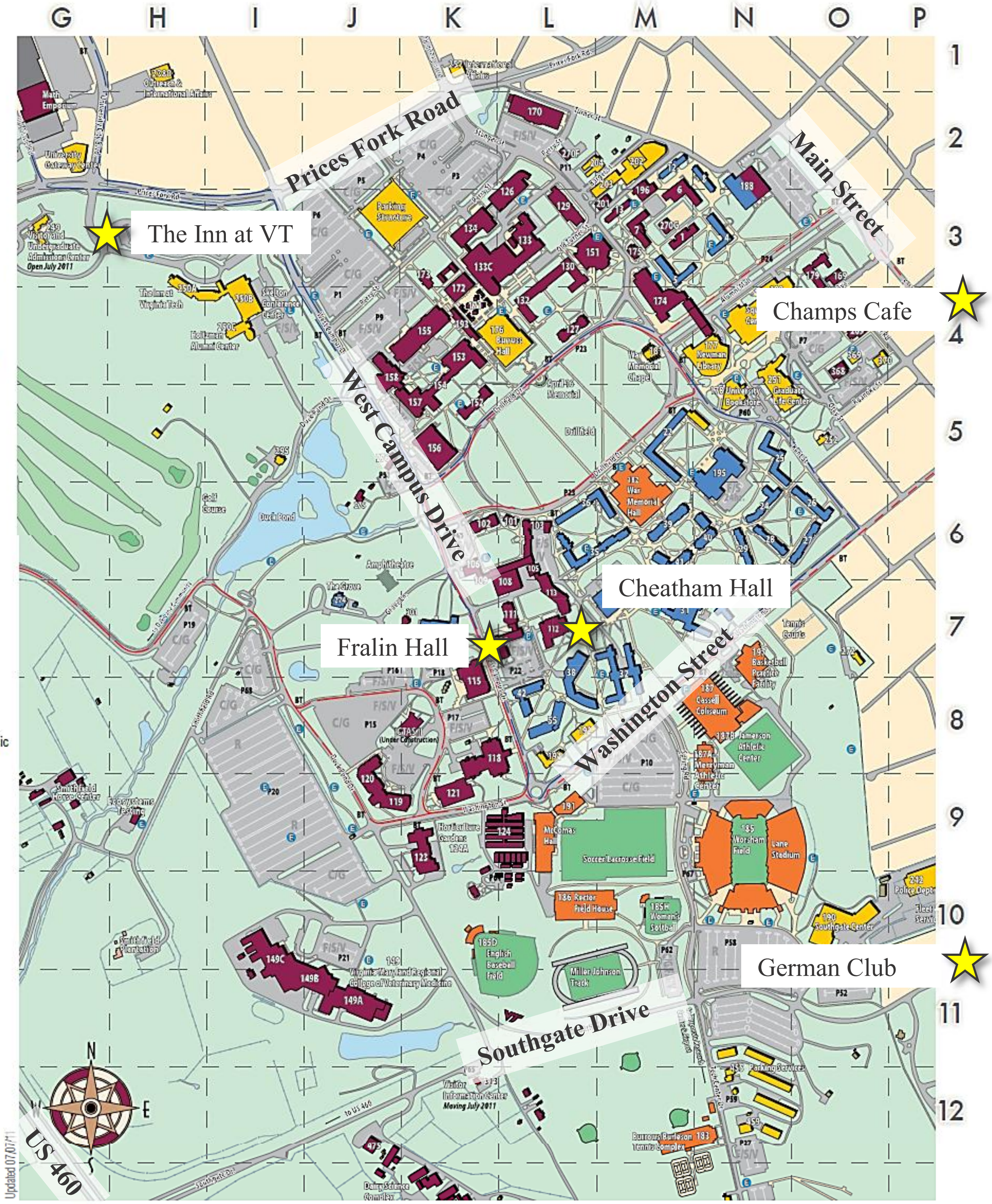
Joint Meeting of the Virginia and Virginia Tech Chapters of the American Fisheries Society

January 31- February 2, 2012
Blacksburg, Virginia

Virginia Tech
Invent the Future®

MAIN CAMPUS MAP



Academic Buildings | Athletic Facilities | Residential & Dining Facilities | Support Facilities | Research Facilities | Parking Lots | Emergency Call Box

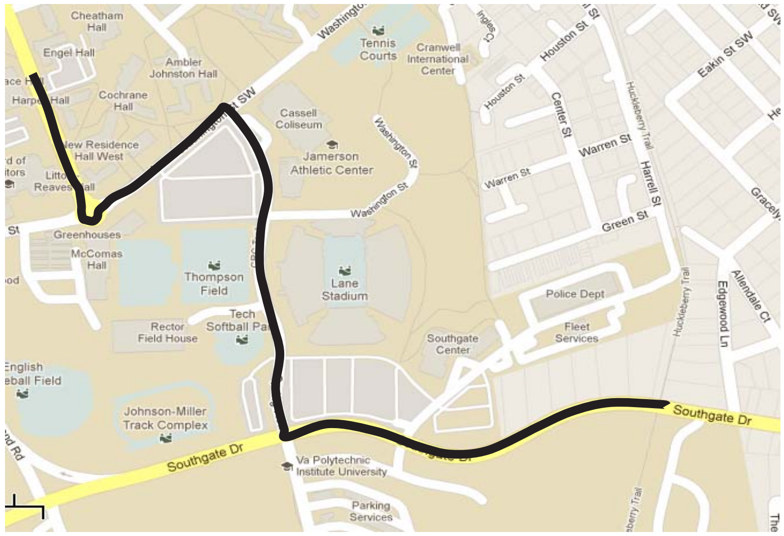
Parking | F/S/V = Faculty/Staff/Visitor | C/G = Commuter/Graduate | R = Resident

Blacksburg Transit | University Mall | Hokie Express | Hokie Express Alt. | (Night & Saturday Route, starts at 7pm)

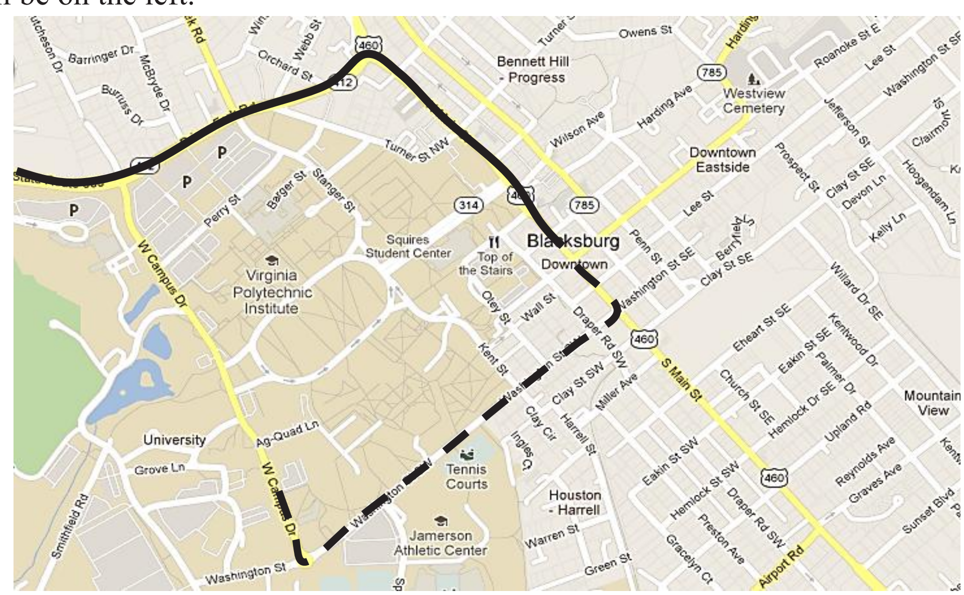
Alphabetical Key

K-7.........109 ....Agnew Hall
M-2.........204 ....Air Conditioning Facility
M-8.........032 ....Ambler Johnston Hall
O-4 ....368 ....Architecture Annex
O-4 ....269 ....Armory
M-2.........196 ....Art and Design Learning Center
O-6 ....026 ....Barringer Hall
N-7 ....197 ....Basketball Practice Facility
J-9.........119 ....Bioinformatics Phase I
J-9.........120 ....Bioinformatics Phase II
K-3.........173 ....Bishop-Favrao Hall
M-3.........005 ....Brodie Hall
L-2.........270F .....Building 270F
K-4.........171 ....Burchard Hall
K-4.........193 ....Burke Johnston Student Center
N-12 ....183 ....Burrows/Burleson Tennis Center
L-4.........176 ....Burruss Hall
L-6.........036 ....Campbell Hall
N-8.........187 ....Cassell Coliseum
L-7.........112 ....Cheatham Hall
L-6.........038 ....Cochrane Hall
M-3.........270G.....College of Science Admin. Bldg.
K-3.........172 ....Cowgill Hall
O-7 ....272 ....Cranwell International Center
J-12 ....475 ....Dairy Science Complex
K-5.........156 ....Davidson Hall
K-4.........155 ....Derring Hall
M-7.........189 ....Dietrick Hall
L-2.........126 ....Durham Hall
M-5.........022 ....Eggleston Hall
L-7.........110 ....Engel Hall
K-10.......185D .....English Field
M-3.........013 ....Femoyer Hall
P-10.......240 ....Fleet Services
L-9.........123 ....Food Science and Technology
L-7.........111 ....Fralin Life Science Institute
[illegible].........233 ....Golf Course Clubhouse
O-5 ....251 ....Graduate Life Center at
................................Donaldson Brown
L-9.........124 ....Greenhouses
J-7 ....274 ....The Grove
J-4.........158 ....Hahn Hall - North Wing
K-5.........157 ....Hahn Hall - South Wing
K-9.........124A.....Hahn Horticulture Gardens
K-3.........133C.....Hancock Hall
L-8.........042 ....Harper Hall
I-10.......149C.....Harry T. Peters Large Animal Clinic
N-12 ....459 ....Health and Safety Building
O-3 ....179 ....Henderson Hall
K-7.........054 ....Hillcrest Hall
L-3.........130 ....Holden Hall
I-4.........250C.....Holtzman Alumni Center
L-6.........103 ....Hutcheson Hall
L-3.........129 ....Institute for Critical Technology
................................and Applied Science
K-1.........257 ....International Affairs
N-8 ....187B.....Jamerson Athletic Center
N-6 ....028 ....Johnson Hall
M-3.........001 ....Lane Hall
N-9 ....185 ....Lane Stadium/Worsham Field
L-7.........113 ....Latham Hall
N-7 ....030 ....Lee Hall
K-9.........121 ....Life Sciences I
K-8.........118 ....Litton-Reaves Hall
M-3.........007 ....Major Williams Hall
M-3.........151 ....McBryde Hall
L-9.........191 ....McComas Hall
O-4 ....369 ....Media Annex
O-4 ....370 ....Media Building
N-8 ....187A.....Merryman Athletic Center
O-6 ....027 ....Miles Hall
M-2.........203 ....Military Building
N-2 ....008 ....Monteith Hall
L-8.........055 ....New Hall West
N-6 ....040 ....New Residence Hall (East)
N-6 ....024 ....Newman Hall
N-4 ....177 ....Newman Library
L-4.........132 ....Norris Hall
M-3.........201 ....Old Security Building
N-6 ....029 ....O'Shaughnessy Hall
H-1 ....2380.....Outreach & International Affairs
N-5 ....195 ....Owens Hall
K-4.........153 ....Pamplin Hall
N-12 ....455 ....Parking Services
L-4.........127 ....Patton Hall
M-6.........039 ....Payne Hall
M-6.........041 ....Peddrew-Yates Residence Hall
M-3.........175 ....Performing Arts Building
P-10.......242 ....Police Department
M-2.........202 ....Power Plant
K-6.........102 ....Price Hall
M-7.........031 ....Pritchard Hall
L-3.........133 ....Randolph Hall
N-3 ....004 ....Rasche Hall
L-10.......186 ....Rector Field House
I-11.........149B.....Richard B. Talbot Educational
................................Resources Center
K-5.........154 ....Robeson Hall
L-6.........101 ....Sandy Hall
K-6.........106 ....Saunders Hall
L-7.........108 ....Seitz Hall
N-2 ....006 ....Shanks Hall
N-2 ....188 ....Shultz Hall
I-4.........250B.....Skelton Conference Center
M-6.........035 ....Slusher Hall
L-8.........194 ....Smith Career Center
L-6.........105 ....Smyth Hall
J-6.........275 ....Solitude
O-10 ....190 ....Southgate Center
N-4 ....180 ....Squires Student Center
P-10.......242 ....Sterrett Facilities Complex
L-8.........192 ....Student Services Building
L-2.........170 ....Surge Space Building
N-12.......182 ....Tennis Center
H-4 ....250A.....The Inn at Virginia Tech
O-3 ....163 ....Theatre 101
M-2.........012 ....Thomas Hall
M-4.........174 ....Torgersen Hall
N-5 ....178 ....University Bookstore
O-5 ....252 ....University Club
N-5 ....025 ....Vawter Hall
J-11 ....149 ....Virginia-Maryland Regional
................................College of Veterinary Medicine
G-3 ....249 ....Visitor and Undergraduate
................................Admissions Center (Open 07/11)
K-7.........301 ....Wallace Annex
K-8.........115 ....Wallace Hall
M-4.........181 ....War Memorial Chapel
M-6.........182 ....War Memorial Hall
K-3.........134 ....Whittemore Hall
J-11 ....149A.....William E. Lavery Health
................................Research Center
K-5.........152 ....Williams Hall
M-10.......185H.....Women's Softball Field
J-5.........276 ....Wright House

German Club
711 Southgate Drive
6-10pm Tuesday, January 31
<u>From The Inn at VT or Fralin</u>: Go south on West Campus Drive and at the roundabout take a left onto Washington Street. Take the first right onto Spring Road. At the light, take a left onto Southgate Drive. Drive 0.5 miles and end at 711 Southgate Drive, on right.



Champs Café (540) 552-2233
111 North Main Street
6-9:30 pm Wednesday, February 1
****USE ENTRANCE OFF OF DRAPER ROAD, NEXT TO THE FARMER'S MARKET***
**Parking will be limited, so all are encouraged to walk, carpool, or use public transportation*
<u>Driving from The Inn at VT</u>: Go east on Prices Fork Road and, at roundabout, take a right onto North Main Street. End at Champs Café, on right. Parking is located on adjacent streets. No meter required.
<u>Walking from Fralin</u> (1 mile): Travel northeast on Washington Street and left onto Main Street. Champs will be on the left.



Program at a Glance

Tuesday, January 31

9:00-5:00	Registration, Fralin Atrium
9:00-12:00	Workshop: GIS for Fisheries Scientists, Cheatham 217
1:00-5:00	Statistics Workshop, Fralin Auditorium
6:00-10:00	Dinner and Social, German Club

Wednesday, February 1

8:00-3:00	Registration, Fralin Atrium
8:15-8:30	Welcome
8:50-9:10	Characterizing a hidden fishery: setline angling in the New River, Virginia Ben Dickinson
9:10-9:30	A decision analysis for oyster mussel (*Epioblasma capsaeformis*) restoration management in Wallen Bend, Clinch River. Man Tang and Yan Jiao
9:30-9:50	Phylogeny of the Indian mackerel in the Coral Triangle. Adam Hanson, et al.
9:50-10:10	Distribution of a new species of minnow (*Chrosomus* sp. cf. *saylori*) in Virginia. Shannon White and Donald Orth
10:10-10:30	The strength of *Nocomis* nest association contributes to patterns of rarity and commonness among New River, Virginia cyprinids. Richard Pendleton, Jeremy Pritt, Brandon Peoples, and Emmanuel Frimpong
10:30-10:50	Break
10:50-11:10	A meta-analysis of North American stream fish movement studies. James Roberts, Yan Jiao, Paul Angermeier, and Brett Albanese.
11:10-11:30	Evaluation of the blue catfish fishery in Kerr Reservoir, Virginia. Nathaniel Adkins, Brian Murphy, Steve McMullin, and Vic DiCenzo
11:30-11:50	Are variegate darters actually rare or imperiled in Virginia? Jane Argentina, and Paul Angermeier
11:50-12:10	Candy darter habitat preferences and their implications for conservation. Corey Dunn, and Paul Angermeier
12:10-2:00	Lunch
2:00-2:20	Southern rivers voluntary stream restoration in Virginia. Justin Laughlin
2:20-2:40	Preliminary results on stocked grass carp movements in Claytor Lake, Virginia. Matt Weberg, Brian Murphy, and Andrew Rypel.
2:40-3:00	Elemental composition of *Didymosphenia geminate* “Didymo” in the Jackson River, Virginia. Phillip Chambers, Waleed Ahmad, and Daniel Downey
3:00-3:15	Break

3:15-4:00	Poster Session • A non-lethal approach to asses and monitor mercury concentrations in black basses from a mercury impacted stream in the Shenandoah Valley, Virginia. Joshua Collins, John Flanders, and Gregory Murphy • Improved determination of nitrate-n in soils and sediments by ion chromatography. Allison Wickham and Daniel Downey • A "snapshot" study of water chemistry for three streams in the Shenandoah Valley. Michael Morris and Daniel Downey. • The South River Science Team: A Collaborative Effort to Understand Mercury in the South River. Calvin Jordan
4:00-5:30	VCAFS Business Meeting
6:00-9:30	Dinner and Social, Champs Café

Thursday, February 2

8:00-3:00	Registration, Fralin Atrium
8:30-8:50	Mercury contamination of fish in South River and floodplain ponds. Calvin Jordan
8:50-9:10	An evaluation of the synchronization in the dynamics of blue crab populations in the western Atlantic. Amanda Colton, Michael Wilberg, Victoria Coles, and Thomas Miller
9:10-9:30	Sequencing, assembly, annotation, expressed sequence tags and microsatellite loci for three freshwater mussel genomes: *Alasmidonta heterodon*, *Alasmidonta varicosa* and *Elliptio complanata* Joshua M. Shallom, et al.
9:30-9:50	"Let's re-route Niagara Falls," and other pressing water management issues in China. Brian Murphy
9:50-10:10	Water temperature and dissolved oxygen (DO) profiling on three lakes in King and Queen County, Virginia after the installation of aeration systems to these impounds. T.P. Gunter, Jr.
10:10-10:30	Break
10:30-10:50	Bowfin tagging project of the Chickahominy Lake. Scott Herrmann
10:50-11:10	Angler exploitation of walleye (*Sander vitreus*) in Virginia. Steve Owens, George Palmer, Tom Hampton, and Dan Wilson
11:10-11:30	Sampling strategies for estimating brook trout effective population size. Andrew Whiteley, et al.
11:30-11:50	Patch size and effective population size: a potential new way for long term evaluation of wild brook trout populations in Virginia. Mark Hudy
11:50-12:10	A tale of two tailwaters: constraints to effective mitigation with environmental flow regulation. Donald Orth, Ryan McManamay, and Scott Smith.

Characterizing a hidden fishery: setline angling in the New River, Virginia

BEN DICKINSON

The Virginia Department of Game and Inland Fisheries (VDGIF) has little information regarding the use of passive fishing gears (setlines) in the New River. Standard creel surveys used to obtain angler effort and harvest estimates on the New River do not adequately sample catfish anglers, particularly those using setlines. This study provides a basic characterization of setline effort and catch rates at four sites in the New River, using effort surveys and experimental trotline fishing. Setline surveys and experimental fishing trials were conducted by kayak from June-October, 2011. We discovered 32 unique active lines during setline surveys, and over 100 inactive, abandoned lines from years past. We found many of the active lines during almost every survey, suggesting that the bulk of setline effort may come from a few highly-dedicated users. Setline effort remained fairly consistent June through August, and declined sharply in mid-September, ending completely by the beginning of October. Experimental fishing produced 197 channel catfish (*Ictalurus punctatus*), 93 flathead catfish (*Pylodictus* olivarus), and 46 game fish. Live bait (14.9 fish per 100 hook-nights) overwhelmingly out-fished dead bait (4.4 fish per 100 hook-nights) during experimental fishing trials. Game fish and flathead catfish were almost exclusively caught by live baits. Game fish were more likely to be caught in October than any other month; flathead and channel catfish catches were mostly consistent June-October. Information from this study will allow VDGIF to consider tailoring specific setline regulations for the New River.

A decision analysis for oyster mussel (*Epioblasma Capsaeformis*) restoration management in Wallen Bend, Clinch River

MAN TANG, YAN JIAO

Department of Fisheries and Wildlife Sciences
Virginia Tech
Blacksburg, VA 24061

The oyster mussel (*Epioblasma Capsaeformis*) has declined 80% during last several decades and is now listed as a federally endangered freshwater bivalve of United States. The restoration of population for the oyster mussel is extremely urgent. The development of restoration strategies faces many challenges, including the selection of priority of strategies or priority of different life stages for restoration. In this study, we developed two statistical models to compute key biological information on oyster mussel mortality rate and fertility rate in Wallen Bend. Leslie matrix model was used for demographic analysis and evaluate alternative restoration strategies for the oyster mussel. A Bayesian model averaging approach was used to provide results by weighting each model using deviance information criterion. Sensitivity and elasticity analyses were conducted to evaluate how sensitive the population was to different life stages and parameters by a Monte Carlo approach. Through this study we found that translocating adult mussels was best at increasing mussel population size rapidly. Our elasticity and sensitivity analyses showed that increasing the survival rate of juvenile mussels would be more effective than that of adult mussels in the long term. The results of these analyses lead us to suggest translocating adult mussels to restore endangered mussel quickly in current and at the same time, other restoration methods, such as critical habitat recovery and fish community restoration, should also be applied to increase mussels' survival rate.

Phylogeography of the Indian Mackerel in the Coral Triangle

ADAM L. HANSON[1], KENT E. CARPENTER[1], PAUL H. BARBER[2], ABDUL HAMID TOHA[3], NOVEMBER ROMENA[4]

[1] Old Dominion University, Norfolk, Virginia, USA
[2] University of California Los Angeles, Los Angeles, CA, USA
[3] State University of Papua, Manokwari, West Papua, Indonesia
[4] National Fisheries Research and Development Institute, Quezon City, Philippines

The Philippines and Indonesia are part of the world's center of marine biodiversity, known as the Coral Triangle. It is thought that numerous sea-level fluctuations during the Pleistocene era have contributed to the isolation and diversification of sea-basin populations within the Coral Triangle. The Indian Mackerel, Rastrelliger kanagurta is the target species of a valuable commercial fishery that provides a low cost protein source for countries within this region. In recent years, enhanced fishing techniques, environmental factors, and an increased demand for protein resources have led to an intensified exploitation of this species. Phylogeographic analyses can be used to identify intra-specific genetic discontinuities that may have formed in response to historical isolation during the Pleistocene, and provide measures of gene flow among populations. Investigating phylogeography and species life history is critical for developing effective management strategies to sustain fisheries. This study delimited phylogeographical patterns from mtDNA control region sequences of an epipelagic neritic fish, Rastrelliger kanagurta, distributed throughout the Indo-west Pacific. A 392 base pair fragment of mtDNA control region was collected from 276 individuals at 20 sites throughout the Philippines and Indonesia. Genetic structure in Cenderawasih Bay, Indonesia was significantly different from most analyzed populations. Panmixia was evident among the remaining populations indicating high connectivity throughout the region. Our results suggest that Pleistocene sea-level fluctuations and semi-enclosed topography in Cenderawasih Bay may have isolated a refugial population, driving significant genetic structure. The restricted amount of gene flow between populations implies that Cenderawasih Bay may require a specialized management strategy.

Distribution of a new species of minnow (*Chrosomus* sp. cf. *saylori*) in Virginia

SHANNON WHITE, DONALD ORTH

Department of Fish and Wildlife Conservation
Virginia Tech
Blacksburg, Virginia 24061

In 1999, a new species of minnow, Clinch dace (*Chrosomus* sp. cf. *saylori*) was discovered in the Tennessee drainage of Virginia. The species is listed as a Federal Species of Concern and on Virginia's Wildlife Action Plan as Tier II- Very High Conservation Need because of potential threats from habitat degradation, high population fragmentation, and unknown distribution. Consequently, a management plan for Clinch dace is of utmost importance, but more information regarding species distribution is required before such a plan can be implemented. In 2011, we sampled 50 headwater streams in Russell and Tazewell counties via backpack electrofishing to determine Clinch dace presence. Sites included locations that Clinch dace historically occupied and locations that had suitable habitat, but Clinch dace presence was uncertain. There were 11 locations inhabited by Clinch dace and, on average, only four individuals were captured from each occupied site. Combined with previous collection records, over 200 locations in Virginia and Tennessee have now been sampled for Clinch dace and the species appears to be restricted to only eight small tributaries to the Clinch River. With a narrow, fragmented distribution, small population sizes remain a cause for concern and viability is questionable. In 2012, a more extensive sampling of occupied streams will be undertaken to better understand population size and habitat requirements, and an analysis of life history and reproductive behavior will be completed.

The strength of *Nocomis* nest association contributes to patterns of rarity and commonness among New River, Virginia cyprinids

RICHARD M. PENDLETON[1], JEREMY J. PRITT[2],
BRANDON K. PEOPLES[3], EMMANUEL A. FRIMPONG[3]

[1] Present address: Department of Biological Sciences, University of North Texas, Denton, 76203
[2] Present address: Department of Environmental Sciences,
University of Toledo, Lake Erie Center, Oregon, Ohio 43616
[3] Department of Fish and Wildlife Conservation,
Virginia Polytechnic Institute and State University, Blacksburg, 24061-0321

Many North American minnows (Cyprinidae) exhibit nest association, a spawning mode in which one species (associate) uses nests constructed by another species (host). Although this relationship may be obligate for some species, many nest associates can use alternative reproductive modes, indicating that the strength of the relationship between associate and host may vary. Quantifying the strength of the nest association relationship represents a necessary first step for understanding the importance of this interaction to stream fish communities. To address this question, we conducted a literature review of ecological and ethological reproductive traits for 11 nest associates of *Nocomis* occurring in the New River basin, Virginia. We used phylogenetic eigenvector regression (PVR) to remove the effects of phylogenetic relatedness among species, and used nonmetric multidimensional scaling (NMS) to ordinate a phylogenetically independent trait similarity matrix of the 11 species. Based on the ordination results, we delineated a group of strong and weak nest associates. Strong nest associates showed significant geographic range overlap with *Nocomis*, while weak ones did not. No difference in spawning temperature range overlap occurred between the two groups. We then tested for effects of nest association strength on species' rarity, and found that most (6 of 7) strong nest associates held rare classifications based on geographic extent, habitat breadth, or local abundance. Conversely, all weak nest associates reflected common classifications. These results indicate that nest association strength is related to rarity; this potentially crucial aspect of conservation has been previously overlooked. Accounting for the relationship between host and associate may provide crucial information for future conservation of imperiled nest associates.

A meta-analysis of North American stream fish movement studies

JAMES H. ROBERTS[1], YAN JIAO[1], PAUL L. ANGERMEIER[2], BRETT W. ALBANESE[3]

[1] Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, VA
[2] U.S. Geological Survey, Virginia Cooperative Fish and Wildlife Research Unit, Blacksburg, VA
[3] Nongame Conservation Section, Wildlife Resources Division, Georgia Department of Natural Resources, Social Circle, GA

Riverscape theory envisions the population dynamics of stream fishes playing out at the watershed scale. In contrast, mark-recapture studies of individual fish typically record more limited, reach-scale movement. This contradiction might be reconciled if mark-recapture data were analyzed using techniques that focus on the "tails", rather than the centers, of movement distributions. We conducted a meta-analysis of 39 published mark-recapture movement studies of North American stream fishes, which spanned a range of taxa but focused particularly on non-salmonids. Bayesian hierarchical modeling was used to fit a generalized dispersal model to empirical movement-distance frequency distributions. From best-fitting models, we estimated the distance threshold corresponding to the upper 10th percentile of movement probability and used this as an estimate of dispersal extent. Estimated dispersal extent varied widely among populations, with much of the variation attributable to the spatial and temporal extent of a study. After accounting for methodological factors, dispersal extent was not strongly related either to taxonomic affiliation or to life-history traits. Although some fish populations seemed to disperse primarily at the reach scale, many others exhibited stream- to watershed-scale dispersal extents. Such long-distance movements form the key, understudied link between individual movements and the population dynamics of stream fishes.

Evaluation of the Blue Catfish Fishery in Kerr Reservoir, Virginia

NATHANIEL ADKINS[1], BRIAN R. MURPHY[1], STEVE L. MCMULLIN[1], VIC DICENZO[2]

[1] Virginia Polytechnic Institute and State University, Department of Fish and Wildlife Conservation, 100 Cheatham Hall, Blacksburg, VA 24060-0321
[2] Virginia Department of Game and Inland Fisheries, 1132 Thomas Jefferson Road, Forest, VA 24551

Kerr Reservoir harbors a blue catfish (*Ictalurus furcatus*) population which continues to grow after their accidental introduction in the early 1980's. Biologists know little about this population or the anglers that pursue these fish. My research contains multiple methods to fill these needs. I aim to quantify the age structure of the blue catfish population by utilizing lapilli otliths to construct a length-at-age curve. Simultaneously, I seek to compare different sampling methods to determine the best option for managers to sample the population while obtaining an accurate assessment of the population and the harvest of anglers. Quantifying the impacts of angler harvest relies on a two part approach; controlled test fishing and angler interviews. Fish harvested by angling methods shows a significant difference in the length of fish collected via gillnets to those caught via 'noodle-style' (modified juglines) methods. As a part of these interviews, I also gather information regarding the attitudes of the anglers toward the current status of the fishery and the management practices implemented on the lake. Results from these methods can be pieced together to understand the dynamics of the fishery as well as the attitudes and impacts of anglers toward it.

Are variegate darters actually rare or imperiled in Virginia?

JANE ARGENTINA[1], PAUL ANGERMEIER[2]

[1]Fish and Wildlife Conservation, Virginia Tech, Blacksburg, VA 24061
[2]US Geological Survey, Virginia Cooperative Fish and Wildlife Research Unit, Virginia Tech, Blacksburg, VA 24061

Definitions of rarity and imperilment are based on measures of species abundance and distribution. Though widespread and generally common across their range, variegate darters (*Etheostoma variatum* Kirtland) are listed as endangered in Virginia, where they occur only in the Big Sandy River drainage. Their apparent imperilment is due to supposed population declines, range contractions, and a variety of threats, including poor habitat and water quality. However, long-term biological data on this species is sparse. We analyzed four years (2008-2011) of data on distribution, population genetics, and population biology from fish that persist in Virginia to assess population status. Based on genetic analyses, variegate darters seem to have a stable historic population size and moderate numbers of individuals breeding each year (N_e >740), and we observed recruitment every year. An initial population estimate at one site, based on mark-recapture, indicates variegate darters exist at densities of ~0.1/m^2. Though these densities vary across time and space, we consider variegate darters relatively common in habitats in which they occur in Virginia based on these data and surveys at other locations across their range. However, the preferred habitat in Virginia is rare, spanning only 30 river kilometers. Upstream distribution seems to be limited by watershed area, and a flood-control dam just downstream of the VA-KY line creates an effective barrier between the Virginia population and populations downstream in Kentucky and West Virginia. Therefore, current extinction risk from a catastrophic event, such as a fly-ash spill, combined with a near-zero likelihood of natural recolonization from downstream, leaves this population at risk and warrants its continued protection.

Candy darter habitat preferences and their implications for conservation

COREY DUNN [1], PAUL ANGERMEIER[2]

[1]Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, Virginia 24060.
[2]US Geological Survey, Virginia Cooperative Fish and Wildlife Research Unit, Virginia Tech, Blacksburg, Virginia 24060.

The candy darter (*Etheostoma osburni*) is a rare non-game species endemic to the mountain streams of the New River drainage. However, it is purportedly extirpated from many of these streams resulting in three isolated Virginia populations. Understanding the basic ecology of this species is crucial to its conservation but such knowledge, including habitat use and behavior, has been scarcely studied. We used direct underwater observation and systematic habitat sampling to address three questions: 1) How similar are available habitats in the East Fork Greenbrier and South Fork Cherry rivers, WV, both of which have healthy candy darters populations?, 2) Do candy darters show ontogenetic shifts in habitat use?, and 3)How might habitat preferences lead to their imperilment? We found both streams contained similar available habitats. Within the streams, candy darters occupied the entire breadth of available habitats as young-of-year and became increasingly specialized towards swift flow and large, umembedded substrate with maturation. This habitat specialization seems to act as a filter, precluding candy darters from many of the streams in the New River drainage, including some where they formerly occurred. The combination of micro-habitat specialization and the male candy darter's intense territoriality will likely lead to strong competition with a recently introduced and ecologically similar species, the variegate darter (*E. variatum)*. Conservation of candy darters may depend on protecting streams with high-velocity, unembedded spawning habitats and preventing the invasion of variegate darters into these streams.

Southern Rivers voluntary stream restoration in Virginia

JUSTIN LAUGHLIN

Virginia Department of Game and Inland Fisheries
1796 Hwy 16
Marion, VA 24354

The Virginia Department of Game and Inland Fisheries (VDGIF) has been working for decades to improve aquatic habitat in Virginia. Working through several grants, including the Landowner Incentive Program funded by U.S. Fish and Wildlife Service, VDGIF has restored over 24 miles of stream corridor. VDGIF has conducted watershed-scale stream restoration in the North Fork Roanoke River watershed on private lands through multiple grant programs. The Catawba LandCare, a landowner-led and community based organization works cooperatively with VDGIF and other partners to promote a sustainable approach to land management that produces economic, social, and environmental benefits. By collaborating with watershed stewardship organizations, VDGIF has found an effective method to communicate with landowners about improving water quality, recreational fisheries, and protecting sensitive aquatic species. This presentation will highlight how watershed-scale voluntary restoration of a sub-watershed is possible when the community and landowners drive the demand for improving the environment. Knowledge and interest in stream restoration have spread rapidly throughout the North Fork Roanoke River watershed thanks to the landowner network. This presentation will document accomplishments and challenges associated with delivering voluntary stream restoration programs in Southwest Virginia.

Preliminary results on stocked grass carp movements in Claytor Lake, VA

MATT WEBERG, BRIAN R. MURPHY, ANDREW L. RYPEL

Department of Fisheries and Wildlife Conservation
Virginia Tech
Blacksburg, VA 24061

Hydrilla (*Hydrilla verticillata*) is an invasive aquatic plant that has established in Claytor Lake, a 4500 acre impoundment of the New River in Pulaski County, VA. First documented in 2003, hydrilla has expanded to cover ~400 acres prompting stakeholders and biologists to investigate management options. Utilization of triploid grass carp *(Ctenopharyngodon idella)* as a biological control for hydrilla in the United States has shown to be effective in large southern reservoirs. However, little is known about grass carp behavior in a large, riverine reservoir such as Claytor Lake. Specifically, there are concerns grass carp may exhibit upstream migrations limiting effectiveness, and impacting native lotic vegetation. In 2010, 6,000 grass carp were stocked into Claytor Lake as a control measure for hydrilla. An additional 34 stocked fish were fitted with external radio-telemetry tags to evaluate grass carp movements. Ultimately, our goals are to: 1) determine long-range movements of stocked grass carp in a riverine reservoir adjacent to long stretches of unimpeded river miles; 2) model stocked grass carp population dynamics, in conjunction with hydrilla growth dynamics, to optimize sequential stocking events to reach hydrilla coverage goals of 100 acres. Preliminary tracking results indicate that stocked grass carp moved moderately post-stocking until hydrilla was located, upon which fish exhibited highly sedentary behavior.

Elemental composition of *Didymosphenia* geminate "Didymo" in the Jackson River, Virginia

PHILLIP CHAMBERS[1], WALEED AHMAD[1], DANIEL M. DOWNEY[1], JOLINE MCNECE[2]

[1]Department of Chemistry and Biochemistry, James Madison University
[2]National Technical Institute for the Deaf, Rochester Institute of Technology

Didymosphenia geminata (Didymo) is a fresh water diatom invasive algal species that produces large mats in rivers that may adversely affect the stream habitat and sources of food for fish. Initially restricted to Northern Hemispheric climates in Europe, it has spread to New Zealand, Canada, and nine states in the United States. As a diatom, it is characterized by a silica (SiO_2) cell wall that also produces a polysaccharide strand. The elemental composition of Didymo is not well established. We believe that a better understanding of its elemental makeup and its relation to the water chemistry of the streams in which it is found may aid control and eradication efforts. The combination of both inorganic and organic components makes the organism difficult to analyze. We have developed a three stage method to determine the elemental fingerprint of Didymo that involves cleaning/drying, acid and base digestion and elemental analysis by Ion Coupled Plasmas - Mass Spectrometry (ICP-MS). Samples collected from the Jackson River in Bath County, Virginia were evaluated for this project. Digestions were accomplished with a Microwave Accelerated Reaction System (MARS) in order to produce completely dissolved samples necessary for the trace elemental analysis. By performing an acid and base digestion, we were able to dissolve both the silica and organic matter. Water chemistry was also determined for the reach of the river where Didymo was found. Twenty nine elements in the didymo and water samples were evaluated for this project. It was found that Cd, Sb, Bi, Tl, In and Ag were below ICP-MS detection limits. Elements that were detected by ICP-MS in the didymo with high concentration (>1000 ppb) were Mg, Al, K, Ca, Mn, Fe and Ni. Elements that were found in moderate concentration (>10 ppm) were Li, B, P, Cr, Co, Zn, Ga, Sr, Ba and Pb. Trace element analysis of the stream water showed that Didymo was present in locations where Mg, P, K and Ca were at high concentration values. A statistical interpretation of the data will be presented in this paper.

Mercury contamination of fish in South River and floodplain ponds

CALVIN JORDAN

Virginia Department of Environmental Quality
Harrisonburg, VA 22801

Mercuric sulphate was used at the DuPont factory in Waynesboro, VA from 1929-1950 as a catalyst in the chemical process to make acetate flake. In 1976 employees doing excavation work at the plant site discovered mercury contaminated soil. In 1977 the SWCB conducted a survey of fish from the South River, South Fork Shenandoah and Shenandoah Rivers. The results caused the closure of 130 miles of river for the consumption of fish. Currently the advisory states do not eat any fish from South River except for stocked trout and 2 meals a month from the South Fork Shenandoah. Fish were last sampled by DEQ in 2007 and will be sampled again next year in 2012. Efforts have been made in the last several years to identify other wildlife of concern such as turtles and waterfowl. Most recently, because of the results of floodplain sampling in 2008, EPA asked DuPont to sample fish from private ponds in the South River floodplain. Because of these results and additional sampling by DEQ, VDH issued an advisory for a public pond in the town of Grottoes that is located approximately 50 yards from the South River.

An evaluation of the synchronization in the dynamics of blue crab populations in the western Atlantic

AMANDA R. COLTON[1], MICHAEL J. WILBERG[1], VICTORIA COLES[2], THOMAS J. MILLER[1]

[1]University of Maryland Center for Environmental Science
Chesapeake Biological Laboratory Solomons, MD 20688
[2]University of Maryland Center for Environmental Science
Horn Point Laboratory Cambridge, MD 21613

Spatial synchronization of two or more distinct populations due to regional environmental conditions has been observed for a wide range of species. Mechanisms behind synchronization in marine environments are difficult to identify because of the vastness of the ocean and complex life histories of oceanic organisms. Blue crabs exhibit a complex life history with high mixing potential as larvae and negligible migration between estuaries as adults. Over the past two decades there have been declines in both landings and survey indices for many blue crab populations along the Atlantic coast. We used fishery-dependent landings data and fishery-independent survey data from Florida to Delaware Bay to parameterize catch-survey models to estimate a time series of absolute abundance for each region. These time series were then analyzed to assess the degree of coherence in abundance among blue crab populations. Through principal component analysis and dynamic factor analysis we found that a latitudinal pattern in abundance among the states exists and that a combination of the Gulf Stream Index, southern winter temperature, and larval mixing in the coastal ocean may be important drivers for the fluctuations of blue crab.

Sequencing, assembly, annotation, expressed sequence tags and microsatellite loci for three freshwater mussel genomes: *Alasmidonta heterodon*, *Alasmidonta varicosa* and *Elliptio complanata*

JOSHUA M. SHALLOM[1], ROBIN JOHNSON[2], BARBARA A. LUBINSKI[2], MICHAEL S. EACKLES[2], MARCUS J. SPRINGMANN[2], JOANNE E. PRINTZ[1], HAKTAN SUREN[3], WILLIAM A. LELLIS[4], BARRY J. WICKLOW[5], JASON HOLLIDAY[3], ERIC M. HALLERMAN[1], TIMOTHY L. KING[2]

[1]Department of Fish and Wildlife Conservation,
Virginia Tech University, Blacksburg, VA 24061, USA
[2]US Geological Survey, Biological Resources Division, Leetown Science Center, Aquatic Ecology Laboratory, 1700 Leetown Road, Kearneysville, WV 25430, USA
[3]Department of Forest Resources and Environmental Conservation,
Virginia Tech University, Blacksburg, VA 24061, USA
[4] US Geological Survey, Biological Resources Division,
Leetown Science Center, Wellsboro, PA 16901, USA
[5] Saint Anselm College, Manchester, NH 03102, USA

Unionids – freshwater mussels – constitute one of the most sensitive and rapidly declining faunal groups in the world. Little is known about physiology of freshwater mussels, impeding conservation efforts; in particular, knowledge of genes mediating adaptation and conferring resiliency in the face of ecological challenge is scant. Against this background, we sequenced the whole genomes of dwarf wedgemussel (*Alasmidonta heterodon*), brook floater (*Alasmidonta varicosa*), and eastern elliptio (*Elliptio complanata*). We assembled contiguous sequences, identified expressed sequence tags (ESTs), and described microsatellite loci for each of the three genomes. A total of 818 open reading frames (ORFs) were identified for *Alasmidonta heterodon*, 1390 for *Alasmidonta varicosa* and 1282 for *Elliptio complanata.* These data were deposited in the GenBank database. Estimated transcriptome sizes were 66.9 Mb for *A. heterodon*, 76.9 Mb for *A. varicosa*, and 74.6 Mb for *E. complanata*. Only 12-18% of the transcript sequences could be rigorously annotated, results similar to those of Bai et al. (2009) for freshwater pearl mussel *Hyriopsis cumingi*. Single nucleotide polymorphisms (SNPs) among species totaled 11,239, with 341 within *A. heterodon*, 738 within *A. varicosa*, and 444 within *E. complanata*. For genes where we have homologous sequences for all three transcriptomes, we are assessing phylogenetic variability and applying tests of selective neutrality to identify sequences subject to natural selection. We found 252 microsatellite DNA-bearing loci in *A. heterodon*, 440 in *A. varicosa*, and 569 in *E. complanata*; a subset of these candidate marker loci will prove useful for population genetic studies to inform conservation planning. The genomic information gained in this and follow-up studies will prove useful in advancing understanding adaptation in freshwater mussels.

"Let's re-route Niagara Falls," and other pressing water management issues in China

BRIAN MURPHY

Department of Fish and Wildlife Conservation
Virginia Tech
Blacksburg, VA 24061

As the world's second-most-populous nation and second-largest overall economy, water resource management issues are paramount in China's plans for economic development. Pressing needs for electric power to support booming economic growth have already compromised ecological services of China's largest river, the Yangtze, impacting everything from migratory species passage and general fish biodiversity levels, to water table levels, irrigation, and fisheries yields in the watershed. Further planned development now targets the second-largest river, the Yellow, which cuts a swath across the dry northern section of the country from the western Himalayas to near the capital city, Beijing. But rapid climate change now threatens plans for power development and industrial water use in the North, and an old proposal has been resurrected for a major South-to-North water diversion project (from the Yangtze to the Yellow) on an enormous scale. However, the Yangtze basin may no longer be as 'water-rich' as once thought, and diversion could lead to even further loss of ecological services.

Water temperature and dissolved oxygen (DO) profiling on three lakes in King and Queen County, Virginia after the installation of aeration systems to these impoundments.

T. P. GUNTER, JR.

Aquatic Biological Monitoring Services (ABMS), LLC

ABMS installed aeration systems on three lakes owned by the King and Queen Rod and Gun Club in 2011. The lakes were built in the 1930's and provide recreational opportunities for club members and guest. Additionally, these lakes serve as a water supply for the King and Queen Fish Hatchery owned and operated by the Virginia Department of Game and Inland Fisheries. The lakes include Spring Branch (an 8.1 hectare impoundment), Walker-Coleman (16.2 hectares), and Old Ice House (12.2 hectares). All three lakes are eutrophic and stratify in the summer months. The aeration systems were installed and running in Spring Branch and Walker-Coleman ponds by August 4, 2011 and by August 11, 2011 in Old Ice House.

Within a week of full aeration operations water temperature throughout the water column in all three impoundments were fairly uniform. DO readings increased to 3 ppm or better down to 3 to 6 meters. In the initial start up there was a DO squeeze down to 3 ppm throughout the entire water column in most of the ponds, but this squeeze was short lived with DO readings improving after 18 days of full aeration operations. In the aftermath of Hurricane Irene, the aeration systems were shut down due to power outages and the impoundments re-stratified within six days of the power outage. However, all three ponds destratified within 22 days of the power being restored.

Bowfin tagging project of Chickahominy Lake

SCOTT HERRMANN

Virginia Department of Game and Inland Fisheries
3801 John Tyler Memorial Highway
Charles City, VA 23030

Bowfin *Amia calva* are a native fish species of Virginia that thrives within various water bodies of the Tidewater region. One of the strongest populations of bowfins can be found within the 1,230-acre impoundment known as Chickahominy Lake. The construction of Walker's Dam in 1943 created this shallow water impoundment of the Chickahominy River. DGIF fisheries staff began a bowfin tagging study on Chickahominy Lake during the summer of 2009. Predator species were collected through the use of electrofishing surveys. All collected bowfins were marked with a T-bar anchor tag for future identification when encountered during surveys or by angler catch. The tagging project continued into 2010 and 2011 to increase the abundance of tagged fish in the population. Individual growth rates of recaptured fish were analyzed along with the general tracking of movements over an extended period of time. Length and weight data from recaptured fish provided variable growth rates with most fish revealing less than expected growth potential. The 2011 surveys yielded a total of 460 bowfins in which 39 fish were recaptures. Tagged bowfins from the 2009 surveys yielded 41% of the 2011 recapture total along with a 46% contribution from 2010 tagged fish.

Angler exploitation of walleye (*Sander vitreus)* in Virginia

STEVE OWENS[1], GEORGE PALMER[2], TOM HAMPTON[2], DAN WILSON[3]

[1]Virginia Department of Game and Inland Fisheries
1320 Belman Road; Fredericksburg, VA 22401
[2]Virginia Department of Game and Inland Fisheries
1796 Highway Sixteen; Marion, VA 24354
[3]Virginia Department of Game and Inland Fisheries
1132 Thomas Jefferson Road; Forest, VA 24551

Walleye *Sander vitreus* populations were monitored from 2008-2011 at seven sites across Virginia in an effort to evaluate angler catch rates and harvest. Walleye were tagged with a T-bar floy tag during each year of the study with small impoundments receiving 100 tags, rivers 150 tags, and large impoundments 250 tags per year. Reward tags were returned for 526 walleye caught during the course of the study. Comparisons between walleye populations in rivers, large impoundments, and small impoundments showed significant differences in the mean size of walleye caught ($p<0.001$). Walleye from large impoundments were consistently the largest (488mm), followed by river (464mm) and small impoundments (415mm).
Anglers reported harvesting 246 tagged walleye during the study. Mean TL of walleye harvested from Lake Brittle were significantly smaller (346mm) than the remaining six study sites where the mean TL ranged 482-524mm. Adjusted exploitation for river, large impoundment, and small impoundment populations were found to be significantly different ($p=0.001$) at 31, 24, and 74 percent, respectively. Walleye exploitation was found to be higher in all waters than expected at the beginning of this study and as a result statewide walleye regulations were changed to include a standard 457mm minimum size limit.

Sampling strategies for estimating brook trout effective population size

ANDREW R. WHITELEY[1], JASON A COOMBS[1], MARK HUDY[2], ZACHARY ROBINSON[3], KEITH H NISLOW[4], BENJAMIN H LETCHER[5]

[1] Department of Environmental Conservation, University of Massachusetts, Amherst, MA
[2] US Forest Service, Fish and Aquatic Ecology Unit
[3] U.S. Fish and Aquatic Ecology Unit USDA Forest Service
[4] U.S. Forest Service, Northern Research Station, University of Massachusetts, Amherst, MA, 01003 USA
[5] U.S. Geological Survey, Biological Resources Division, S.O. Conte Anadromous Fish Research Center, Turners Falls, MA 01376, USA

The influence of sampling strategy on estimates of effective population size (Ne) from single-sample genetic methods has not been rigorously examined, though these methods are increasingly used. For headwater salmonids, spatially close kin association among age-0 individuals suggests that sampling strategy (number of individuals and location from which they are collected) will influence estimates of Ne through family representation effects. We collected age-0 brook trout by completely sampling three headwater habitat patches, and used microsatellite data and empirically parameterized simulations to test the effects of different combinations of sample size (S = 25, 50, 75, 100, 150, or 200) and number of equally-spaced sample starting locations (SL = 1, 2, 3, 4, or random) on estimates of mean family size and effective number of breeders (Nb). Both S and SL had a strong influence on estimates of mean family size and, however the strength of the effects varied among habitat patches that varied in family spatial distributions. The sampling strategy that resulted in an optimal balance between precise estimates of Nb and sampling effort regardless of family structure occurred with S = 75 and SL = 3. This strategy limited bias by ensuring samples contained individuals from a high proportion of available families while providing a large enough sample size for precise estimates. Because this sampling effort performed well for populations that vary in family structure, it should provide a generally applicable approach for genetic monitoring of iteroparous headwater stream fishes that have overlapping generations.

Patch size and effective population size: a potential new way for long term evaluation of wild brook trout populations in Virginia

MARK HUDY

U.S. Forest Service
Harrisonburg, VA 22802

The wild brook trout resource in Virginia has been significantly reduced over the last 150 years and faces ongoing and future threats from climate change, land use changes, invasive species and loss of genetic integrity. Large scale population monitoring using standard electrofishing sampling paired with genetic samples at the “patch” level has the potential as a cost effective way to detect and monitor these population changes. The Eastern Brook Trout Joint Venture (EBTJV) assessed the current status of wild brook trout in Virginia at the catchment level and identified 1,883 catchments containing allopatric populations; 513 catchments containing sympatric populations with either brown or rainbow trout; and 450 catchments containing only exotic trout species. Dissolving contiguous catchments containing brook trout resulted in 331 unique “patches’ or genetically isolated populations of brook trout in Virginia. Average patch size was low (2,800 ha). Effective population size (N_e) estimates were less than 100 on many of the smaller patches. Many of the current patches may not be demographically or genetically viable in the long term. Monitoring patch number, size and N_e on a rotating panel design has potential to be a cost effective tool for managers to detect trends in wild brook trout populations.

A tale of two tailwaters: constraints to effective mitigation with environmental flow restoration

DONALD J. ORTH, RYAM A. McMANAMAY, SCOTT M. SMITH

Department of Fish and Wildlife Conservation
Virginia Tech
Blacksburg, VA 24061

The dams which regulate streamflows in the United States are aging; many of them are over 50 years old. Over one-half of the dams are in private ownership and operation and only the larger dams are owned and operated by the Federal Government. Modernization, optimization, rehabilitation, and decommissioning US dams programs are priorities for the existing dam infrastructure. In many cases the planning for U.S. dams was conducted before Fish and Wildlife Coordination Act was amended in 1946 requiring consultation with the Fish and Wildlife Service and the fish and wildlife agencies of the states. In this paper we review the historical changes in two tailwaters that have been controlled by dams from over 50 years. The operating rules and guidelines for these dams were established in an old era. The Cheoah River has been regulated by Santeetlah dam since 1928. Prior to relicensing agreement there were no flow releases from Santeetlah dam and in 2005 seasonally variable peak and baseflow releases were required. The Smith River was regulated by Philpott Dam, a U.S. Army Corps of Engineers project since 1950. We studied the physical habitat, flow, temperature, and fish assemblage characteristics over multiple years. We develop a conceptual model of changes in river morphology following dam construction and flow alteration. Both tailwaters showed longitudinal patterns in sediment size and composition consistent with the conceptual model. The Cheoah tailwater had substantial riparian encroachment in channel and on bars; restoration of peak flows has resulted in the break-up of some midchannel bars. Fish assemblages in these tailwaters are strongly influenced by temperature regimes and are further limited due to diminished gravel substrates and degraded channel morphology as a result of river regulation. Fish species richness in both tailwaters is lower than expected for similar sized rivers. Benthic macroinvertebrate abundance and richness were lower than expected. Specifically, in Smith River tailwater below Philpott Dam the fish assemblages is dominated by the non-native brown trout *Salmo trutta* and native species, including a federally endangered species, are reduced in abundance. A coldwater release, daily fluctuation in discharge, sediment size, and lack of connectivity were constraints on downstream flora and fauna. Operational changes to U.S. Corps of Engineers dams are limited to changes that are within their operating guidelines. For Philpott Dam the mitigation was a change in the rate of increase in flow, which did influence the peak shear stress on the streambed. The flow restoration at Santeetlah dam resulted in a 2 degree increase in summer water temperature. Cheoah River fauna was influenced by warmer water released from the dam. Only one fish species re-colonized the tailwater after flow restoration and one fish species diminished in abundance. In situations such as these, temperature and sediment constraints suggest that restoring flow alone will provide only incremental, if any, change in biota. In 2008 the Department of Energy re-established its research and development program for waterpower. Programs to restore native flora and fauna in these and similar tailwaters will require more than re-establishing more natural flows. We must consider the need for more active management, depending on the loss of habitat due to the sediment trap effect and/or temperature change, as well as the viability of source populations to re-colonize the tailwaters.

A non-lethal approach to assess and monitor mercury concentrations in black basses from a mercury impacted stream in the Shenandoah Valley, Virginia

JOSHUA COLLINS[1], JOHN R. FLANDERS[2], GREGORY MURPHY[3]

[1]URS Coproation, Fort Washington, PA 19034
[2]URS Coporation, Oakland, VA
[3] Pennsylvania Fish and Boat Commission, Revere, PA

A non-lethal sampling approach utilizing dermal biopsy punches has been developed to assess and monitor total mercury (THg) concentrations in black basses along 26 miles of the South River, Virginia. Fish tissue biopsy samples provide data on spatial, temporal and ontogenetic variations of THg in the muscle tissue of smallmouth and largemouth bass, without causing mortality. Fish were collected through the use of boat and tote-barge mounted electrofishers and held in flow-through live pens prior tissue sampling to minimize handling stress. Tissue samples from up to 30 bass from each biological monitoring location were collected with a mid-dorsal biopsy plug obtained using a 3.5 millimeter (mm) sterile biopsy punch. After sampling a small passive integrated transponder (PIT) tag was inserted beneath the posterior dorsal fin terminus in order to track THg levels in unique individuals over time. An antibacterial salve was applied to the wounds to prevent infection and field observations from the 2009-2011 sampling events indicated that recaptured smallmouth and largemouth bass had complete regrowth of skin and scales between sampling events. Sample results were found to be comparable to traditional lethal sampling techniques and present a sustainable alternative for assessing metals concentrations in fish.

Improved determination of nitrate-n soils and sediments by ion chromatography

ALLISON E. WICKHAM AND DANIEL M. DOWNEY

Department of Chemistry and Biochemistry
James Madison University

Nitrogen as nitrogen-nitrate (N-NO3) is a nutrient and pollutant that may lead to eutrophication. Knowledge of the amount of N-NO3 in sediment is important for lake management, but can be difficult to determine. The standard procedure for the quantification of nitrogen-nitrate (N-NO3) in soil and sediment samples involves extraction of sediment with concentrated potassium chloride (KCl) solution to remove the nitrate ion from binding sites. The extracted nitrate is then reduced to nitrite with a cadmium column, and then reacted in a colorimetric analytical finish. The reduction and colorimetry steps are time-consuming, and prone to contamination, oxidation and matrix interferences. N-NO3 in low ionic strength aqueous samples can be readily determined by instrumental ion chromatography (IC). However IC cannot be used for direct extract analysis since the high concentration of KCl (2M) saturates the column and detector. Recently, silver columns (Dionex OnGuard® II Ag) for chloride removal have been marketed for use in IC sample pretreatment. The Ag columns have been employed for the determination of nitrogen-nitrate in the KCl extracts. A more rapid and convenient procedure than the standard method has been developed that enables removal of more than 99.9% prior to IC analysis, while recovering N-NO3 with no loss in the silver cartridges ($p<0.001$). N-NO3 for samples collected in the Shenandoah Valley was determined by both the colorimetric and IC methods for method comparison. With this new method, lake mangers should be able to obtain from testing laboratories N-NO3 data more rapidly, at lower cost and improved reporting times.

A "snapshot" study of water chemistry for three streams in the Shenandoah Valley

MICHAEL MORRIS[1], DANIEL M. DOWNEY[1], CAITLIN SIEMENS[2]

[1]Department of Chemistry and Biochemistry, James Madison University
[2]National Technical Institute for the Deaf, Rochester Institute of Technology

There are two ways to collect stream water samples for water chemistry and environmental evaluation: grab samples taken from select sites at regular intervals for a long period of time, or grab samples taken at many sites in a short period of time. The latter approach is known as a snapshot or synoptic sampling. For most of our projects monthly water quality samples have been collected for a number of streams to support research on acid deposition, liming and non-point source pollution. However due to time, effort and budget limitations only a few sites for each stream are regularly sampled. To better understand the changes in water chemistry as a stream moves downgrade, synoptic samples were collected during the summer of 2011for three streams we sample on a monthly basis. For our project, synoptic sampling involved taking water samples and physical measurements at two to three hundred meter intervals in a short time frame. Distances were measured and recorded with a hip chain. Little Stony Creek in Shenandoah County and Mountain Run in Rockingham County are acid sensitive streams that have been treated with limestone. Mountain Run discharges into Smith Creek, a meandering stream that flows through agricultural land. For Little Stony Creek on two days in June 2011 we sampled 4,800 meters from the downstream US Forest Service boundary to upstream of the limestone treatment site. In a three day period in July 2011 we sampled Mountain Run and Smith Creek for 8,420 meters. In the field physical measurements of pH, temperature, turbidity and conductivity were made at each site. Samples were returned to the lab for determination of acid neutralization capacity (ANC) and the concentrations of sodium, potassium, magnesium, calcium, chloride, sulfate, nitrate and aluminum. These parameters and on-site physical observations were used to evaluate geology, soils, land use and pollution on the water quality of the above streams, and to provide data for evaluation of the effectiveness of limestone treatment for acidic streams.

The South River Science Team: a collaborative effort to understand mercury in the South River

CALVIN JORDAN

Virginia Department of Environmental Quality
Harrisonburg, VA 22801

The South River Science Team was formed to serve as a focal point for technical issues concerning mercury in the South River and downstream waterways. The Science Team is a cooperative effort between the Virginia Department of Environmental Quality, Department of Health, and the Department of Game and Inland Fisheries, and the representatives from academia, citizen groups, the Environmental Protection Agency, and DuPont. The Science Team provides technical direction for the mercury monitoring program and ensures that there is effective communication provided to the users of the river.