Anglers, Boaters and Viewers
- Variety of Wildlife Values
- Recognized Indigenous Tribes



## The Relevancy Project - NOW

### **An Agency Path Forward: Designing Effective Engagement and Building Capacity for Relevancy**

#### **List of deliverables:**

- Stakeholder mapping and assessment of opportunities for engagement with underserved constituencies.
- Advice and assistance in designing and conducting initial outreach to priority (underserved) partner constituencies.
- Facilitated listening sessions with priority partner constituencies.
- Assessment of priority constituency values, priorities, and perceptions.



## The Relevancy Project - NOW

### **An Agency Path Forward: Designing Effective Engagement and Building Capacity for Relevancy**

#### **List of deliverables:**

- Assessment of agency capacity, values, culture, value proposition, and perceptions.
- Comparative analyses of partner constituency and agency values, priorities, and perceptions.
- Co-designed strategy document for collaborative engagement to guide future relevancy efforts.
- Co-designed collaborative project prototype(s), setting the stage for ongoing engagement.





## The Relevancy Project - NOW

### **An Agency Path Forward: Designing Effective Engagement and Building Capacity for Relevancy**

#### **List of deliverables:**

- Comparative pre- and post-project surveys of agency staff and priority constituent group(s).
- Assistance with engagement and relationship building throughout the project.
- Final project report geared toward agency leadership teams.
- Assistance in designing measures for tracking the project's longer-term impact.



## The Relevancy Project - NOW

### **An Agency Path Forward: Designing Effective Engagement and Building Capacity for Relevancy**

#### **List of deliverables:**

All results and products to be integrated into the Relevancy Roadmap and its online community of learning and presented at national and regional agency association meetings.



## The Relevancy Project - NOW

### **An Agency Path Forward: Designing Effective Engagement and Building Capacity for Relevancy**

How do we define diversity for this project:

- Culture
- Race
- Ethnic background
- Urban
- Rural
- Those who don't know our Agency
- Hunters
- Anglers
- Wildlife Viewers
- Boaters
- Diverse Interests in the outdoors
- Diversity of knowledge about wildlife
- EVERYONE!! (But we can't do it all in this project!!)



## The Relevancy Project - NOW

### **An Agency Path Forward: Designing Effective Engagement and Building Capacity for Relevancy**

#### **Current Status:**

- DWR has assembled 20 separate reports ranging from the House Bill 38 study of 2000 to Wildlife Viewing Plan to Team WILD surveys of the Agency to provide base data for the project.
- Inter-divisional team of 15-20 staff was assembled to provide input on Agency culture and help identify partners to assist.
- Surveyed Agency Staff in June 2021 (Received 330 responses (~78%))
- Working through those results now with the DWR Executive Director, WMI and Metropolitan Group





## The Relevancy Project - NOW

### **An Agency Path Forward: Designing Effective Engagement and Building Capacity for Relevancy**

#### **Current Status:**

- Working with the Executive Committee we have identified two underserved communities to develop outreach and relevancy tools to reach – Native American Tribes (Rappahannock and Upper Mattaponi) and working with George Braxton trying to identify 1 Black/African American group.
- 12 Month Project
- Evaluation will be conducted to determine outcomes
- Toolkit will be developed that will hopefully translate to other state fish and wildlife agencies





# Questions?



**Proposed Board of Wildlife Resources' Policy -  
Board Member Attending Meeting by Electronic Means**

**Policy**<sup>1</sup>

It is the policy of the Board of Wildlife Resources that individual Board members may participate in Board meetings by electronic means as permitted by Section 2.2-3708.2 of the Code of Virginia. This policy shall apply to the entire membership and without regard to the identity of the member requesting remote participation or the matters that will be considered or voted on at the meeting.

Whenever an individual member wishes to participate from a remote location, the law requires a quorum of this Board, six members, to be physically assembled at the primary or central meeting location and there must be arrangements for the voice of the remote participant to be heard by all persons attending the meeting in-person and remotely.

When such individual participation is due to a personal matter, such participation is limited by law to two meetings each calendar year or 25 percent of the meetings held per calendar year rounded up to the next whole number, whichever is greater.

**Approval Process**<sup>2</sup>

An individual may make a request to participate in a public meeting from a remote location at any time up to and including the day of the meeting. The requesting member must advise the chair of the request.

Where the basis for the request is due to either (i) a temporary or permanent disability or other medical condition that prevents the member's physical attendance or (ii) a family member's medical condition that requires the member to provide care for such family member, thereby preventing the member's physical attendance, the member is not required to disclose the disability, medical condition, or the identity of the family member, but will be required to provide the general nature of the issue - e.g. "temporary hospitalization, confinement to the home, contagious illness, any disability or medical condition prevents travel to the meeting location, or provision of necessary care for a sick child or parent." This will need to be recorded

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<sup>1</sup> The language of this policy is adopted, with slight revision, from Virginia FOIA Council's Electronic Meeting Guide, <http://foiacouncil.dls.virginia.gov/ref/EMeetGuide2021.pdf> pp.9-10 (last visited Sep. 8, 2021).

<sup>2</sup> This approval process is adapted from the sample provided in Virginia FOIA Council's Electronic Meeting Guide, <http://foiacouncil.dls.virginia.gov/ref/EMeetGuide2021.pdf> p.10 (last visited Sep. 8, 2021).

in the minutes along with the location from which the member, subject to approval, will be participating.

Where the basis for the request is due to a personal matter, the member is required to identify, with specificity, the nature of the personal matter. Permissible personal matters include the following - Flat tire on the way to the meeting; Traffic congestion or stoppage; Personal, family, or business emergency; Blizzard, flood, or other sudden severe weather conditions that prevent travel to the meeting location; Business trip; Family trip; and Scheduling conflict. This will need to be recorded in the minutes along with the location from which the member, subject to approval, will be participating.

Individual participation from a remote location shall be approved unless such participation would violate this policy or the provisions of the Virginia Freedom of Information Act (FOIA). Va. Code §§ 2.2-3700 to -3715. Note that a member may only use “personal matters” for “two meetings or 25 percent of the meetings held per calendar year rounded up to the next whole number, whichever is greater.” § 2.2-3708.2(A)(1)(b).

If a member’s participation from a remote location is challenged, then the Board shall vote on whether to allow such participation. If the Board votes to disapprove of the member’s participation because such participation would violate this policy, such disapproval shall be recorded in the minutes noting, with specificity, the basis for the denial. Where the request is denied, the requesting member may monitor the meeting, but may only listen.

Otherwise, a member participating through electronic communication means may make motions, vote, join in closed meetings, and otherwise participate fully as if such member was physically present.

It is also important to keep in mind that, where the absence defeats the assembly of a quorum in one physical location, the Board cannot conduct any business. Section 2.2-3708.2 requires that “[a] quorum of the public body is physically assembled at one primary or central meeting location.” Id. (C)(2). Here, a quorum is six Board members. See Va. Code § 29.1-102(B) (“The Board shall consist of 11 members.”) and id. (E) (“The majority of the members shall constitute a quorum.”).