2020 VA-VT Joint Meeting American Fisheries Society Presentation Abstracts

Tuesday, February 4th to Thursday, February 6th, 2020
Lexington, VA

Population Genetic Structure of Walleye in the Eastern Highlands and Adjacent Regions

Eric Hallerman*, Sheila C. Harris, George Palmer, Carol Stepien, Matt White, Eric Peatman, Leah Berkman, and Chelsea Titus

*Presenting

Virginia Tech, Blacksburg, VA

Walleye Sander vitreus populations across their eastern native range were screened to better understand evolutionary history and to inform fishery management. Population genetic variation at eight microsatellite loci supported differentiated stocks in Alabama, Mississippi River, the Eastern Highlands (Tennessee, New, and Ohio rivers), and Great Lakes drainages. The geographic pattern of population genetic differentiation was consistent with a history of recolonization from glacial refugia in the lower Mississippi, Alabama and upper Teays drainages, with secondary contact and anthropogenic impacts from stocking. All estimates of effective numbers of breeding individuals were under 25, and all populations had ~15-20% inter-individual relatedness, likely effects of both unequal reproductive contribution and stocking. Within Virginia, the New River population appears as a mixture of native and several stocked gene pools, and the upper Tennessee drainage populations as mixtures of native, Kentucky and Lake Erie stocks. We recommend that any stocking of walleye be restricted to restoring native gene pools.

Stream habitat conditions in the North River before and after restoration activities

Brandon Fair*, Colin Krause, Dawn Kirk, Craig Roghair, and Andy Dolloff

*Presenting

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We inventoried sections of the North River within the North River Ranger District, George Washington-Jefferson National Forest (GWJNF), Virginia, in 2002 and 2005 prior to stream habitat restoration, and in 2014 and 2019 after restoration to quantify stream habitat conditions. The North River flows east from an elevation of 1,100 m through the GWJNF, past Bridgewater, VA, and into the South Fork Shenandoah River. On June 17th 1949, a catastrophic flood in the North River claimed 3 lives, damaged over 100 homes, and washed out roads and bridges. Following this flood, large portions of the North River above Elkhorn Lake were channelized in an effort to protect the reconstructed roadway and bridges. Between 1959 and 1965, 69 gabion walls, 7 cross-channel weirs, and 17 in-channel wing deflectors were installed within a 9.3 km reach of the river. The structures caused excessive down-cutting in some areas, and deposition of cobble-sized materials in others. In November of 1985, Hurricane Juan removed or buried many of these structures, resulting in loss of habitat complexity. Consequently, large sections of the stream dewater during periods of low flow. A series of structures were installed over the past several years to create and maintain low-water pools that serve as essential habitat during low-flow periods. Additionally, deteriorating gabions were removed to allow the river to access its floodplain. Here, we compare stream habitat before and after habitat restoration to assess the effectiveness of the restoration efforts to date.

The consequences of size-selective fishing mortality for larval production and sustainable yield in species with obligate male care

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*Presenting

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Parental care is common among sunfishes, bass, salmon, and other benthic spawners. Size-based harvest limits or gear regulations are often used to manage fishing mortality and ensure the spawning biomass of females is sufficiently protected. Yet, how management interacts with species' mating systems to affect fishery sustainability and yield are rarely considered. For species with obligate male care of eggs, it is possible that size-specific harvest of males will decrease larval production. In order to examine how size-based management practices interact with mating systems, we modeled fisheries of two species with obligate male care, Symphodus melops (corkwing wrasse) and Ophiodon elongatus (lingcod) under two management scenarios, a minimum size limit and a harvest slot limit. We simulated the population dynamics, larval production, and yield to the fishery under a range of fishing mortalities. We also modeled size-dependent male care to determine its interaction with management. In both species, the slot limit decreased yield by less than 12% at low fishing mortalities; at higher mortalities, individuals rarely survived to outgrow the slot and overfishing was possible. The spawning potential decreased less when managed with a slot limit if we included a positive feedback between male size, care, and hatching success, but the benefit the slot depended both on the relative proportions of males and females selected by the fishery and on assumptions regarding male size and care. This theoretical work motivates experimental research on feedbacks between fisheries management and reproductive habits of fishes of commercial and recreational value.

The Global Shark Fin Trade – How Domestic and International Laws are Impacting Shark Fishing Activities

Brian Noland*

*Presenter

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The legislation on shark finning varies drastically between nations. Some economies and cultures rely on the shark fin trade to make a living, and unfortunately partake in illegal or gruesome acts during harvesting (Clarke et al. 2013). A quick glimpse of domestic and international shark finning and fishing regulations is essential to understanding the scope of issues surrounding this comprehensive fishery. This fishery involves threatened and endangered species, local, federal and international governments, and various fisheries policy and management agendas. A set of global standards would lay the groundwork for sustainable shark fisheries. Advances in sustainable harvesting are viable through modifications in fisheries policy and management. Especially, learning from past errors and obtaining lessons from sustainable fisheries programs. Technological advances will be key to assisting law enforcement officials in fighting illegal, unreported and unregulated (IUU) fishing, in both coastal and pelagic waters. Not only will these changes assist shark conservation, but will also improve ecosystem health by sustaining apex predators within their natural habitat. Regulations on global shark finning and fishing have progressed within the past century, but certain cultural, political and management alterations are necessary to sustain shark fishing for future generations. Especially with current shark populations subject to habitat destruction, pollution issues, ecosystem imbalance, overfishing, threatened species and climate change (Clarke et al. 2013).

Application of a Traditional Fisheries Management Technique on a Newly Established Fish Species in North America

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*Presenting

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Northern Snakehead were first discovered in the Potomac River basin in 2004. Obtaining demographic data is especially important for invasive species. Relative weight and size structure indices are useful tools for fish biologists to characterize fish condition and fish size structure. These indices can provide insight into population dynamics (i.e., recruitment, growth and mortality). Obtaining age data is the most accurate method to quantify population dynamics. A standard-weight (Ws) and size structure indices do not currently exist for Northern Snakehead. Further, no ageing structure has been validated for Northern Snakehead. We used the regression line-percentile (RLP) method to develop a standard-weight equation for Northern Snakehead. Based on this approach, we propose a metric standard-weight equation as log10(Ws) = –5.142 + 3.0418 * log10(TL) with a minimum length of 200 mm; Ws is weight in grams and TL is total length in millimeters. For calculating proportional size distribution (PSD) we proposed the following length categories: stock, 190mm (7.5 in); quality, 340 mm (13 in); preferred, 420 mm (16.5 in); memorable, 550 mm (22 in); and trophy, 700mm (27.5 in). Marginal increment analysis is one method that has traditionally been employed to confirm annual annuli deposition. A subset of Northern Snakehead otoliths (n=200) were subjected to marginal increment analyses (ages 2 - 10). Differences in index of completion scores occurred among months ($F_{7,192} = 18.26$, $P<0.001$) but were lowest in July. These population level indices can provide biologists important tools to describe Northern Snakehead populations in North America.

Habitat Utilization and Impact of Flooding on James spinymussel (Parvaspina collina) Populations in Virginia Streams

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*Presenting

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The James spinymussel (Parvaspina collina), is one of many endangered freshwater mussels found in Virginia and results from this project will provide information that can be applied to recovery plans for mussels by identifying high survival habitats. The primary objective of this study was to investigate the relationship between flood disturbance and population dynamics of co-occuring P. collina and V. constricta in a flood prone stream and compare to a stream below a dam that dampens flood disturbance. A second objective was to identify habitat preferences of P. collina in both streams. Analyses used long-term mark-recapture data sets for two sites in the James River watershed, as well as habitat data collected from both sites including substrate, depth and velocity measurements collected during summer low-flow conditions. We hypothesized that the populations in the flood prone stream would exhibit unstable population dynamics due to the lack or refugia in the predominantly sand-bedded channel. Results thus far support this hypothesis, with emigration increasing as discharge increases and recapture probability decreasing following high flow events. In addition, it was hypothesized that mussels will utilize habitat patches within the streambed that contain coarser grained substrate, in conjunction with lower depths and velocities. Preliminary analyses suggest that many mussels in the flood prone stream are transiently occupying unstable habitats, often in areas predominantly comprised of sand. Understanding where mussels are most likely to survive and reproduce it crucial for identifying potential habitat and determining where propagated mussels should be released.

Direct versus Terrestrial Liming for Mitigating Acidity in Streams

Madison A. Roberts* and Daniel M. Downey

*Presenter

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Atmospheric acid deposition (acid rain) that is the result of use of fossil fuels for energy production. Combustion of coal and other fuels disperses sulfur and nitrogen oxides into the air that travel great distances. Title IV of the Clean Air Act (1990) put restrictions on power plant emissions to reduce the amount of SOx and NOx and thus the amount of sulfuric and nitric acid deposited on the landscape. Despite significant reductions in acid content of rainfall in the past 20 years, many streams and lakes along the east coast of the U.S. have yet to fully recover. The addition of limestone to acidified streams (liming) to temporarily mitigate the effects of acid rain on aquatic systems has become a popular and important method for stream management. The effectiveness of direct application of limestone to the stream has been researched extensively since 1987 by James Madison University (JMU) in cooperation with United States Forest Service (USFS). Recently the application of limestone to the watershed of an acidified stream for mitigating the effects of acid rain in the soils and waters has been under consideration as an alternative to direct in stream liming. This study compares direct stream liming versus watershed liming as management tools for manipulating stream water chemistry. Stream liming requires road access, treats only the downstream reach and does not benefit soils that have become acidic. However, direct stream liming is relatively inexpensive and provides immediate and predictable changes in stream chemistry. Watershed liming is expensive but could provide long-term benefits.

Analysis of the Reliability and Results of the Brook Trout Sustainability Model Over a Five-Year Data Collection

Lydia Cheng* and Kirk Smith

*Presenter

James Madison High School, Vienna, VA
George Mason University, Fairfax, VA

James Madison High School students (Vienna, VA) employ the use of the Brook Trout Sustainability Index (BKTI, Smith and Sklarew, 2012), a model that computes a value that is analyzed to identify the relative quality of a sampled stream. According to George E.P. Box, "All models are wrong. However, some are useful." All models are a simplified version of reality and often ignore larger variables that aren't accounted for. However, these simplifications of reality are useful because it allows us to explain and predict the world around us. The BKTI model provides us with invaluable insight on identifying and predicting any deviations from expected conditions when compared to other sampling areas. The students utilize a sampling location, Wildcat Hollow (Thompson Wildlife Management Area, Fauquier County, VA), yearly which serves as a baseline reference site for the Northwest Virginia operation due to its locations within a WMA. Quality controlled results in 2015, 2016, 2017, 2018 and 2019 produced BKTIs of 83.3, 84.9, 79.1, 79.1, and 83.8 respectively. The Mann-Kendall (MK) test (Mann 1945, Kendall 1975, Gilbert 1987) produced a p-value (0.042) less than $p < 0.05$, therefore we reject the null hypothesis that the BKTI values have no trend, meaning that these values are independent of each other and there is no correlation between measurements collected at various times. In summary, the work of the students and the use of the BKTI model have procured reliable and accurate results accumulated over these past 5 years that indicate and predict discrepancies and issues that may arise among future sampling locations of interest.

Where everybody knows your name: brook trout remember conspecifics for at least a week

Caroline Golightly* and Charles Gowan

*Presenter

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Brook trout exhibit high variation in the tendency for an individual to be mobile, with the result that some individuals enter new hierarchies often (they are commonly 'intruders' into an existing hierarchy) while others (the 'residents') spend considerable time within the same hierarchy. Trout use sophisticated cognitive skills when establishing their position within a hierarchy, including individual recognition of conspecifics. We wanted to determine if an individual trout would remember conspecifics when separated from them for a week. Two residents were allowed to establish a hierarchy in an artificial pool, and then an intruder was introduced. All agonistic interactions were recording during formation of the new three-fish hierarchy. Once the hierarchy was established, we moved the intruder to a separate pool for seven days. The intruder was then reintroduced to the original hierarchy, and we observed agonistic interactions as the hierarchy re-formed. We compared the amount of time fish spent performing lateral displays during the first and second tests and found that lateral displays were much less frequent during the second test. Because lateral displays are common when two unfamiliar fish are put together for the first time (charges and chases become common once firm dominance is established), our results indicate that the individuals involved remembered each other despite the week-long separation. This cognitive skill would reduce the cost of movement because a mobile individual could explore new habitat, but then return to its original pool without having to expend the energy involved in fighting to re-establish dominance.

Quantifying catch-and-release mortality in a southern Muskellunge population

Cory Bauerlien*, Derek Crane, Scott Smith, George Palmer, Tyler Young, Dan Goetz, Kyle Hartman, and Jeff Hansbarger -

*Presenter

Coastal Carolina University, Conway, SC
Virginia Department of Game and Inland Fisheries, Forest, VA
Maryland Department of Natural Reasources
West Virginia University, Morgantown, WV
West Virginia Division of Natural Resources

Mortality is a key component in population dynamics. In fisheries, mortality is often broken into two components – natural mortality and fishing mortality (i.e., harvest). In fisheries dominated by catch-and-release angling, mortality of angled fish is often unknown. However, fish that are caught and released may experience high mortality rates due to stress from angling, especially during warm periods. Therefore, quantifying catch-and-release mortality of fishes that support recreational fisheries is important for understanding population dynamics. Anecdotal evidence (e.g., development of specialized guide services, outdoor media coverage) suggests increased popularity of Muskellunge Esox masquinongy angling in the southern portion of the Muskellunge's distribution. The vast majority of Muskellunge anglers practice catch-and-release with the goal of increasing catch rates and trophy potential of fisheries. However, Muskellunge anglers have expressed substantial concern about the potential for high mortality of fish caught and released in the summer because Muskellunge are a cool-water species. The upper James River supports a popular Muskellunge fishery where catch rates are high (~72% of tagged fish were angled in a recent study) and temperatures can reach 30°C. In this study, we seek to quantify the rates of catch-and-release angling mortality as well as identify the factors (e.g., water temperature, fish size) that contribute to catch-and-release angling mortality in the James River Muskellunge population by using radio telemetry to monitor the fates of angled and non-angled Muskellunge. Here we discuss the study design and how data from this study can be used to guide management of an important southern Muskellunge fishery.

TIA Alliance, An Update

Christian Yupanqui* and Dr. Smith,

*Presenter

James Madison High School, Vienna, Virginia
George Mason University, Fairfax, VA

The TIA Alliance charter signed in November 2018 by Trout Unlimited, American Fisheries Society, and Izaak Walton League of America, was established to encourage youth engagement in conservation field activities. It is hoped such activity will inspire youth to consider career fields in natural resource management or associated fields. At the very least, participating youth may develop a deeper appreciation for the impacts of climate change and other factors influencing the state of natural resources. As the year goes on, there will be an increase in Alliance activities. Within one year in 2020, there will be an increase in stream monitoring training. Currently, there are two teacher trainings, one in MD, the second in NC. Both will recruit high school science teachers in the southeast. Trainings are capped at 25 individuals. Participants will be trained in Izaak Walton League's Save Our Stream protocols with visions of eventually developing mission-based, community science projects. In Blacksburg, TIA alliance activities will engage students through its high school FFA chapter, starting with a willow transplantation project on a local stocked trout stream in March 2020. This will also bring other activities from local IWLC chapter, AFS at Virginia Tech, and local Trout Unlimited Chapter. The Alliance will be able to share the successes of these trainings with other teachers and networks to begin sparking interest in new regions. These TIA trainings will develop across states, especially in the Mid-Atlantic region, due to the proximity of Alliance organization HQs in the Maryland and DC area. In five years, it's projected there will be conservation projects orchestrated by trained teachers and students. Youth organizations, to include local Scout organizations, Future Farmers of America (FFA), 4-H, etc., may be involved in Alliance activities as well. Engaging youth in hands-on field activities is key to inspiring future scientists and engineers and to enhancing the legacy of conservation ethics.

Quality Control Management of Volunteer Collected Data

Elsa Wilbur*, Sophia Samantaroy, Elsa Wilbur, and Kirk Smith

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James Madison High School, Vienna, VA
George Mason University, Fairfax, VA

Governmental agencies and professional organizations are often reluctant to acknowledge field data collected by volunteers. Since 2014, with the goal of locating new release sites for brook trout (Salvelinus fontinalis) fingerlings, students at James Madison High School (Vienna, VA) have been coordinating efforts to assess potential watersheds with VA DGIF and USFS. Because students are not familiar with data collection, extra vigilance is required to ensure quality assurance of collected data. Utilizing a draft field manual, standardized field forms, and automated computer entry fields has diminished human error considerably—but fails to prevent all human error. Thus, students perform internal data quality control in order to ensure data shared with various governmental agencies and other stakeholders are as accurate as possible. In this presentation, we will explore quality control procedures and methods used in the field. Properly calculating stream discharge was particularly problematic during the 2019 field season. Challenges and solutions will be discussed.

Resolving the mysteries of the Tennessee heelsplitter (Lasmigona holstonia) with stream temperature and paired mark-recapture data

Alissa Ganser*, E. M. Hallerman, and J. W. Jones

*Presenter

Virginia Tech
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The freshwater mussel Lasmigona holstonia is endangered in Virginia and is a candidate for listing under the U.S. Endangered Species Act. Our current understanding of L. holstonia suggests that individuals may remain buried in sediment during summer months in an effort to find thermal refuge from warmer water temperatures, and re-surface in the fall for reproduction. To establish a baseline temperature tolerance range for this species, temperature loggers were deployed in June 2019 in five L. holstonia streams, four in southwestern Virginia and one in southern Tennessee. At all sites, a logger was placed in-stream about 20 cm above the sediment-water interface, and recorded temperatures every 90 minutes. Daily water temperatures ranged from 13.5 °C – 25.5°C (June – August 2019) and from 12.5°C – 22.5°C (September – October 2019). At one Virginia site (South Fork Clinch) and the Tennessee site, an additional logger was buried ≥30 cm below the sediment-water interface. Below-sediment temperatures remained 0.5 – 8 degrees cooler than in-stream temperatures during the summer, suggesting that the sediments may act as a thermal buffer for L. holstonia during warmer months. A paired mark-recapture survey showed recapture rates in the South Fork Clinch were higher in September and October 2019 for this species, which corresponded to the appearance of gravid mussels and a downward shift in the daily water temperature range. Results from this study will guide researchers to the appropriate time of year to conduct presence-absence surveys for L. holstonia, and will provide critical habitat information needed for possible listing of the species.

Combining inference from movement studies and population genetics to determine scale of smallmouth bass dispersal in rivers

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*Presenter

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Virginia Tech, Blacksburg, VA
Virginia Department of Game and Inland Fisheries, Forest, VA

Dispersal of fish in river-tributary networks is a process that determines connectivity of populations, expansion of invasive species, and spatial patterns in community composition. We combined inference from direct observation on fish movement and population genetics to determine the scale of dispersal in riverine populations of Smallmouth Bass (Micropterus dolomieu). Results of studies using telemetry and otolith chemistry in the James River basin were combined to estimate dispersal distance from direct observation. Analysis of population genetic data and isolation-by-distance among mainstem populations allowed indirect estimation of average dispersal distance. These two sources of inference were combined to characterize dispersal over short and long timescales. These results are considered in the context of other published accounts of smallmouth bass dispersal. Our results can be applied to understand how dispersal will influence the ability of populations to track changes in resource availability and the timescale of range expansion.

Preserving a Potential State Record Fish

Hunter Hatcher*, Andy Strickland, Scott Bisping

*Presenter

Virginia Department of Game and Inland Fisheries, Farmville, VA
Florida Fish and Wildlife Conservation Commission, Quincy, FL
Florida Fish and Wildlife Conservation Commission, Eustis, FL

Catching a state record fish represents a significant accomplishment in the life of any angler. The need to have a state agency biologist present to verify the record fish can delay the certification process and potentially lead to change in weight of the fish. A limited number of studies have directly investigated the impact of preservation method on change in weight of fish after catch. To identify the best preservation methods to minimize change in weight post-catch, we used four fish species: Flathead Catfish (Pylodictis olivaris), Black Crappie (Pomoxis nigromaculatus), Largemouth Bass (Micropterus salmoides), and Bluegill (Lepomis macrochirus). We evaluated four fish preservation methods including holding fish alive, in ice, in an ice bath, and in a freezer for a 24 and 48-hour periods. Results indicate that preservation method significantly impacts change in weight of fish post-catch. Change in weight relative to preservation method also varied by species. Generally, fish preserved in an ice bath gained weight after capture, while fish preserved alive lost weight for some species. Fish preserved in ice and in a freezer appeared to experience minimal change in weight post-catch. Results represent the first investigation of the impacts of several preservation methods on the change in weight of freshwater fish post-catch, while also serving as a basis for revision of agency recommended preservation methods for potential state record fish.

Trends in abundance of Northern Snakehead and Largemouth Bass in two Virginia tidal rivers

John Odenkirk*

*Presenter

Virginia Department of Game and Inland Fisheries, Fredericksburg, VA

Northern Snakehead Channa argus and Largemouth Bass Micropterus salmoides populations were monitored with electrofishing in the Potomac and Rappahannock River systems from 2004-2019. Relative abundance (fish/hour) of Northern Snakehead in four Virginia Potomac River tributaries increased dramatically following establishment, hit peaks in similar years post-colonization before declining to moderate levels. Largemouth Bass numbers fluctuated, apparently due to influences of variable year classes, but overall linear trends in abundance were positive. The Rappahannock River Northern Snakehead population was much slower to expand, but catch rates in 2019 finally approached those commensurate with Potomac River creeks. During this time, Largemouth Bass numbers rose significantly with record numbers of bass captured in 2019. It appeared the four populations were functioning independently of one another with no negative impact to either bass fishery because of snakehead presence.

Smith Mountain Lake Aquatic Habitat Enhancement Project

Dan Wilson*

*Presenter

Virginia Department of Game and Inland Fisheries, Forest, VA

Lake ageing and shoreline development at Smith Mountain Lake, Virginia, has reduced littoral aquatic habitat important to many species for juvenile survival, development, and eventual production of fisheries. Aquatic habitat provides areas that aquatic organisms use to spawn, rear, and mature. Popular sport species such as largemouth bass Micropterus salmoides, utilize these habitats for spawning and juvenile protection but also benefit from additional production of plankton and insect populations. Plans to offset continued habitat loss and provide better habitat connectivity were developed during the lake's FERC relicensing process, resulting in annual habitat enhancement funding by American Electric Power (AEP). Beginning in 2017, Virginia Department of Game and Inland Fisheries (VDGIF) started using these funds to purchase and deploy artificial structures such as bundled milk crates and Mossback structures. Additionally, water willow has been planted at numerous locations around the reservoir. Observations of installed artificial structures has provided insight for future habitat deployment modifications.

Use of an Electronic Fish Counter to Estimate River Herring Run Strength at Walker's Dam Denil Fishway on the Chickahominy River

Alan Weaver* and Tim Owen

*Presenter

Virginia Department of Game and Inland Fisheries, Henrico, VA

A Smith-Root 16 channel electronic fish counter (SR1601) system was deployed in the exit channels of the double Denil fishway in Walker's Dam (river km 36) on the Chickahominy River during spring in 2018 and 2019. The intent is to establish an annual river herring (Alewife and Blueback Herring) run count estimate to help evaluate herring populations under a Virginia Marine Resources Commission harvest moratorium because stocks are below sustainable fisheries levels. Passage tunnels fabricated by Virginia Department of Game and Inland Fisheries biologists were connected to the SR1601 using 22 gage shielded wire. Passing fish were collected in 19 mm mesh box traps set for varying periods (~ one to 30 minutes) in the exit channels on a random basis two to three days per week. Species composition was calculated and the accuracy of the SR1601 was tested. In both years, there was no significant difference between the counter numbers and the actual count of fish trapped for both fishway arrays (two-tailed paired t-test, $p<0,05$). The most abundant species in both years was Gizzard Shad (302,605; 161,531) followed by Blueback Herring (146,808; 74,969) and Alewife (35,631; 10,983). Five other species were trapped in very limited numbers (e.g., Hickory Shad; Yellow Perch). The total number of fish passed declined from 485,526 in 2018 to 250,394 in 2019 while species composition was consistent. Gizzard Shad comprised 62.4% in 2018 and 64.5% in 2019. Blueback Herring comprised 30.3% in 2018 and 29.9% in 2018. Alewife comprised 7.3% in 2018 and 4.4% in 2019. Tailwater depth data was collected in 2019 and is being evaluated for potential tidal effects on passage at the dam. The SR1601 is a useful tool in the evaluation of the run strength of river herring using the Walker's Dam Double Denil Fishway.

2020 VA-VT Joint Meeting
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Poster Abstracts

Tuesday, February 4th to Thursday, February 6th, 2020
Lexington, VA

Comparing Spawning Population Size of Alewife (Alosa pseudoharengus) and Blueback Herring (A. aestivalis) in Three Potomac River Tributaries

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*Presenter

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This study is examining differences in the size of the spawning population of anadromous river herring, Alewife (Alosa pseudoharengus) and Blueback Herring (A. aestivalis), in three tributaries of the Potomac River - Cameron Run, Pohick Creek, and Accotink Creek - that experience different amounts of human activity. Cameron Run is in a heavily urbanized area and receives treated wastewater discharge, Pohick Creek receives treated wastewater discharge and is in a moderately urbanized area, and Accotink Creek does not receive wastewater discharge. The objective of the project is to determine how human activities, such as treated wastewater discharge and runoff from urbanized areas, influence water quality and river herring population size. To determine the abundance of river herring and the water quality in each tributary, field collections and surveys of water quality parameters, ichthyoplankton, and adult herring are being employed. Ichthyoplankton samples were collected in spring 2019 and are currently being identified to species, and water quality and adult river herring are to be sampled and identified by spring 2020. This data will determine the differences and significance between the river herring spawning populations of each tributary. There are no concrete findings yet, but it is anticipated that that Cameron Run may have the smallest overall population of river herring as result of poor water quality, but also that Cameron Run and Pohick Creek will have increased counts of just Blueback Herring, which prefer to spawn in warmer waters, as a result of warm water temperatures from wastewater discharge.

Utilizing untapped Instagram resources for assessing global shark distribution

Jeremy Jenrette* and Francesco Ferretti

*Presenter

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Abundance and distribution data of global shark populations is necessary for effective conservation and management. While there are effective direct methods to retrieve such data from scientific surveys and fisheries monitoring, species specific indices of population abundance coming from these sources are rare for most shark species. Yet, there is an abundance of unconventional data and unstructured information that is virtually untapped and has great potential to fill the information gap characterizing shark populations. Instagram contains over a billion users worldwide making it the largest image-sharing platform in the world. Despite its modern surge in popularity and approachability, there is little research that implements social media for shark conservation. Here, we show the biological importance of transforming variably tagged, non-time-stamped, non-geocoded images into occurrence records. By pipelining image detection and validation from shark-related tags via a modeled convolutional neural network (CNN), we have identified, with 97% accuracy, meaningful data from a massive cloud of images. Location and time-stamp data were reconstructed by developing an automatic method for crowdsourcing the information. These data were then compared with Instagram user density maps to characterize sampling effort and produce proxies of shark population abundance. Our approach suggests that Instagram can be efficiently exploited to reveal important spatiotemporal trends of global shark populations. Using alternative sources of abundance data has proved strongly needed for promoting management and conservation of this endangered and important group of marine animals.

Impact of Tree Felling for Atlantic Coast Pipeline on Hodges Draft in Augusta County

Andrew Slawson* and Thomas R. Benzing

*Presenter

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Hodges Draft is a small brook trout stream in Augusta County on the proposed route of the Atlantic Coast Pipeline. For nearly 4 years, this stream was monitored monthly for water quality and habitat conditions at locations above and below the proposed crossing using protocols established by Trout Unlimited. In March 2018, tree felling took place to clear the route for pipeline construction. This tree felling occurred approximately 150 yards above the lowest sampling location directly adjacent to the stream and on a very steep slope. Since that time, pipeline construction has been suspended which provided an opportunity to evaluate tree felling in isolation from other construction-related impacts. To evaluate the impact of the tree felling, this study compares water quality and habitat conditions before and after the activity. Both upstream sampling locations on Hodges Draft as well as a location on nearby Ramseys Draft are used for comparison to the impacted location. Water quality as measured by temperature, conductivity, and clarity shows no statistically significant response to the tree felling. Habitat conditions as measured using pebble counts show a possible trend towards finer-grained materials but significant natural variability exists in these measurements. All of the data for this study are shared through a citizen science portal with the larger effort by Trout Unlimited to monitor pipeline impacts should construction activities commence in the future.