

North Carolina 2014 SWPBA Newsletter

2014 Biological Assessment Branch Summary

Benthic Macroinvertebrates

Taxonomy

Due in large part to specimens collected by Biological Assessment Branch (BAB) biologists over the last three years, a revision of Eastern Nearctic *Isoperla* (males, female and eggs) by outside parties has revealed that there are at least 26 species of *Isoperla* in NC of which 15 are newly described (Illiesia: In Press). Moreover, nymphs of *Isoperla cherokee* and *Isoperla siouan* (Kondratieff and Szczytko, In Press) were both positively associated with both adult males and females and a possible new species of *Isoperla* was discovered from Orange County, NC. Males of this species have distinctively toothed paraprocts and uniquely adorned aedeagus and appear different from the new species of *Isoperla* described by Kondratieff and Szczytko (In Press). Additionally, the nymphs of this new species appear unique. In house BAB rearing of *Isoperla* nymphs has associated at least four (probably five) of these new species and confirmed the nymph/adult associations in at least three previously known species.

A recent winter basinwide sample obtained from a swamp (Merrick's Creek) near Wilmington produced a single specimen of a Baetid mayfly. After numerous efforts of keying, it readily failed all available Baetid keys. After close consultation with Luke Jacobus at Indiana University, it appears that this specimen may represent an entirely new genus. Attempts at collecting additional material in 2014 were thwarted due to high water levels but 2015 will find BAB biologists scouring Merrick's Creek for additional specimens and life stages.

In terms of caddisflies, we have interesting mountain records of *Nectopsyche* that are either a new species or a significant (300+ mile) range extension of a species endemic to the coastal plain Lake Waccamaw (*Nectopsyche waccamawensis*). Light trapping is planned for late spring-early summer 2015 at both Lake Waccamaw and at several of the mountain localities where this taxon has been found. Light trapping is also planned in 2015 in an attempt to collect a possible new species of *Holocentropus* that occurs in the NC Coastal Plain.

Special Monitoring

BAU benthic biologists sampled 12 Random Ambient Monitoring Sites (RAMS) sites. RAMS is a probabilistic based water quality monitoring strategy encompassing randomly selected sites throughout the State. In addition, five benthos samples were collected as part of a supplemental water quality reclassification study on Lake Adger. BAB biologists also participated in a large scale trout feeding ecology study undertaken on behalf of the North Carolina Wildlife Resources Commission (NCWRC). The NCWRC has maintained several long term, wild brook trout monitoring locations in an effort to better understand the biotic and abiotic conditions necessary to support wild brook trout. The BAB samples were the first efforts in attempting to describe and enumerate the invertebrate forage available to brook trout in these systems.

As a result of the early February 2014 coal ash spill on the Dan River, numerous physical and chemical analyses have been collected by NCDWR. Benthos sampling has been hampered repeatedly since the time of the spill due to high flows, turbidity, and staffing reductions. Two benthic samples bracketing the discharge are tentatively scheduled for October.

Basinwide Monitoring

In terms of basinwide monitoring, the BAB collected 95 samples from the Roanoke, Savannah, Hiwassee and Little Tennessee river basins.

Fish Community

Basinwide Monitoring

In 2014, approximately 60 rateable sites were sampled as part of the Roanoke, Little Tennessee and Hiwassee basins as part of the basinwide monitoring program. To help defray staffing reductions, and as was the case in previous years, field assistance in 2014 was provided by staff from the Intensive Survey and Ecosystems Unit and the Asheville, Mooresville, and Winston-Salem Regional Offices; additional assistance was provided by the NC Natural Heritage Program and the NC Wildlife Resources Commission. In addition, several sites sampled in 2013 in the Cape Fear River were re-sampled in 2014 to verify why the biological integrity rating declined substantially or to verify that placement on the impaired streams list is warranted.

Metric Calibration and Rating Development for Wadeable Streams in the Sand Hills

For the last three years, considerable effort and accomplishment has been made in the continued development of fish community criteria for rating Sand Hills streams, including data analyses, memorandum writing, and selection of reference sites, data collection, and model validation. As a result of these processes, a 7-Metric NCIBI was derived which has demonstrated the ability to reliably identify impairment and to differentiate between highly impacted non-reference samples rated Poor or Fair and reference and near-reference samples rated Good or Excellent.

Relationships were determined between the seven metrics and the 7-Metric NCIBI total score vs. specific conductance, pH, total habitat score, landuse types, and landuse disturbance gradients. Based upon the existing dataset, reference sites and other least impacted fish community sites in the Sand Hills should have: 1) low specific conductance, low pH, low abundances of fish, and low percentages of tolerant fish; 2) high percentages of Key Sand Hills species, Key Sand Hills fish, and Insectivore Cyprinids; 3) at least two intolerant species; and 4) high quality instream habitat characteristics. Impacted sites would have the converse for these characteristics. Currently, these methods are complete and are under in-house review for possible adoption in 2015.

Random Ambient Monitoring (RAMS)

As was the case for the benthic macroinvertebrate program, 12 fish community sites were assessed as part of the 2013-2014 Random Ambient Monitoring System Program (RAMS). RAMS is a probabilistic based water quality monitoring strategy encompassing randomly selected sites throughout the State.

Fish Reintroduction Studies:

The Division of Water Quality, NC Wildlife Resources Commission (NCWRC), University of Tennessee-Knoxville (UT-K), Haywood Waterways Association, and Evergreen Packaging have been working together for the last several years on an innovative project designed to remove the middle reaches of Richland Creek (a tributary of the Pigeon River near Waynesville, North Carolina) from the §303(d) impaired waters list. The project is modeled on the successful bi-state Pigeon River Reintroduction project led by UT-K and NCWRC. Richland Creek had historic and long-term poor water quality, hydrologic modifications, habitat degradation and impaired biological integrity. After a decade of water quality enhancement projects, water quality had improved to a level suitable for the reintroduction of the native fish community to areas upstream of the Lake Junaluska dam (a barrier to re-colonization since 1913). River Chub, Warpaint Shiner, Saffron Shiner, Mottled Sculpin, Rock Bass, Tuckasegee Darter, and Greenfin Darter are collected from nearby watersheds in Haywood and Buncombe counties (e.g., Jonathans Creek, South Hominy Creek, and Swannanoa River), transported to the area above the lake and released twice a year (for a maximum of three years), or until the species establish reproducing populations. Since April 2010, more than 14,000 fish representing these seven species, plus Mirror Shiner and Fantail Darter, have been collected from nearby source populations and reintroduced at multiple sites in Richland Creek in Waynesville. Reproducing populations and longitudinal dispersal have already been documented for some species (e.g., Warpaint Shiner,

River Chub, and Tuckasegee Darter). With the reintroduction of the fish population, removal of the middle reach of Richland Creek from the impaired water list is expected. However, long-term success for the project will require continued habitat improvements, stormwater management and other water quality improvements.