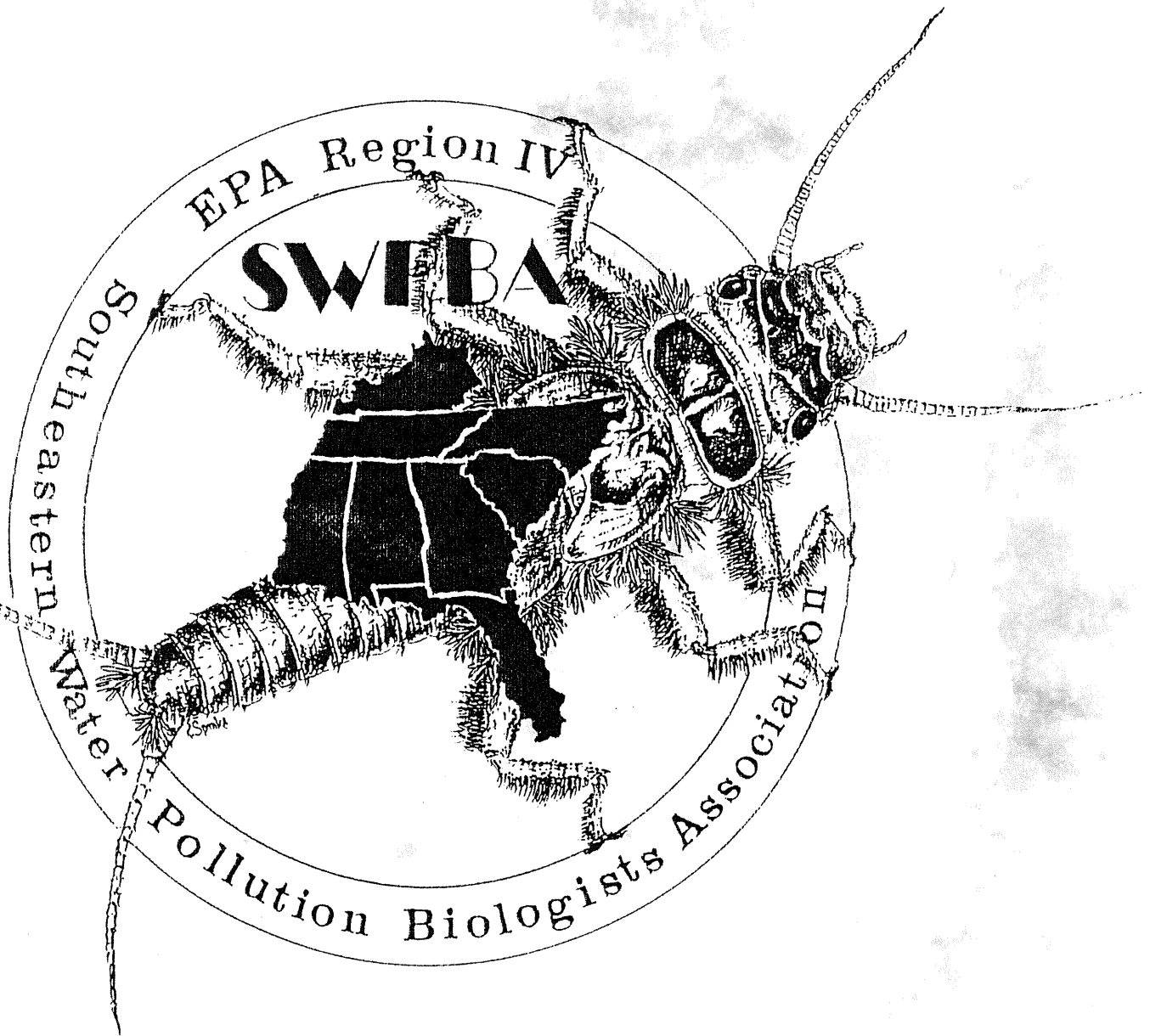


*SOUTHEASTERN WATER POLLUTION  
BIOLOGIST'S ASSOCIATION*

*NEWSLETTER*



April 1995

# Presidential Letter

## Dear SWPBA Members;

The year is rolling on fast, too fast for us as we scurry around to make meeting arrangements, activities, agendas, and newsletters.! We plan to have two newsletters this year. This is the first issue. We will have a second issue probably in August/September to finalize agenda and arrangements for the Fall meeting.

The SWPBA meeting is schedule in Chattanooga, at the Chattanooga ChooChoo Hotel, October 31 - November 2. The hotel address is 1400 Market Street, and the phone number is 1-800-TRACK29. We are estimating a 62.00 room charge with the room holding up to 4 people. There will be a cost for the meeting room if we fill less than 50 rooms, so bring relatives if you have to. We are still checking into the Ocoee River rafting. While we are still trying to set something up on November 2, the next option is to go rafting on Sunday afternoon, October 29 at a cost of 15.00 per person. We'll keep you posted as soon as we know something.

Because of the Holiday - Halloween - we are scheduling the Banquet at the Hotel on October 31, 1995. Please follow the dress code (costume) or there could be some tricks. What we do for the rest of the meeting nights (probably recovering) will depend on the Ocoee River and Tennessee Aquarium schedule. For info on the 1995 SWPBA T-Shirt see Tennessee News. What would you think about a sweatshirt as well as a T-Shirt? Final arrangements will be published in the next SWPBA Newsletter.

A few Agenda topics suggested at the Florida meeting included sessions on:

- Storage and Management of Biological Data. For example Alabama, North Carolina, and Florida have developed computer programs. STORET X is combining its STORET/BIOS/ODES prototype. What do other states have and is there a possibility of shareware.
  - Neil Bedwell, NC, will demonstrate the Mac 4th Dimension biological software capabilities. In addition, he will show off a software package that will access STORET data for downloading to your PC into an analytical database with some trend analysis capabilities.
  - Florida will be demonstrating the next generation of BIOS - BIOS 8.
  - Joy Broach, TN, will show a software package called Ambstor that allows the user to put in water quality data and upload to STORET with a push of a button (well, almost one button)
- Volunteer Monitoring. Florida has been very successful in using this data. What other states use volunteer monitoring data. What about Adopt-A-Stream programs? It may be interesting to have a volunteer monitoring group come talk to us as to their perception of state monitoring data.
  - Tammy Hutchinson, TN will give an overview of a watershed restoration in Chattanooga involving several state, federal, and private organizations.
- Ecoregion Delineation. All states are in some stage of delineation from complete with several reference streams, to identifying subregion boundaries.
- Community Structure and Assessment. Fish IBIs are becoming an important tool in monitoring the health and structure of an aquatic community. The majority of us use macroinvertebrates, however some states use fish in their assessments while others are considering it. This is a broad subject and can include benthic data. Does sampling equipment affect what you find in community structure and assessment? Is there a difference between a triangular net verses a D-frame? How is benthic data affected and/or interpreted when it is simultaneously collected and identified by multiple agencies?
- Toxicity Session. Is there a consensus that fish tend to be more sensitive to metals and ammonia while *Ceriodaphnia* tend to be more sensitive to organics? What information or trends have been found in running AGPT? What are States using for sediment toxicity? How are you managing your database (may fit well in the first topic above)? Are there pressures to use stream diluent water verses standard lab water? **Hey Bill!** You want to talk about the eagerly anticipated new toxicity manual?
- Certification of Aquatic Biologists. Does anyone know about any other certifications?
- Other. Any other suggestions for topics? What is it that your have a burning desire to know and would come to this meeting to know it?

The agenda is still wide open. Please consider this the **FIRST CALL FOR PAPERS!** A topic title and a name will make a good start. You can even volunteer someone and suprise them a week before the meeting. Feel free to make as many copies as you like and circulate it within your agency and friends (who are ususally outside your agency). Please send your information to :

Donna Wingfield Phone: (615) 262-6328  
TDH - Environmental Laboratory Fax: (615) 262-6393  
630 Ben Allen Road  
Nashville, TN 37247-0801

Many Many Thanks - Joy Broach

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## *Minutes of the SWPBA meeting in Sandestin, FL*

The SWPBA Business Meeting was called to order at approximately 11:00 am Thursday, November 17, 1994. Jim Hulbert, the 1994 President, thanked many members for their hard work resulting in a very successful 1994 SWPBA meeting hosted by Florida. Special thanks went to Kathy Lurding for program set-up and T-shirts, and to Liz Miller and Vicki Whiting for managing registration. Thanks went to members of the Executive Committee: Kathy Lurding, Mike Beiser, Skip Call, and Joy Broach. Many thanks also went to the Sponsors, particularly Hydrolab, YSI, Wildco, and Barry A. Vittor & Associates who helped underwrite costs incurred in setting up the meeting. Their support enhanced the success of the meeting.

### Old Business:

Jim informed the members of the status of the draft letter he had placed in the April, 1994 SWPBA Newsletter requesting that NABS look into registering or certifying aquatic biologists. This would give the states a list of "qualified biologists. Jim had requested comments concerning his draft letter and had received little response from the SWPBA members. He again requested input. Jim noted that another option would be to contact the Professional Ecologist Association (?) and see if aquatic biologists could be registered through them. He noted that Dave Penrose, with the Biological Assessment Group in NC, was currently a member. Jim said he would pursue this option if the SWPBA members were interested in this option.

### New Business:

Next came the motion to call for election of new officers for 1995. It was stated that Tennessee would be hosting the meeting in '95. The representatives from Tennessee stated that they did not foresee any problem as they had anticipated the upcoming meeting. It was also mentioned that Alabama was slated to host SWPBA in 1996.

Nominations came from the floor in rapid fire order. Hoke Howard nominated Joy Broach for President followed by a second from Debbie Arnwine. A call from the floor for additional nominations was quickly concluded by a motion to close the nominations. A unanimous cry of assent from the members was quickly followed by a call from Jim Hulbert for all those in favor to say "Aye". The resounding crescendo of aye's without opposition concluded the election of Joy Broach as the new President for 1994-95.

Without missing a beat, a call was made for nominations for the office of Secretary. Mike Beiser answered with his nomination of Donna Wingfield. Multiple seconds came from Lythia Metzmeier and Debbie Arnwine. Jim Hulbert made a motion to close the nominations that was met with enthusiastic support. Without much ado and no "nays" Donna Wingfield was elected Secretary of SWPBA for the 1994-95 meeting year.

# TENNESSEE NEWS

## FROM THE BEST

### *Biologist/Environmental Specialist Teams*

**Department of Health**  
Environmental Laboratory  
Aquatic Biology Section

Hello once again fellow biologist types, we've been up to our wader tops in fish and bugs as usual. For those of you who remember Alicia Wade (from the Kentucky meeting) she left in December to pursue entrepreneurial activities. Fortunately, we have been able to hire two new biologists this year. Andrew McAllister came to us from Florida in January (just in time to learn what ice and snow is). Andy has over 9 years experience in benthic ecology and marine & freshwater invertebrate taxonomy. Prior to joining the state of Tennessee, Andy was employed by Mote Marine Laboratory in Sarasota Florida managing the benthic laboratory. From 1991 to 1993, he managed the benthic lab at the University of Mississippi. His field of expertise is the taxonomy of marine and freshwater macroinvertebrates of the Southeast United States and Puerto Rico with emphasis on the taxonomy of freshwater and estuarine Oligochaeta. Andy is a great asset to our macroinvertebrate program! Since coming to us he has also learned the fine art of chronic bioassays. Next month we are going to send him out on the Mississippi River for his boat electrofishing initiation (trial by fire).

Our second new recruit is Kim Sparks who joined us in February. Kim comes to us after serving four years with Nashville, Davidson Co. Metropolitan Health Department where she worked as a restaurant inspector. (You remember what they told us in school, "You'll never find a job as a biologist!") Well, Kim majored in Biology..... Anyway we feel especially lucky to have her. Kim's experience in Quality Control has already proved an asset as she is adapting well to toxicity testing. She says she doesn't mind all the record keeping. Kim graduated from David Lipscomb University, Nashville, TN where she minored in Chemistry and Art. Therefore, she has graciously offered to design the T-shirt for the next SWPBA Meeting. She already has some great ideas. A taste of things to come are provided on the cover of this newsletter. I don't know about you but I can't wait. I think this years shirt will be spectacular.

For those of you who haven't heard, Tennessee's Nonpoint Source Pollution Program is moving from the Department of Environment and Conservation to the Department of Agriculture as of July 1, 1995. Our section has been conducting the bulk of the biological monitoring for this program since October 1990. Since our section is considered an equal opportunity biological group (we work for every department) we will continue to do the biological monitoring for the NPS program with the Department of Agriculture. However, the scope of the monitoring will be changed from intensive,

watershed wide to rapid bioassessment upstream and downstream of facilities before and after BMP emplacement. The original watershed projects which began in 1990, will continue through this summer which will give us one full year of post BMP analysis. Once this data is worked up, we will continue monitoring any stations which show some improvement. We have finally finished analysis of all pre-BMP samples and are currently performing data reduction and report preparation. David Stucki, has completed the data reduction for the Bear Creek Watershed.

### **Bear Creek Acid Mine Drainage Reclamation Project Update**

Nearly seven hundred acres of land in the Bear Creek watershed, Scott County, Tennessee were strip mined prior to 1977. The drainage of this unreclaimed land enters the Big South Fork of the Cumberland National Recreation Area just upstream of a mussel bed that contains 21 species, two of which are federally listed as endangered. BMP's consisting of anoxic alkaline trenches and subsequent artificial wetlands were installed fall 1991 at two abandoned mine sites, with grading, revegetation and artificial wetlands at a third smaller site fall 1992. Stream sampling stations are located immediately downstream of these reclamation areas on first order streams with an additional test site downstream on Bear Creek, the third order receiving stream. A watershed reference and ecoregion reference stream were sampled for comparison purposes.

A pre-BMP placement baseline macroinvertebrate and fish study was completed and reported last year. Seasonal macroinvertebrate and fish collections of the year during and following construction have now been compared to this baseline study. Initial findings indicate that while the first order stream receiving the reclamation drainage demonstrated no improvement to very slight improvement, the third order stream (Bear Creek) they feed displayed significant improvement in the macroinvertebrate community structure. Sampling for the study will be completed July 1995 with results of fall 1992 through summer 1995 to be interpreted by the end of the year. If anyone has comments or would like additional information, please contact David Stucki (262-6329) or Debbie Arnwine (262-6327).

Until next time,

Debbie Arnwine  
David Stucki  
Dan Murray  
Pat Alicea

Donna Wingfield  
Andy McAllister  
Kim Sparks

**Department of Environment and Conservation**

Division of Water Pollution Control

Division of D.O.E. Oversight

**NOVEMBER WORKSHOP SUMMARY**

The Habitat Assessment and Bioassessment Workshop held November 8-10, 1994 was a tremendous success ! The purpose of the workshop was to standardize habitat assessment, benthic and fish sampling protocols, update/refine current methods used, and develop the ground work based on consensus for a written State SOP. Technical issues addressed selecting reference conditions, taking representative samples (standard field sampling methodology), identifying source and cause (habitat vs. chemical impacts), and accounting for seasonal effects. We utilized Mike Barbour's modified habitat assessment sheets which consider high and low gradient streams. We adopted modified RBP V fish protocols developed by the Tennessee Valley Authority and the Tennessee Wildlife Resources Agency. We agreed to modify RBP III and to keep multi habitats separate. While we agreed during the workshop to pick 200 organisms and to use an 18 inch rectangular net to collect riffle samples at two fast and two slow areas of a riffle, to date this hasn't been finalized. In fact, during the last few months requests have come in to pick 100 organisms and to use the Traveling Kick Method (similar to Kentucky's TKN). The major result of the workshop was the production of a draft State SOP initially by the Department of Environment and Conservation, Department of Health, and the Tennessee Wildlife Resources Agency with other state agencies to be included as they are identified. There will be a steering committee comprised of these and federal agencies to hopefully reconcile protocol differences. A draft SOP concerning everything but the fish was sent out for comment at the end of January. The fish protocols was sent out at the end of March. We will compile all the comments and try to send the workshop participants a list of issues in late summer. Wish all of us Tennesseans luck as this is a large undertaking!!!

**ECOREGION UPDATE**

Preliminary findings indicate that Tennessee will contain approximately 20 subregions within its 8 ecoregions. The more homogenous ecoregions in West Tennessee may contain none or 2 at most. The Interior Plateau may contain 5 or 6 subregions while the remaining ecoregions east of the Interior Plateau may subdivide into 2 or 3 subregions each. Minimally we hope to establish 3 reference sites per subregion, although the optimal number will be affected by the variability of the subregion.

A boundary verification meeting on mapped information only is being scheduled by Jim Omernik May 9-11 at the Fleming Training Center in Murfreesboro. Jim is working closely with the U. S. Forestry Service to align ecoregion and subregion boundaries with potential vegetative cover boundaries shown at the initial Ecoregion Delineation meeting July 22, 1994. We are expecting a draft boundary map within the next 3 - 4 weeks. We will forward the map to all interested parties for comment. Jim intends to

go over each subregion boundary and confirm the accuracy of the boundary location based on mapped information. Final confirmation will occur during ground-truthing on the boundaries and candidate reference sites across the whole state in August. The letter that that was sent to invitees is enclosed.

SUBJECT: Revision and Subdivision of Ecoregions in Tennessee

Dear Colleague:

A meeting regarding the revision and subdivision of ecoregions in Tennessee will be held May 9-11, 1995, at the Fleming Training Center, in Murfreesboro, TN. This meeting is part of a collaborative project between the Tennessee Department of Environment and Conservation, Division of Water Pollution Control, and the U.S. Environmental Protection Agency (EPA) to refine Tennessee ecoregions and select stream reference sites. This May meeting is a follow-up to the ecoregion delineation overview and information-gathering meeting that occurred in Nashville last July. The May will primarily address the regions and boundaries of the draft ecoregion/subregion framework.

Similar to collaborative projects in other parts of the United States, the refinement and subdivision of ecoregions in Tennessee was initiated because of the need for a spatial framework to structure water resource programs. The main interest in these projects has been in developing regional biological criteria, water quality standards, and establishing nonpoint source pollution and lake management goals. However, there is opportunity for terrestrial applications as well. Ecoregions are necessary to conduct resource management across agencies and political boundaries in a more holistic manner that considers patterns in the natural capacities and potentials of ecosystems. A government-wide approach to ecosystem management involves increased levels of coordination among agencies, and collaboration and consensus building among federal, state, local, and private parties participating in activities affecting aquatic ecosystems.

The key to the success and ultimate usefulness of the defined ecoregions and subregions lies in the collaborative nature of the project. For the regionalization, it is necessary to gather small to medium scale (1: 1,000,000 to 1:250,000) mapped information on causal and integrative factors such as bedrock and surficial geology, soil, hydrology, physiography, existing and potential vegetation, land use, as well as available interpretations of biomes, ecosystem regions, and so on. Also invaluable are the "mental maps" of ecosystem patterns held by scientists and resource managers who have studied the area.

An additional objective of this project is to obtain consensus between the U.S. EPA, the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS - formerly the Soil Conservation Service), and the U.S. Forestry Service regarding the final alignments of ecological regions. This objective reflects the purpose of a draft Interagency Memorandum of Understanding (MOU) directed towards developing a



common geographical framework of ecological regions. The steps necessary to accomplish this goal include:

1. Recognition of the differences in the approaches used to compile the three major frameworks currently in use and development (USDA-MLRA, USFS-ECOMAP, and EPA Ecoregions)
2. Recognition of the evolving nature of the development of the three frameworks, and the tendency for the differences between them to become less as understandings of the definition of ecosystems and uses of ecoregions evolve, and
3. Increasing the number of interagency collaborative projects (e.g. federal and state agencies in Oregon/Washington and Indiana/Ohio) in which a common set of shared ecoregions is the final product. With the U.S. EPA, U.S. Forest Service, and the NRCS all embarking on refinement of their ecoregional frameworks in the subject area (Tennessee)) at this time, the opportunity for collaboration is excellent.

The types of people who should attend the meeting include those who are willing to actively discuss and debate the ecosystem patterns and boundaries in Tennessee, those who have knowledge of the data sources, and those who will be involved in the eventual use of the framework. The discussion will center on the different agency scenarios for ecoregion definition at different scales for Tennessee and on developing a strategy for further collaboration.

Please bring your ideas and any pertinent mapped information for reports to the meeting. If you are planning to attend or have questions, please contact me at 503/754-4458 or Glenn Griffith at 503/754-4465. Contacts in the Tennessee Department of Environment and Conservation are Joy Broach 615/532-0701 and Linda Cartwright 615/532-0704. We would like to know the number of attendees to ensure that we have adequate room for the meeting. Thank you

Sincerely,

James M. Omernik  
Research Geographer

## **Environmental Field Office News**

### **Johnson City Happenings**

This office is working on assessing the Iris Glen landfill and adjoining engineered wetlands. A french drain was placed around the landfill and the surrounding landscape was enhanced. A small nearby stream flowing below the landfill was designed with instream wetlands and check dams. The stream was heavily impacted but apparently not by the landfill. A more likely source appears to be upstream the landfill. The field office plans to do an RBP III upstream and downstream to assess the stream's health.

### **Knoxville News**

Close to Gatlinburg, this field office is working on the Little Pigeon and the West Prong Little Pigeon Rivers. Dr. Jim Alyzer, with the National Biological Services, is working with this field office utilizing IFIM (Instream Flow Incremental Methodology) on these rivers. There is concern that future water demands in the Gatlinburg, Pigeon Forge, and Sevierville area could produce water withdrawal related impacts. A study is underway to consider the minimum flow needed to support Fish and Aquatic Life uses. Indicator species most likely to be used include the fresh water mussels and obligate riffle fish species. Due to the large area of the study site, affected communities, TVA, and TWRA will be involved.

A recent mussel survey on the West Prong Pigeon River performed by the Knoxville Field Office and the Tennessee Wildlife Resources Agency found only 9 species of mussels. This river historically contained 45 species. The most severe decline in species has occurred in the last 10 years. Toxicity may be a factor, but sedimentation can't be ruled out.

### **Chattanooga Notes**

The Chattanooga Field Office is reviewing their stream listing in their neck of the woods. There are three major reasons for the in-depth inventory. The first reason is to update their stream files, secondly, to update the 305b, and last but not least, compile a listing of potential reference streams. Although we are expecting a list of candidate streams from Jim Omernik, these folks are going to be ready, in case many of the streams on the candidate list (based on mapped information) don't all pan out.

Four or five sites are being considered for intensive survey work utilizing different sampling techniques. Depending on manpower both fish and macroinvertebrates will be sampled using modified RBP III and V methodology. Waters under consideration include the South Chestnee, tributary to the Hiwassee River; Council Springs, on the TN/GA border; the Big Firery Gizzard, and the Conasauga River.

A big survey is being planned on North Chickamauga Creek. The field office will be working with a local group known as the Friends of North Chickamauga. The creek has been impacted by drainage from abandoned mines. BMPs were implemented many years ago. The purpose of the study is to evaluate the creek's recovery, the effectiveness of the BMPs, and determine where other BMPs may need to be implemented. Some impact may still exist based on the preliminary findings of low pH, evidence of yellow boy, and finding very few macroinvertebrates.

**ALABAMA**  
**DEPARTMENT OF ENVIRONMENTAL MANAGEMENT**

**RESERVOIR WATER QUALITY MONITORING**

Approximately one-half of the State's publicly accessible reservoirs were sampled for baseline limnological parameters including water column profiles, nutrients, chlorophyll *a* and phytoplankton. Data has been entered into our Reservoir Database and has been submitted for entry into STORET. The remaining reservoirs will be sampled during 1995 in preparation for completion of the ADEM biennial reservoir monitoring report and the 1996 Water Quality Report to Congress.

The West Point Reservoir Phase I Diagnostic/Feasibility Study received from Auburn University, cooperators on the study, has been reviewed and forwarded to EPA as a joint final report with the Georgia Environmental Protection Division. The final draft Phase I Diagnostic Report for Walter F. George Reservoir was also received from Auburn. Results of the diagnostic study were presented at the October meeting of the Walter F. George Advisory Group held at Ft. Gaines, Georgia. The feasibility portion of the report has been initiated.

**FISH TISSUE MONITORING**

Sixty composite fish tissue samples were collected from 30 locations on 19 waterbodies during the fall of 1994 in conjunction with the Fish Tissue Monitoring Program. All samples have been submitted to the ADEM Central Laboratory for analysis. The waterbodies sampled were chosen following consultation and review with the ADEM Water Division, the Alabama Department of Conservation and Natural Resources, and the Alabama Department of Public Health.

The Fish tissue Monitoring Program is scheduled to continue in 1995.

## SPECIAL SURVEYS

An intensive survey was conducted on Sugar Creek at Lake Martin during August of 1994. A draft report has been forwarded to ADEM's Water Division for review. The study included aquatic macroinvertebrate sampling, baseline limnological studies, and toxicity testing.

The study proposal for continued monitoring of a portion of the Black Warrior River associated with Coalbed Methane discharges has been completed. A one-time sampling event is scheduled for late August. This effort will include chemical, physical, and biological monitoring utilizing Hester-Dendy multiplate samplers.

## MACROINVERTEBRATE BIOLOGICAL MONITORING

All macroinvertebrate data collected during the 1994 sampling year has been analyzed and the study reports completed and forwarded to the requesting ADEM Divisions. The study proposal for the 1995 ecoregional reference site selection and sampling was forwarded to the Water Division. If approved, reconnaissance efforts will begin the last week of March. This year, Ecological Studies Section staff plan to concentrate their efforts back in the Southeastern Plains Ecoregion (65), more specifically in the Southeastern Plains and Hills (65E) and the Blackland Prairie (65A) subregions. An additional four to six sites will be selected to add to the 29 current ecoregional reference sites sampled on an annual basis throughout the State.

The report for the Alabama/Mississippi Pilot Ecoregion Project has been reviewed by ADEM and Mississippi Office of Pollution Control. The draft was forwarded to EPA Region IV (Hoke Howard and Jim Harrison) and EPA-Environmental Research Lab-Corvallis (Jim Omernik and Glenn Griffith) for review and comments. A final joint state report should be available by early summer. Annual quality assurance/quality control joint bioassessment efforts between AL and MS will continue indefinitely to ensure the comparability of the shared data.

## TOXICS UNIT

The Toxics Unit had an exciting winter. We dealt with a few unnatural disasters which included fire (well almost fire), flood, and another unmentionable situation. In addition to all of our extracurricular activities we conducted eight toxicity tests. We are close to completing our commitment list for FY 95 and are looking forward to a break before next years work begins.

## MEETINGS

Fred Leslie attended the Annual Meeting of the North American Lakes Management Society in Orlando, Florida during November. He also attended a meeting of the regional EPA Clean Lakes Program Coordinators while there.

## PERSONNEL

Congratulations to Vickie and Richard Hulcher upon the birth of their son, Zachary, on October 20th.

Our Good-bye to Cathy Shoemaker who is leaving our Department the end of March for educational pursuits in Texas. She will be sorely missed. We wish her the best.

## FLORIDA

### FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

#### SURFACE WATER AMBIENT MONITORING PROGRAM(SWAMP)

#### I. STREAM AND LAKE ECOREGION REFERENCE SITE WORK:

Five sets of data are almost complete on the 80+ stream reference sites in Florida and one set has been analyzed. Out of 35 metrics evaluated, 7 metrics from the panhandle and 9 from the peninsular region have been tentatively proposed. From these metrics an index- the Stream Invertebrate Index of Florida (SIIF)- was developed.

The lake reference site work is also continuing to develop. Thus far 13 pairs of lakes (a reference lake paired w/ a potentially degraded lake) have been sampled and analyzed. Nine metrics, out of 29 evaluated, have been used to develop a tentative index- the Florida Index of Lake Integrity (FILI). Twenty\_one more pairs have now been sampled. Additionally, 30 reference lakes have been sampled twice and Tetra Tech is analyzing those data. Eighty more lakes are to be sampled this summer.

#### II. BIOLOGICAL RECONNAISSANCE (BioRecon):

With the stream/lake reference site work taking so much of the SWAMP biologists' time, a method to allow for a broader coverage and screening of streams was needed. The following protocol report is just such a method to be tried in Florida. The "Score Sheet" will, undoubtedly, have to be adjusted somewhat after more field testing. A brief "certification" procedure is also proposed.

### III. SUBSAMPLING ANALYSIS AND RESULTS:

A key design feature of cost-effective benthic macroinvertebrate assessment programs is the use of subsampling to reduce sample size. The Florida Department of Environmental Protection (DEP) currently uses a 100-organism subsampling scheme for its bioassessment program, which is based on the Stream Invertebrate Index of Florida (SIIF). Although this subsampling level is the least costly of alternatives, it is uncertain whether the 100-organism subsample is sufficient to adequately address all of the program objectives. Within the constraints dictated by the program's goals and objectives, decisions must be made regarding the most appropriate subsampling scheme. Resolution of this issue is important to characterize regionwide reference conditions and to assess biological impairment.

An intrastate cooperative pilot study was conducted among the Florida DEP districts to test how data resolution could be maximized while minimizing cost investment. This comparison test focused on three levels of subsampling — 100-, 200-, or 300-organism subsamples. The results of this test and subsequent recommendations have critical cost-benefit implications (i.e., the compromise between resource investment and data resolution). Another important question is whether the same subsampling level is appropriate among the different subcoregional aggregations and between the two index periods (winter and summer). The study design, therefore, included the processing of samples in each of the two primary subcoregional aggregations (panhandle subcoregions 65e, f, g, 75a and peninsula subcoregions 75b, c, d and in each of the index periods).

Two analytical approaches were taken to evaluate this subsampling comparison. First, power-cost efficiency (PCE) analyses were performed using data collected by DEP. PCE analysis incorporates data on cost of a sampling strategy (in this case, the laboratory sorting and identification effort in person-hours for each of the three subsampling schemes) and the number of samples required to detect differences in metric means at desired levels of confidence and power ( $\alpha$  and  $1-\beta$ , respectively) to calculate the most cost-effective sampling strategy. The second analytical approach (Graves and Strom 1994) evaluated the effects of subsample size on candidate metrics and the ability of the metrics calculated from a given subsample size to accurately characterize the complete population. A Monte Carlo analysis was performed to randomly select a subsample of species from a larger master species list. All of the candidate metrics as per the SIIF were calculated for these analyses.

■	The Power-Cost Efficiency (PCE) analysis results on these winter and summer data sets suggest that a 100-organism subsample is the most cost-effective level of subsampling that provides scientifically valid data for assessment. These results were substantiated for both the panhandle and peninsula regions of Florida for the majority of the metrics, and thus the aggregated index.
■	However, the power of resolution for richness metrics would be improved by increasing the subsampling effort. The differential in improvement (i.e., increase in number of taxa encountered) appears to be greatest from 100 to 200 organisms.
■	The PCE results indicate that the 100-organism subsample is optimal for discriminating impairment from reference condition; the 200-organism subsample improved the resolution of certain metrics. The benefits did not outweigh the costs of going from 100 to 200.
■	The current analysis suggests that increasing the subsampling to the 300-organism level would not increase the power of resolution in proportion to the cost investment. However, the consideration of a 200-organism subsample, while not fully warranted from a cost investment point of view, is partially supported by the increased resolution of the richness metrics, which are important to the overall integrity of the SIIF.
■	The subsampling procedure has undergone some modification to provide a more accurate attainment of the targeted organisms. Smaller grids are used to ensure smaller counts, and thus a closer approximation to the intended number of organisms and a more dispersed (through a random selection) sorting procedure is reached.



# Protocols for Conducting a Biological Reconnaissance in Florida Streams

Department of Environmental Protection  
Tallahassee, Florida

The use of biological assessment and monitoring has become an important tool for Florida DEP to accomplish its ecosystem management plan and to ascertain the quality of the state's surface waters. The development of the Stream Invertebrate Index for Florida (SIIF) was a major step forward in obtaining quantifiable biological data across the state to establish criteria for the judgment of condition and impairment.

The purpose of this document is to describe a Biological Reconnaissance (BioRecon) technique that will allow a broader coverage of stream assessments and provide a screening tool for problem identification. The BioRecon is not intended to replace the SIIF, but to provide a second level (less rigorous) to obtain supplemental biological data to enhance prioritization and decision-making by DEP in protecting and maintaining its surface water resources.

## 1. Introduction

Florida DEP has convened a technical workgroup to develop an approach to conduct a biological reconnaissance of an unlimited number of stream sites in response to suspected and known input sources of perturbation, or to management directives. This approach is not intended to replace the more rigorous Stream Invertebrate Index for Florida (SIIF) streams. The purpose of this Biological Reconnaissance (BioRecon) is to provide a rapid bioassessment technique to maximize the use of limited technical resources and minimize the costs of assessing the condition of streams. Investigations of the biological condition is important to the assessment of the overall quality of the aquatic resource from influence by both nonpoint and point sources.

An overview of the essential elements of both the SIIF and BioRecon are presented in Figure 1 and Table 1 for comparison. Both techniques correspond to different levels of the stream bioassessment program for Florida DEP. BioRecon can be used independently of the SIIF as a screening tool, or as a precursor to the SIIF to identify sites that may need more intensive evaluation.

This document is a draft protocol for review and comment by Florida DEP biologists and other designated technical associates. Comments will be compiled and evaluated for incorporation into this protocol. The refined protocol will be tested in a variety of field situations around the state before implementation.

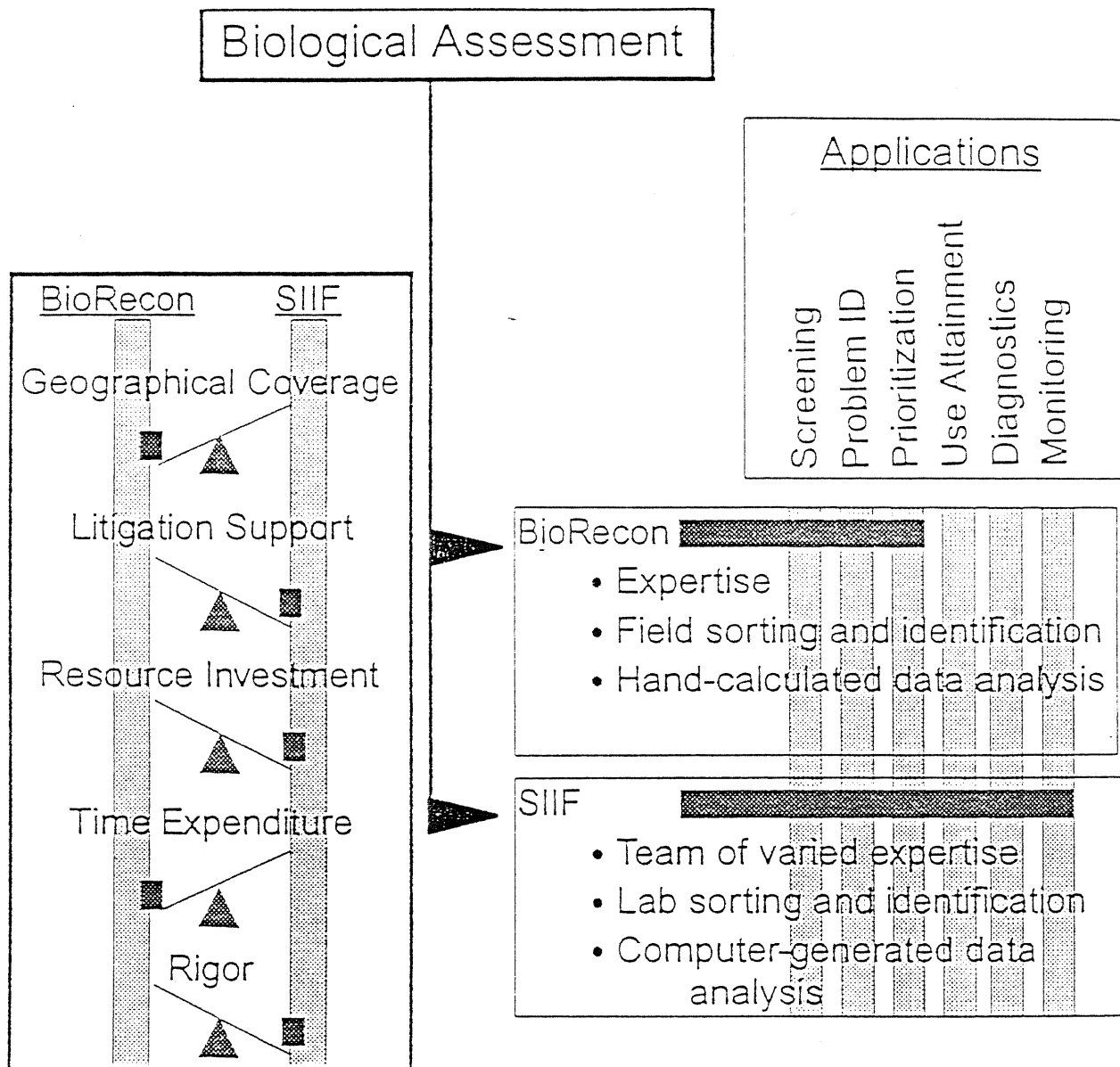


Figure 1. Schematic of the relative attributes and applications of the BioRecon and SIIF.

BioRecon Workgroup \*

Ellen McCarron  
 Doug Strom  
 Russ Frydenborg  
 Jim Hulbert  
 Donald Ray  
 Michael Barbour

\* Input from G. Butts,  
 P. Morgan, E. Pluchino

Table 1. Overview of the bioassessment programs for Florida DEP.

Biological Reconnaissance for Florida (BioRecon)

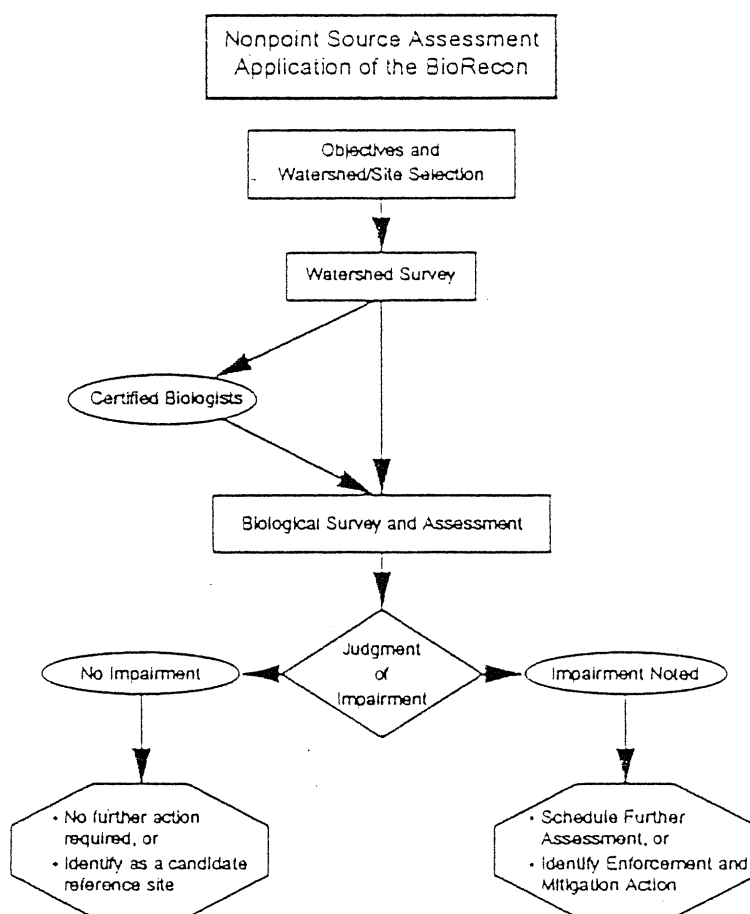
Habitat Selection	Only major productive habitats are sampled at each sampling location. Habitats include: riffles, snags, aquatic vegetation, leaf packs, undercut banks/root systems, leaf mat, rocky outcrops. Major habitats sampled equally.
Sample Gear	Standard D frame dip net (0.3 meter width 800 micron mesh).
Sampling Method	Sequential sampling depending on the attainment of metric threshold. A maximum of 10 jabs with a dip net taken, composite sample across habitats. Individual jabs are approximately 0.5 m making a total composite of 1.5 m <sup>2</sup> .
Subsampling and Enumeration	Sorting and Identification done in the field. A BX or 10X magnifier may be necessary in some streams because of the minute size of certain taxa. Verification of IDs done in lab, if necessary. Entire sample sorted randomly searching for unique taxa. Excessive or unusual abundances noted. Sorting and Identification process approximately 0.5 hours.
Taxonomic Level	Taxonomic level at family or genus.
QA Procedures	Only experienced biologists used for the BioRecon. A certification procedure used to identify qualified biologists. Field crew undergo periodic training.
Habitat Assessment	Field data sheet, 7 visually-estimated habitat parameters, weighted equally. Physicochemical characterization field data sheet (P-chem).
Comments	Stream classification factors for establishing reference conditions based on Ecoregion and subecoregion as in SIFF. Site selection factors: Broad coverage of stream sites for problem identification, specific monitoring issues, prioritization from NPS Assessment Reports. Results of BioRecon used to ascertain need for more study.

Stream Invertebrate Index for Florida (SIIF)

Habitat Selection	Presence or absence of major productive habitats at each sampling location is established during preliminary reconnaissance. Habitats include: riffles, snags, aquatic vegetation, leaf packs, undercut banks/root systems, leaf mat, rocky outcrops, muck/silt, sand. Major habitats are sampled equally; Group of minor habitats treated as a single major habitat for allocation of sampling effort.
Sample Gear	Standard D frame dip net (0.3 meter width 800 micron mesh), wide mouth jar, formalin.
Sampling Method	20 jab dip net sample, composite sample across habitats. Individual jabs are approximately 0.5 m making a total composite of 3 m <sup>2</sup> .
Subsampling and Enumeration	Sorting and Identification done in the lab. Entire sample in gilded pan (6 X 3 cm gilded), randomly select grids (1/72 of sample), remove contents, sort into taxonomic groups, continue until a minimum of 100 organisms are counted; a grid's entire contents must be sorted.
Taxonomic Level	Lowest taxonomic level (genus or species).
QA Procedures	Replicate sampling for 10% of samples collected on an annual basis have not been implemented but are planned. Resorting of 10% of samples. Field crew undergo periodic training.
Habitat Assessment	Field data sheet, 7 visually-estimated habitat parameters, weighted equally. Physical/Chemical characterization field data sheet (P-chem).
Comments	Stream classification factors for establishing reference conditions based on Ecoregion and subecoregion. Site selection factors: Availability of least impaired and reference sites, specific monitoring issues, accessibility and safety, compatibility of habitat. Standard operating procedures and report describing state-wide nonpoint source program prepared by Florida DEP and support contractors.

## 2. Summary

The BioRecon is a rapid biological assessment tool that is to be implemented for the purpose of providing a broad geographical coverage of stream assessments and to maximize the use of limited resources and expertise. Through the interactions of a special workgroup, the essence of the procedure has been developed. The three major components of the BioRecon are the Objectives and Watershed/Site Selection, the Watershed Survey, and the Biological Survey as depicted in the flowchart below. The attributes of the BioRecon are discussed in the following table.



## Biological Reconnaissance for Florida Streams

Attribute	Description		
Name	BioRecon		
Purpose	A rapid bioassessment technique to maximize resources and minimize costs		
Goals	<ol style="list-style-type: none"><li>1. Problem identification</li><li>2. Broad coverage of bioassessment within an index period</li><li>3. Provides for management to prioritize problem areas</li><li>4. Enhance 305b reporting and ecosystem management</li></ol>		
Technical Considerations	<ol style="list-style-type: none"><li>a. Keep it simple</li><li>b. Field sorting and identification (lab for verification)</li><li>c. Employ rapid identification technique</li><li>d. Employ only experienced biologists</li><li>e. Use limited number of metrics</li><li>f. Expedite product to management</li></ol>		
Organizational Structure	Three tiers: (1) Objectives and Watershed/Site Selection; (2) Watershed Survey for landuse characterization and habitat assessment; (3) Biological Survey and on-site assessment. (NOTE: (2) and (3) can be conducted simultaneously or at separate times.)		
Elements of Objectives and Watershed/Site Selection	<ol style="list-style-type: none"><li>a. Determine BioRecon's objectives<ul style="list-style-type: none"><li>• Meet with managers</li><li>• Discuss technical issues</li></ul></li><li>b. Determine watershed and site(s)<ul style="list-style-type: none"><li>• Review data sources</li><li>• Determine logistics</li><li>• Document objectives and selections</li></ul></li></ol>		
Elements of Watershed Survey	<ol style="list-style-type: none"><li>a. Visit site to screen conditions</li><li>b. Scannable form for NPS assessment</li><li>c. Physicochemical Data Characterization sheet (P-Chem)</li><li>d. Habitat assessment</li></ol>		
Elements of Biological Survey	<ol style="list-style-type: none"><li>a. Sequential sweeps in productive habitats (maximum of 10 sweeps)</li><li>b. Sweeps can be composited or analyzed sequentially</li><li>c. Sort for diversity of taxa</li><li>d. Should not take more than 0.5 hour total time sorting and ID</li><li>e. Look for unique taxa, estimate relative abundance (comment on unusual abundance)</li><li>f. Record on Preliminary Assessment Score Sheet (PASS)</li></ol>		
Candidate Metrics	Total taxa richness (genus) EPT richness (genus) Florida Index		
Judgment Criteria		<u>Panhandle</u>	<u>Peninsula</u>
	Total Taxa	20	12
	EPT	6	4
	FI	12	8
Impairment	Two of three metrics have to pass to be considered <u>unimpaired</u>		

### 3. Objectives and Watershed/Site Selection

A BioRecon is initiated with a planning phase called the Objectives and Watershed/Site Selection. This is the stage where specific objectives are established for the BioRecon, and the target watershed and actual site(s) are determined. In this phase, activities may be conducted entirely within the office setting.

Establishing objectives for a BioRecon must consider both technical and management perspectives, and requires close coordination between the managers and biologists. The information that will come from the BioRecon must immediately be transferred to the program manager or technical manager for further action. Otherwise, the BioRecon becomes ineffective. The following table is a hypothetical list of objectives for which a BioRecon could serve.

As can be seen from this limited list, objectives may easily readily address both management and technical

Objectives	Technical	Management
To close a data gap identified in the current 305(b) report	✓	
To investigate the effects of a target land use activity	✓	✓
To verify qualitative assessments of past nonpoint source problems	✓	
To survey a broad geographic area for indications of problems		✓
To investigate the effectiveness of management practices implemented in the past	✓	

perspectives. This maximizes the information from a BioRecon, thereby enhancing the cost-effectiveness and increasing the application of this sampling strategy.

Depending on the specific objective(s) that have been established for the BioRecon information and data may be available for a watershed and/or sites. If this is the case, then the Watershed Survey Phase may be implemented.

However, if the actual watershed and site(s) are not determined during the formulation of the BioRecon objectives, various maps and data resources should be consulted. The following is a

brief list of examples of resources which can be reviewed to prioritize sites, depending on the BioRecon's objective(s):

- Biannual Statewide Water Quality Assessment (i.e., 305(b) report)
- Statewide Nonpoint Source Assessment GIS maps and reports
- Land use GIS maps
- Topographic maps
- Special studies/reports
- FDOT county maps.

Logistics of the BioRecon at selected sites should be determined; i.e., site access and ease of field sampling and assessment protocols. Logistical constraints or inaccessibility may prevent sampling.

A brief report documenting the objectives and the selection of watershed(s) and site(s) from this phase should be produced. This report may constitute the opening sections of the final report for the BioRecon (see attached BioRecon Evaluation Form cover page).

Elements	Description
a. Establish objectives	Consider both technical and management perspectives when identifying objectives. Effectiveness of BioRecon is enhanced when technical and management collaboration is considered.
b. Review 1994 Assessment Reports to prioritize watersheds	A nonpoint source assessment report is available for most watersheds in Florida. Categories of landuse and chemical pollutants are given. An impairment rating is given based on the pollutant information. Watersheds can be prioritized from a review of these reports.
c. Determine site locations	A site or series of sites within the targeted watersheds should be identified to conduct a site visit and to verify the condition and habitat quality. Topographic maps and county maps should be reviewed to characterize landuse and access points. Florida's GIS Arc-Info database is available to confirm the latest characteristics.

## 4. The Watershed Survey

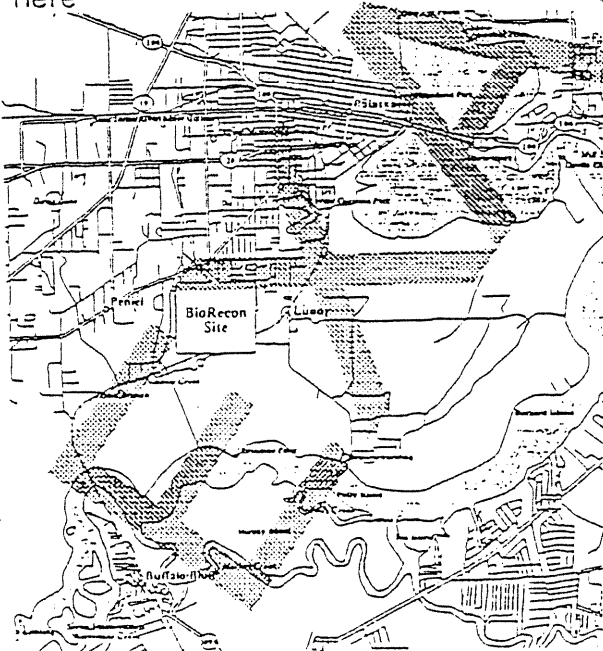
The Watershed Survey is the second phase in performing a BioRecon (or a SIIF), because the actual characteristics of the site(s) and the surrounding landuse can be compiled and reviewed. This approach provides (1) an initial evaluation of the conditions and suspected problems, (2) a screening of sites requiring further investigation, (3) further logistical planning of the extent and nature of resource investment, and (4) development of a monitoring and assessment plan for management. It is likely that the data composing the watershed survey are available for most stream sites from routine monitoring and other programs. A site visit may not be necessary to complete this watershed survey step.

Elements	Description
a. Visit site to screen conditions	A site visit is optional, but probably necessary at new sites or those not recently visited. The site visit will ground-truth the suspected conditions and site characteristics. Data on the physical and chemical conditions will be updated through a site visit.
b. Complete NPS form	*See attached form. this form is completed after review of relevant data and information, and after the site visit, if applicable. The information in this form will be used to update the NPS Assessment Report. The extent of the site and watershed to which this information pertains should be documented.
c. Complete physicochemical characterization data sheet (P-Chem)	*See attached form. The P-Chem form of the Biology Program is completed for those sites where information is lacking or not current. The most important data are the <i>in situ</i> measurements that can be taken during the site visit and used immediately to help characterize the site conditions. Water samples for chemical analyses may also be part of this step, but incorporation of resultant data will await lab analysis.
d. Conduct habitat assessment	*See attached form. A habitat assessment would be taken during the site visit. The habitat assessment is the current method also used in the SIIF, and is to ascertain alteration to the physical habitat structure critical to maintenance of a healthy biological condition.

# Biological Reconnaissance Evaluation Form

A format for the cover sheet with example.

Biological Reconnaissance Evaluation Form	
<p>District: Northeast Date: 9/15/95 Certified Biologist(s): Lee Banks, Mike Hollingsworth</p> <hr/> <p>Objective(s): To close data gaps existing in the 1994 305(b) report for the Lower St. Johns basin.</p> <hr/> <p>Hydrologic Unit: Lower St. Johns (USGS code 03080103)</p> <hr/> <p>Watershed GIS Identifier: #2836, Turkey Creek</p> <hr/> <p>Site Location: There will be a GIS map here</p>	<p>Evaluation</p> <hr/> <p>Watershed Survey:</p> <p><i>Land Use:</i> Urban and residential. <i>NPS Pollution: Categories</i>—Municipal stormwater, land development, highway construction, removal of riparian vegetation; <i>symptoms</i>—algal bloom, odor, no fishing; <i>pollutants</i>—nutrients, oil and grease, metals, habitat alteration. <i>Physical/Chemical:</i> Sediment and water odors of petroleum and sewage; water color of green; slightly turbid. <i>Habitat Assessment:</i> Marginal condition; riparian vegetation depleted.</p> <hr/> <p>Biological Survey: Suspected impairment; low EPT and Florida Index.</p> <hr/> <p>Comments/Recommendations: More intensive confirmatory investigation warranted. Restoration of riparian zone critical to reducing runoff from roads and private property.</p>

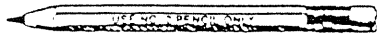




# FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

## NONPOINT SOURCE ASSESSMENT

### MARKING INSTRUCTIONS



- Do not use ink, or felt tip pens.
- Fill in the oval completely.
- Erase cleanly any marks you change.
- Make no stray marks on this form.
- Do not fold, tear, or mutilate this form.

RIGHT MARK:

WRONG MARKS:

Map Number		
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

Assessment No.		
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

This assessment confirms all of the provided data for the designated polygon(s)

☐ Yes

Impairment Rating
(Choose only one)
<input type="radio"/> Good
<input type="radio"/> Suspected
<input type="radio"/> Threatened
<input type="radio"/> Moderate
<input type="radio"/> Severe

Do Not Write in This Area		
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

### NONPOINT SOURCE CATEGORY(IES) (Choose all that apply)

#### Agriculture

- ☐ Non-irrigated crop production
- ☐ Irrigated crop production
- ☐ Specialty crop production
- ☐ Pastureland
- ☐ Rangeland
- ☐ Feed lots
- ☐ Aquaculture
- ☐ Animal holding area
- ☐ Manure Lagoons
- ☐ Unspecified other

#### Silviculture

- ☐ Harvesting, restoration and/or residue management
- ☐ Forest management
- ☐ Logging road construction or maintenance
- ☐ Unspecified other

#### Urban Stormwater

- ☐ Municipal
- ☐ Industrial
- ☐ Unspecified other

#### Other Miscellaneous

- ☐ Marinas
- ☐ Atmospheric deposition
- ☐ Waste storage/storage tank leaks
- ☐ Highway maintenance and runoff
- ☐ Utility installations
- ☐ Contaminated sediments
- ☐ Recreational activities
- ☐ Upstream impoundments
- ☐ Groundwater loading
- ☐ Groundwater withdrawal
- ☐ Unspecified other

#### Source Extraction

- ☐ Surface mining
- ☐ Subsurface mining
- ☐ Placer mining
- ☐ Dredge mining
- ☐ Petroleum activities
- ☐ Mill tailings
- ☐ Mine tailings
- ☐ Acid mine drainage
- ☐ Unspecified other

#### Land Disposal

- ☐ Sludge
- ☐ Wastewater
- ☐ Landfills
- ☐ Industrial land treatment
- ☐ Septic tanks
- ☐ Hazardous waste
- ☐ Septage disposal
- ☐ Unspecified other

#### Construction

- ☐ Highway/road/bridge construction
- ☐ Land development
- ☐ Unspecified other

#### Hydromodification/Habitat Alteration

- ☐ Channelization
- ☐ Dredging
- ☐ Dam construction
- ☐ Flow alteration
- ☐ Bridge construction
- ☐ Removal of riparian vegetation
- ☐ Streambank modification
- ☐ Dredging/filling in wetlands
- ☐ Unspecified other

### NONPOINT SOURCE POLLUTANT(S) and SYMPTOMS (Choose all that apply)

Nutrients
Bacteria
Sediments
Oil & Grease
Pesticides
Other Chemicals
Debris
Oxygen Depletion
Salinity
pH
Metals
Habitat Alteration
Flow Alteration
Thermal Pollution
Other Pollutants

POLLUTANTS

Fish kill
Algal Bloom
Weeds
Turbidity
Odor
Decline in Fishery
No Swimming
No Fishing
Other Symptoms

SYMPTOMS

### COMMENTS

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: _____	STORET STATION NUMBER _____	DATE (MO/Y): _____	TIME _____	RECEIVING BODY OF WATER _____
SUBMITTING AGENCY NAME: _____				

REMARKS: _____	LOCATION: _____	FIELD ID/NAME: _____
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**RIPARIAN ZONE/INSTREAM FEATURES**

Predominant Surrounding Land-Use (specify relative percent in each category):							
Forest/Natural <input type="text"/>	Silviculture <input type="text"/>	Field/Pasture <input type="text"/>	Agricultural <input type="text"/>	Residential <input type="text"/>	Commercial <input type="text"/>	Industrial <input type="text"/>	Other (Specify) <input type="text"/>
Local Watershed Erosion (check box):    None <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy <input type="checkbox"/>							
Local Watershed NPS Pollution (check box):    No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources <input type="checkbox"/>							
Width of riparian vegetation (m) on least buffered side: <input type="text"/>		List & map dominant vegetation on back		Typical Width (m)/Depth (m) /Velocity (m/sec) Transect: (draw cross-section & provide at least 3 velocity & depth values) →			
Artificially Channelized <input type="checkbox"/> no <input type="checkbox"/> recent, severe <input type="checkbox"/> some recovery <input type="checkbox"/> mostly recovered, more sinuous <input type="checkbox"/>							
Artificially Impounded <input type="checkbox"/> yes <input type="checkbox"/>							
High Water Mark (m above bed): <input type="text"/>							
Canopy Cover % :    Open : <input type="checkbox"/> Lightly Shaded (11-45%): <input type="checkbox"/> Moderately Shaded (46-80%): <input type="checkbox"/> Heavily Shaded: <input type="checkbox"/>							

**SEDIMENT/SUBSTRATE**

Sediment Odors:    Normal: <input type="checkbox"/> Sewage: <input type="checkbox"/> Petroleum: <input type="checkbox"/> Chemical: <input type="checkbox"/> Anaerobic: <input type="checkbox"/> Other: <input type="text"/>			
Sediment Oils:    Absent: <input type="checkbox"/> Slight: <input type="checkbox"/> Moderate: <input type="checkbox"/> Profuse: <input type="checkbox"/>			
Sediment Deposition: Sludge: <input type="checkbox"/> Sand smothering: <input type="checkbox"/> none slight <input type="checkbox"/> moderate severe <input type="checkbox"/> Silt smothering: <input type="checkbox"/> none slight <input type="checkbox"/> moderate severe <input type="checkbox"/> Other: <input type="text"/>			
Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	<input type="text"/>	<input type="text"/>	<input type="text"/>
Leaf Packs or Mats	<input type="text"/>	<input type="text"/>	<input type="text"/>
Aquatic Vegetation	<input type="text"/>	<input type="text"/>	<input type="text"/>
Rock or Shell Rubble	<input type="text"/>	<input type="text"/>	<input type="text"/>
Shorezone (Roots/Veg.)	<input type="text"/>	<input type="text"/>	<input type="text"/>
Substrate Types    % coverage    # times sampled    method			
Sand	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mud/Muck/Silt	<input type="text"/>	<input type="text"/>	<input type="text"/>
Other:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Other:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Draw aerial view sketch of habitats found in 100 m section			

WATER QUALITY	Depth (m): <input type="text"/>	Temp. (°C): <input type="text"/>	pH (SU): <input type="text"/>	D.O. (mg/l): <input type="text"/>	Cond. (µmho/cm) or Salinity (ppt): <input type="text"/>			Secchi (m): <input type="text"/>
Top	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mid-depth	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Bottom	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
System Type : Stream: <input type="checkbox"/> (1st - 2nd order    3rd - 4th order    5th - 6th order    7th order or greater )    Lake: <input type="checkbox"/> Wetland: <input type="checkbox"/> Estuary: <input type="checkbox"/> Other: <input type="text"/>								
Water Odors (check box):    Normal: <input type="checkbox"/> Sewage: <input type="checkbox"/> Petroleum: <input type="checkbox"/> Chemical: <input type="checkbox"/> Other: <input type="text"/>								
Water Surface Oils (check box):    None: <input type="checkbox"/> Sheen: <input type="checkbox"/> Globbs: <input type="checkbox"/> Slick: <input type="checkbox"/>								
Clarity (check box):    Clear: <input type="checkbox"/> Slightly turbid: <input type="checkbox"/> Turbid: <input type="checkbox"/> Opaque: <input type="checkbox"/>								
Color (check box):    Tannic: <input type="checkbox"/> Green (algae): <input type="checkbox"/> Clear: <input type="checkbox"/> Other: <input type="text"/>								
Weather Conditions/Notes: _____					Abundance:			
					Periphyton    Absent <input type="checkbox"/> Rare <input type="checkbox"/> Common <input type="checkbox"/> Abundant <input type="checkbox"/>			
					Fish <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
					Aquatic Macrophytes <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
					Iron/sulfur Bacteria <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			

SAMPLING TEAM: _____	SIGNATURE: _____	DATE: _____
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STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (v2)

SUBMITTING AGENCY CODE: _____	STORET STATION NUMBER: _____	DATE (MO/Y): _____	RECEIVING BODY OF WATER: _____
SUBMITTING AGENCY NAME: _____			

REMARKS: _____	LOCATION: _____	FIELD ID/NAME: _____
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Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover <div style="border: 1px solid black; width: 50px; height: 20px; margin: 5px auto;"></div>	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity <div style="border: 1px solid black; width: 50px; height: 20px; margin: 5px auto;"></div>	Max. observed: >0.25 m/sec. but < 2 m/sec 20 19 18 17 16	Max. observed; 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization <div style="border: 1px solid black; width: 50px; height: 20px; margin: 5px auto;"></div>	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition <div style="border: 1px solid black; width: 50px; height: 20px; margin: 5px auto;"></div>	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability <div style="border: 1px solid black; width: 50px; height: 20px; margin: 5px auto;"></div>	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width <div style="border: 1px solid black; width: 50px; height: 20px; margin: 5px auto;"></div>	Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality <div style="border: 1px solid black; width: 50px; height: 20px; margin: 5px auto;"></div>	Over 80% of streambank surfaces consist of native plants, including trees understory shrubs, or non-woody macrophytes. Plants growing naturally. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

☐ Add 5 points if cross-sectional area of flow is estimated to be > one square meter during periods of normal flow.

☐ TOTAL SCORE

Comments

ANALYSIS DATE: _____	ANALYST: _____	SIGNATURE: _____
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## 5. The Biological Survey

The time expenditure for conducting a BioRecon and analyzing the resultant data is substantially less than the more rigorous SIIF. The total assessment done with a BioRecon can be accomplished in the field, in most cases. Both the P-Chem and Habitat Assessment forms may need to be completed when the actual BioRecon is conducted, in addition to or in place of the Watershed Survey step. Because the assessment is done quickly without comprehensive vouchering and documentation, the BioRecon is conducted by certified biologists (see Chapter 6 for certification procedures).

Elements	Description
a. Identify major habitats for sampling	Using the same procedure as in the SIIF, identify and estimate the percent composition of the major habitats at the site. Only the major habitats will be sampled in the BioRecon.
b. Perform sequential sweeps in the productive habitats (maximum of 10 sweeps)	The sampling can proceed sequentially; i.e., periodic examination of a few sweeps can be done to record findings. The objective is to exceed the threshold for each metric (see below). Therefore, if exceedance is obtained prior to full sampling, no more effort is required. A maximum of 10 sweeps is composited for sorting and identification.
c. Composite sweeps and sort for diversity	The sweeps are composited as in the SIIF for sorting and identification. Diversity or variety is the key indicator emphasized with the BioRecon.
d. Look for unique taxa, and estimate relative abundance (comment on unusual abundance)	Relative abundance can be estimated (e.g., Rare [1-3], Common [4-10], Abundant [11-100], Dominant [ $>100$ ]). However, only unusual abundance, i.e., dominance or rarity is of prime interest. Search pattern is focused on recording a list of taxa encountered. No subsampling is required because absolute enumeration is not done.
e. Record results on Preliminary Assessment Score Sheet (PASS)	*See attached form. A PASS is completed, which serves as documentation of the results of the biological survey. Calculations of the pertinent metrics can be accomplished at the bottom of sheet and an assessment obtained.
f. Prepare a BioRecon Assessment Report	All forms completed as part of the Watershed Survey or Biological Survey should be attached as a single packet to support the findings and assessment using the BioRecon. A cover page that identifies the site, summarizes the characteristics, assesses the condition, and provides recommendations, is attached to the packet.

## 6. Decision Criteria - Metrics

A limited number of metrics is required to make the BioRecon an effective tool for screening. These metrics are based on richness of taxa and the Florida Index, which were determined to be among the strongest discriminators of the SIIF metrics. Three metrics are thought to be useful throughout Florida: Total taxa richness, EPT taxa richness, and Florida Index. The taxonomic level of identification is to genus, with a few monotypic species (see attached PASS) included. The thresholds for these three metrics are relatively conservative as an adjustment to the conservative level of taxonomy. However, the efficacy of these metrics and the respective thresholds will be tested through some specially designed pilot studies.

TORET Station #	Location
Station Nickname	Watershed Name
Date Collected	Collected & ID'ed By (print & sign)

Taxa	FI points	Abund. Code **	Taxa	FI points	Abund. Code **	Taxa	FI points	Abund. Code **
iptera			Trombidiformes			Ephemeroptera		
entaneura inconspicua	2					Stenonema sp.	2	
heqtanytarsus sp.	2					Stenacron sp.	1	
mulium sp.	2					Tricorythodes sp.	1	
orvnoneura sp.	2					Caenis sp.		
enochironomus sp.	2		Oligochaeta			Isonychia sp.		
						Callibaetis sp.		
						Baetis sp.		
			Pelecypoda			Baetisca sp.		
			Corbicula sp.			Centroptilum sp.		
			Elliptio sp.			Leptophlebia sp.		
			Pisidiidae			Hexagenia sp.		
astropoda						Neophemera sp.		
imia sp.	2					Heptagenia sp.		
hysella sp.								
ncvliidae								
vidarus sp.								
			Megaloptera					
			Corydalis cornutus	2				
			Sialis sp.			Plecoptera	2	
						Acroneuria sp.	2	
			Other (name groups)			Taeniopteryx sp.	2	
						Leuctra sp.	2	
donata						Neoperla sp.	2	
rgia sp.	2					Perlesta sp.	2	
alopteryx sp.	2					Paragnetina sp.	2	
etaerina sp.	2					Perlina sp.	2	
ovena sp.	2					Hydropsyche sp.	2	
acromia sp.	2					Isoperla sp.	2	
rogomphus sp.	2					Peltoperla sp.	2	
omphus sp.	1					Pteronarcys sp.	2	
eurocordulia sp.	1					Amphinemura sp.	2	
							2	
							2	
						Trichoptera		
						Oxyethira sp.	2	
						Chimarra sp.	2	
						Macrostema sp.	2	
						Polycentropus sp.	2	
leoptera						Hydropsyche sp.	2	
icrocvileopus sp.			Decapoda			Brachycentrus sp.	2	
eneimis sp.			Procambarus sp.			Hydroptila sp.	2	
ubiraphia sp.			Palaemonetes sp.	1		Nectopsyche sp.	1	
ncyronyx variagatus						Oecetis sp.	1	
			Amphipoda			Cheumatopsyche sp.	1	
			Gammaridae	1		Anisocentropus sp.		
						Lype diversa		
						Diplectrona sp.		
			Isopoda					
			Caecidotea (Asellus sp.)	1				
ColumnTotal: FI/Taxa			ColumnTotal: FI/Taxa			ColumnTotal: FI/Taxa		

Site Total Taxa Richness	Peninsula > 12 = unimpaired Panhandle > 20 = unimpaired	If 2 or more metrics are "unimpaired", site is	Healthy
Site Total Florida Index	Peninsula > 8 = unimpaired Panhandle > 12 = unimpaired	If less than 2 metrics are "unimpaired", site is	Suspected
Site Total EPT	Peninsula > 4 = unimpaired Panhandle > 6 = unimpaired		Impaired

	Panhandle	Peninsula
Total Taxa Richness	20	12
EPT Taxa Richness	6	4
Florida Index	12	8

The results are evaluated as "pass" or "fail" of each metric based on the thresholds. The passing of two metric thresholds is sufficient for the site to be considered as healthy. It is hoped that this technique will be useful in screening sites for further study or assessment. In a large proportion of cases the BioRecon will probably duplicate findings of the more rigorous SIIF. However, where there is contradiction, the results of the SIIF should be considered a better indicator of conditions. The healthy designation is probably more correctly an "inability to detect impairment", thus erring in favor of a non-impairment judgment.

Judgment	Description
Healthy	If 2 or 3 metrics are "unimpaired", the site is judged to be "healthy" unable to detect impairment.
Suspected Impairment	If all metrics are "impaired" or only 1 metric is "unimpaired", the site is suspected to be impaired.

Pilot studies will be designed to evaluate these methods and analysis technique in different parts of Florida. For instance, it is anticipated that the EPT taxa richness may not be useful for all parts of Florida. An alternative metric or analysis scheme may have to be considered. Also, the question of field identification may not be

feasible in areas where an abundance of midge larvae is the dominant fauna. Some modification that incorporates the use of laboratory sorting and/or identification may be necessary. However, the ultimate goal is to reduce both the sample backlog and the turn-around time for reporting results to management. Other considerations for testing will be discussed as part of the March meeting among the Florida DEP biologists.

It is expected that the BioRecon will be conducted during the same index period identified for the SIIF. The BioRecon is also planned for use in the nonpoint-source program. The methods for the point-source program will remain unchanged.

## 7. Certification of Biologists

The purpose of a certification program for the BioRecon is to ensure that the judgment of biological condition is done by an experienced biologist whose credentials are well-established within Florida DEP. Training and experience of biologists should be commensurate with the needs of the program. In this case, BioRecon focuses on the ability to field identify the benthic macroinvertebrates. However, specimen vouchering and verification is recommended as part of the Florida DEP procedures for standard biological practices. Therefore, quality control can be imposed to ensure the consistency and reliability of the investigator.

A Certification Board would be set up within Florida DEP to review and verify the credentials of the biologists. This Board would be headed by the Surface Water Ambient Monitoring Program Administrator, James Hulbert, and consist of two other biologists who may or may not be employed by DEP. The following requirements pertain to the certification of the biologists:

Requirements	Rationale
1. Employed by DEP	Because of potential litigation or contesting of findings, performance of BioRecon by biologists other than DEP (e.g., Water Management Districts, consultants) would not be advised. Designees of DEP for site-specific evaluations may be warranted.
2. B.Sc. degree in biology, ecology, or related field as a minimum	Authorizing staff to draw judgment on the condition of the biological community without having the minimum requirements might not be a good idea. Some combination of education and experience might be established: As an example, an M.Sc. or greater may be optimal. Alternatively, a B.Sc. and any combination of additional years of experience and graduate-level study in the proposed field of expertise totaling 2 years may be substituted for the M.Sc. degree.
3. Trained and experienced in Nonpoint-source assessments	Each biologist should be trained in the proper documentation for conducting nonpoint-source assessments, habitat assessments, and physicochemical measurements. Because these aspects are routine to the district biologist, the same criteria used to verify the certification in the general nonpoint-source program can be used here.
4. Expert knowledge in regional fauna	Regional fauna may vary somewhat, so taxonomic authorities may be certified by bioregion, or perhaps DEP district. If the listing of organisms on the PASS is relatively comprehensive, an organism reference collection could be established to test the ability of biologists to identify to genus level under conditions imposed by the BioRecon. An accuracy of 95% is expected to be achieved.
5. Experienced in reporting and assessment	Some experience in interpreting data and preparing reports should be considered. Verification of this experience may be merely to establish the track record of the biologist in preparing concise, timely, and accurate reports on their assessments.

Water Quality Management Program  
Water Protection Branch  
Environmental Protection Division  
Georgia Department of Natural Resources

Hello again! Well, we survived a mild winter (with no snow!) and find that it is again time to enter the field for another sampling season. Summer weather has arrived early this year, and a touch of cabin fever is being dispelled by busy preparation. The Water Quality Management Program (WQMP) has a number of major projects underway, and this should be a full and very busy summer.

Georgia is excited about this years SWPBA conference meeting being held in Chattahoochee. The location is close to home and everyone involved in the biological side of our studies hopes to have the chance to attend. See ya'll there.

### CHATTAHOOCHEE RIVER MODELING PROJECT 1995

This is the beginning of the third year of sampling for this project. 1995 field work will be similar to that done in 1994, with a few changes. Data from 1994 has been processed and entered into the projects mainframe. This years data will be used to verify the model being developed. This information will help to enhance the water quality management decisions in general and provide a centralized, user friendly storage/retrieval system for water quality data.

### BIOLOGICAL MONITORING

Georgia is moving along well with biological monitoring activities. Currently, Trish Foster is writing the SOP for macroinvertebrate biological monitoring; its about half way complete. Also, Trish and Bill Kennedy are in the field training members of the Water Quality Management Program on the methodology for collecting macroinvertebrates and habitat assessments. In February and March there were teams of 6-7 people visiting various streams throughout the state performing habitat assessments using Barbour and Stribling's improved visual based assessments for riffle/run and glide/pool prevalent streams. So far, 22 streams have been assessed and the results are looking quite good. At a given site, all participants' total scores are within 10 points from one another. There has been some complications with the interpretation of the category descriptions for 3 habitat parameters: Sediment Deposition, Channel Flow Status, and Bank Vegetative Protection. If anyone out there has any suggestions on how to clarify the descriptions, contact Trish. We are also in the process of modifying some of the category descriptions to suit Georgia streams.

The biological collection training has also been quite productive and has been an "eye-opening" experience for quite a number of folks in WQMP. Six training sessions have been conducted at various sites in the northern part of Georgia with 6-8 participants on each trip. At each site, the participants are divided into two teams. Each team has been responsible for collecting macroinvertebrates using the Georgia Bioassessment Protocol (an intensive, multi-



habitat collection). Trish hopes to get in the lab soon to work on the samples. Four more training trips were planned for March. Mid to late April, biological monitoring activities will begin for Georgia's River Basin Management Project on the Chattahoochee and Flint basins. The final number of biological sites has not yet been determined. The big emphasis this year for WQMP will be to solidify the biological monitoring methodologies for streams throughout the state, develop the SOP, and begin long-term reference site monitoring.

### **FISH TISSUE ASSESSMENT PROJECT**

Georgia has recently published a booklet entitled "Guidelines for Eating Fish from Georgia Waters". This booklet represents a new system of communicating fish consumption guidelines to the public. In the past, advisories were issued using FDA action limits. Now, Georgia is using a risk based system that is presented in terms of the number of meals which can be safely eaten per unit of time. This new system should provide the average angler with more easily understandable information about what fish can be eaten and in what quantities.

Three contaminants were detected in significant amounts in a few species of fish. These were PCBs, chlordane, and mercury. For further information on fish consumption in Georgia, contact the Georgia Department of Natural Resources, Environmental Protection Division, 205 Butler Street, S.E., Suite 1152, Atlanta, GA. 30334, (404) 656-4713.

### **ADOPT-A STREAM**

The Adopt-a-stream project started by Georgia in 1994 has grown by leaps and bounds. Adopt-A-Stream manuals are now available. The final version is split into two parts: Level I and Levels II and III. Level I describes the 11 steps necessary to complete a one year project, including how to find a stream to adopt, conducting a watershed walk, and registering with Georgia Adopt-A-Stream. The Levels II and III manual describes chemical and biological monitoring methods as well as tips for habitat enhancement projects.

Three new Adopt-A-Stream programs have recently been initiated. Cherokee and Rockdale Counties had programs start up in February of this year. The J. R. Tripp Middle School in Vidalia, Georgia has started an Adopt-A-Stream project on Swift Creek, with the corporate sponsorship of Operation Management International (OMI). This company handles all the water treatment facilities for Vidalia and has a treatment facility on Swift Creek.

For further information on Georgia's Adopt-A-Stream, contact Laurie Hawks at (404) 656-4988.

### **Georgia's Watershed Protection Approach: River Basin Management Planning**

The Georgia Environmental Protection Division (GA EPD) is currently planning and implementing its watershed protection approach of river basin management planning (RBMP). A watershed protection approach such as RBMP is an integrated and holistic approach to water resources management that focuses on activities affecting water resources within a watershed,

rather than specific programs, water bodies, or statewide approaches. RBMP is intended to be comprehensive and include the expertise from various state, federal, and local agencies in the development of river basin management plans. The plans will include investigations into many of the factors affecting water supply and water quality.

Another important component of RBMP is stakeholder involvement. A stakeholder is any individual, organization, municipality, or industry who has an interest in or is affected by water resources in the watershed. Stakeholder involvement is intended to encourage interest in water resource issues, and involvement in the implementation of water resource management strategies. At this time GAPED is developing its RBMP program design which will culminate in a framework document describing the many aspects of the program. In addition, RBMP activities are ongoing for the Chattahoochee, Flint, Coosa, and Oconee river basins.

### **NONPOINT SOURCE**

Georgia has just released an updated publication list for Nonpoint Source Pollution education. This includes a Library Document List with over 400 titles, a "Pointless Pollution in Georgia" brochure and "Protecting Community Streams: A Guidebook for Local Governments." There is also a video available on Nonpoint Pollution, as well as books on Agriculture Best Management Practices and guidelines for streambank restoration. Contact Susan Hendricks at 9404) 656-4988 for further information.

### **EPD-ISU DIVE TEAM**

The dive team didn't have an opportunity to get wet this past winter, but that's about to change. Installation of additional continuously recording water quality monitoring devices is scheduled for the Chattahoochee River Modeling Project (CRMP) for 1995. This addition of eight new units will also allow for the continuation of Sediment Oxygen Demand (SOD) testing on the river. Initial field testing and equipment checks will begin with a training dive/refreshers course on April 5th.

The dive team would like to welcome two new members, Lydia Buxbaum and Shannon Winness. Both have substantial experience and will begin SOD training this spring. Shannon is planning to attend the EPA's Hazard Waste and Polluted Water Diving Class this summer if space is available.

Newsletter Contact: Chip Cutcliff, GA EPD

## KENTUCKY NEWS

### Nonpoint Source Section

#### **New Employees:**

The Water Quality Branch has two new employees, both hired on contract through the University of Kentucky (paid for with 319 funds) to do grant administration work for the nonpoint source section. They are:

#### **Wendy Romain - Contract Manager**

Wendy has her MS in Public Administration from UK. She is nearing completion of work for a graduate certificate in Environmental System from UK. She's from Saginaw, Michigan, where she got her BS from Western Michigan University.

#### **Kathleen O'Leary - Contract Manager**

BS in Communications from Bellarmine College in Louisville. Rumor has it she's originally from out west somewhere.

#### **New Section:**

John Dovak was hired as supervisor of the newly formed 401 Certification Section (a spin-off of the Ecological Support Section). He has been working in the Commissioner's Office.

#### **Resignations:**

Steve Alexander resigned (again) in January, just before the new section was formed. His position is still vacant... his old office has been raided for all the good stuff already.

### Ecological Support Section

#### **Intensive Surveys:**

Skip and Lythia have been spending a lot of time at the airport (unfortunately, not catching flights to sunny shores). It seems that ethylene glycol, while necessary for deicing airplanes, is not too good for the stream that receives the runoff. While treatment options exist for this sort of problem, the solution is still up in the air as the enforcement game plays on.

Lythia is doing a study that may correlate nutrient concentrations with algal biomass in Chenoweth Run, a Jefferson county (Louisville area) stream. There's a package plant on the stream, the stream has the highest phosphorus concentrations in the county, and the filamentous algae (mostly Cladophora) was already plentiful in early March. This study will continue, with sampling conducted every three to four weeks, throughout the summer.

Results TBA at SWPBA. Anybody with any good data on effects of nutrients on algal biomass in streams please contact Lythia Metzmeier at (502) 364-3410.

#### **Reference Reach:**

Ron, Karen, and John have been "reconning" sites in Northern and Western Kentucky to supplement the existing reference reach sites. These are areas where, because of existing impacts, it has been difficult to locate "least impacted" streams. They are continuing to process data collected over the past three years. This data has been instrumental in developing scoring criteria for the IBI and other bioassessment indices we use for stream assessment. Spring sampling will begin around the middle of April.

#### **Standards & Specifications**

##### **District Office Meetings:**

Over the past several weeks, we have been holding joint meetings with our district offices, informing district personnel of our activities and getting valuable feedback. This past week, we held a meeting at Pennyryle State Park in western Kentucky. The redbuds are in full bloom there, with the dogwoods just opening. Tom VanArsdall spoke about the 305b report, while Giles addressed ambient monitoring.

##### **Triennial Review of Standards:**

Currently, we are in the midst of our triennial review. In late April, public meetings will be held, followed by a public hearing in late May. The regulations will then go through the promulgation process leading to adoption.

##### **Ambient Monitoring:**

Over the winter, we began using a weighted bottle sampler (WBS) for the collection of ambient samples in non-wadable streams. This sampler is also being used by the Illinois EPA. It improves our quality assurance in collection of samples by eliminating any possible carry-over between stations. We have also started using new rigid cylinder sampling bottles (Dave Chestnut of South Carolina put me on to these). We had been using cubitainers.

Some of you may have heard that the USGS has recommended no longer acidifying ambient nutrient samples. The USEPA has not suit however. A study of the effects of acidification of nutrient samples is being considered by the Methods Council of the former ITFM (now National Council). We have begun a limited study of our own by acidifying one of a pair of duplicate samples at an ambient network site known to be impacted by wastewater dischargers.

- 1) POTW average design flow = 2.2 mgd.  
Receiving stream 7Q10 = 0.0 mgd.
  - 7 states with acute limits
  - 24 states with chronic limits.
  - 11 states with both acute and chronic limits.
  - 9 states with no WET limits or monitoring only.
- 2) POTW average design flow = 2.2 mgd.  
Receiving stream 7Q10 = 8.1 mgd.
  - 6 states with acute limits
  - 21 states with chronic limits.
  - 15 states with both acute and chronic limits.
  - 3 states with no WET limits or monitoring only.
- 3) POTW average design flow = 2.2 mgd.  
Receiving stream 7Q10 = 3000 mgd.
  - 33 states with acute limits
  - 3 states with chronic limits.
  - 4 states with both acute and chronic limits.
  - 11 states with no WET limits or monitoring only.

If you would like a copy of the complete report, please give the Bioassay Section a call.

Hopefully, in May we will begin dissolved metal sampling after a hiatus of about 10 years. Currently we sample only for total recoverable metals. Protocol for sampling will follow (as closely as possible) that of USGS and the still in draft USEPA protocol. Giles hopes to split samples with the USGS to evaluate our procedures. Will keep you abreast of what happens.

Cliff has been concentrating on getting out a final report on our lake sampling. He plans to begin sampling lakes in mid-April.

### Bioassay Section

As some of you may be aware, in August, 1994, the Bioassay Section with the help of Marshall Hyatt from EPA Region IV conducted a national whole effluent toxicity (WET) survey. The intent of this survey was to gain some knowledge of the way EPA Regions and States were implementing their WET Programs.

The survey was designed as a series of questions regarding any WET requirements for a municipal facility meeting several basic permitting—situations/conditions such—as having a pretreatment program, discharging to a freshwater tier I stream, having no diffuser and finally having "reasonable potential" to exceed water quality standards.

The survey then identified three different scenarios involving a POTW with a design flow of 2.2 mgd namely receiving stream critical low-flows of 0.0 mgd, 8.1 mgd, and 3000 mgd.

Several generalizations can be made from this study:

- 27 states allow for some type of compliance schedule.
- 41 states consider each toxicity test failure a permit violation.
- 36 states use 7Q10 as receiving stream low flow.
- All states use Caridophnia and the fathead minnow as the freshwater test species.
- 25 states allow for testing of a most sensitive species.
- 39 states require multiple concentration tests.
- 38 states require additional tests after an initial failure.
- 34 states utilize the TRE as a permit required response to a toxic effluent.

When given a specific permitting situation for WET, the responses are summarized as follow:

## BIOLOGICAL AND TOXICITY BIO-SHAREWARE!

The Kentucky Water Quality Branch has developed two applications for collecting, tracking, and analyzing biological data. Both applications require the user to have dBASE IV (or higher) already installed on a DOS-based PC.

TOXTRAK is a tracking tool that supports the following features:

### Data entry:

- compliance biomonitoring test data (not raw data): test type, sample/test/report dates, endpoints (TUa/TUc, # Young, Average Weights, % Mortality), hardness (for determination of metal permit limits), comments, etc.
- facility information: type, capacity, treatment type, age, TRE status, permit limits, receiving stream name and size, basin, comments, testing lab, etc.
- TRE information: testing lab, review/report dates, comments on progress and activities, suspected toxicants, etc.
- All data entry has extensive error checking built-in, e.g. acute data can not be entered for a facility with a chronic limit; results for the same test may not be entered twice, etc.

### Printouts:

- can print any of the above in practically any order or subset. Facility compliance data printouts include some basic statistical summaries (% compliance, average/max/min TU's, etc.)

### Summaries:

- Quarterly report of reports and TREs reviewed
- Facility summary of number of facilities, number in TRE, all broken down by industries vs. municipalities
- Seasonal summary: compiles percentage compliance and average/max/min TUs by months of the year for review of season-related toxicity problems, for most any sub-set of data
- Percent compliance by test type, i.e. minnow/Ceriodaphnia vs. acute/chronic vs. municipal/industrial

ABIS (Aquatic Biological Information System) is a database, analysis, and reporting tool for fish, macroinvertebrate, and diatom data. Features include:

### Data entry:

- a master species pick-list makes entry easy and avoids typographical errors; fields include (if applicable) species name, family, order, functional feeding group, sensitivity indices, IBI variables, etc
- error checks avoid double entry of the same data
- a master station file keeps track of all sampling sites. ABIS automatically maintains and updates a summary inventory of all samples events at each location, so you know at a glance how much data you have for a particular site; fields include: two site IDs, county, location description, ecoregion, basin, physiographic region, map number, latitude/longitude, stream, mile point, basin size, stream order, etc.
- a sample event file keeps track of sampling method, persons

doing collections, comments, etc.

- collections data includes: species name, family, number of individuals collected/observed, (and comments), site ID, and data collected

#### Reporting:

- standard data reports are printed with site information and sample event headers described below; at the bottom of each printout are all standard metrics (TNT, TNI, IBI, tolerance indices, diversity, proportion of functional feeding groups, and more)
- all reports may be printed to paper or file; print files may be incorporated directly into most any word processing software, avoiding the need to retype data
- cross tabulations of data allow any combination of sample sets and synoptic species lists to be created for comparison of different sites and dates (up to 15 sample events with most laser/landscape printers; otherwise only 9)
- summary lists of sample events and sites for any combination of locational identifiers or species name
- synoptic species list for any locational criteria, e.g. a particular ecoregion for a three-year time frame for only the reference sites
- station information printouts for any subset of stations

#### Data handling:

- data may be exported to disk for any subset of data, in ABIS or ASCII format
- outside data sets from a consulting lab using same software may be printed and analyzed the same as in-house data -- this allows for consistent reporting format and statistical QA
- site information and tracking
- sample inventory

While no documentation is currently available -- soon, I hope -- use of both software packages are all menu-driven and easy to learn. Installation is easy; configuration of TOXTRAK is menu-driven; configuration of ABIS will require some over-the-phone coaching. If you are interested call 502-564-3410, for Lee Colten.



For the SWPBA Newsletter

COMMITTEE FOR THE  
NATIONAL INSTITUTE FOR THE ENVIRONMENT

Does anybody remember when this came up at the SWPBA meeting in beautiful, warm Sandestin? We were in a discussion on the lack of funding for training systematists and researching population distributions of various organisms. I naively chimed in about this NIE project a friend of mine was lobbying Congress to create. At the time, I had little-to-no information about the project. At the request of several SWPBA members, I got back in contact with my friend, David Blockstein, who is the Outreach Director and Senior Scientist for CNIE. He sent me lots of information, brochures, the proposal, executive summaries, recent newsletters, and more. This is relevant to us, folks! If you would like to get on the mailing list to receive this and more, contact David at:

David Blockstein  
CNIE  
730 11th st. NW  
Washington, DC 20001-4251

phone # 202-628-4303  
Fax # 202-628-4311  
email # [cnie@access.digex.net](mailto:cnie@access.digex.net)

Feel free to tell David where you got his name. I worked for him one summer in Upham, ND, studying Mourning Doves. Let me quote from the letter David sent to me to summarize what the NIE would be about: "The NIE would be a new federal science agency focused on the environment. It would provide the resources for science and engineering to understand the causes and consequences of environmental degradation, to propose solutions, and to communicate this knowledge to decisionmakers. It would not have the responsibilities for regulating or managing the environment - only to get the science right and to communicate in a credible way."

NIE mission: "To improve the scientific basis for making decisions on environmental issues."

Goals: "Increase scientific understanding of environmental issues by supporting credible, problem-focused research;  
Enhance decision making by comprehensive assessment of current environmental knowledge;  
Enlarge access to environmental information and better communicate scientific and technological results;  
Strengthen capacity to address environmental issues by sponsoring higher education and training."

"NIE would sponsor research organized around the broad themes of:  
environmental resources -- inventories, monitoring and characterization,

environmental systems -- mechanisms, process and effects, and  
environmental sustainability -- strategies, technologies and solutions."

"The NIE would: be non-regulatory, mission-oriented, organized around core research problems, relevant to solving and preventing environmental problems, involve a full range of scientific disciplines, involve a full range of society in its programs and governance, emphasize extramural research and training, and require competitive peer review of research."

"Information would be communicated through a state-of-the-art electronic information infrastructure (National Library for the Environment), which would provide single channel access for a broad array of users. The Library would be a distributed network, not a central repository."

If anybody wants more, I have some extra copies of things, but it would be easier to get from CNIE headquarters. Hope this information is useful to SWPBA. David said he felt like this new Congress may actually go for the idea because they have made industry and environmentalists mad, and that this Congress is looking for legitimate research and not emotional responses to every issue. This would be an opportunity to get sound environmental research going and communicated.

Okay, that's it from me, Susan Cohn, Kentucky Division Of Water, 14 Reilly Rd, Frankfort, KY 40601, 502/564-3410, ext. 493.

# The National Institute for the Environment

*"To Improve the Scientific Basis for Environmental Decision-Making"*

## WHY THE U.S. NEEDS THE NIE...

Current federal environmental research, fragmented among twenty agencies, fails to provide the credible, timely information needed to solve the critical environmental problems that threaten our nation's health and economic security. The National Institute for the Environment (NIE) will provide the environmental information needed to anticipate, prevent, and respond to our country's complex environmental problems.

### THE NIE WILL...

- Assess environmental knowledge and identify issues of critical importance where information is needed.
- Fund peer-reviewed, problem-focused research in the natural and social sciences, engineering, economics, and other fields as required.
- Communicate environmental information through a universal accessible electronic National Library for the Environment.
- Support education and training to raise public environmental literacy and prepare for the environmental challenges ahead.

## A NEW APPROACH...

NIE's inclusive Governing Board, balanced by the participation of business, environmentalists, scientists, state and local governments, and others, will set priorities for environmental research and ensure that it addresses the needs of all decision-makers.

The NIE will complement, rather than replace, existing programs to fill the voids in our environmental knowledge. An interagency advisory council will help NIE prevent duplication and coordinate with existing federal programs.

To control costs and bureaucracy, the NIE will not operate labs or research facilities. It will competitively award extramural research grants to academia, government laboratories, private companies, and others. To ensure the credibility of its research, the NIE will have no regulatory or management responsibilities.

## NIE'S DIVERSE SUPPORT...

► **Congress:** Senators Tom Daschle and eleven bipartisan colleagues support legislation to create the NIE. Legislation in the House has 83 bipartisan supporters, including Jim Saxton (R-NJ), Connie Morella (R-MD), and House Speaker Newt Gingrich (R-GA).

► **Former EPA Administrators** Reilly, Ruckelshaus, and Train endorsed the NIE, "Merely adapting the existing research programs will not solve the problems of the current fragmented system. Thus, we strongly support the proposed NIE."

► **Business:** "The CNIE's efforts to improve the effectiveness in developing and applying science to complex environmental issues are vital," Frank Popoff, Chairman & CEO, Dow Chemical Company.

► **The U.S. Chamber of Commerce, U.S. Conference of Mayors, National Council of Negro Women, Environmental Defense Fund, and more than 180 universities, scientific societies, businesses, and environmental groups** endorse the NIE.

The Committee for the NIE is a national non-profit group of more than 8,000 scientists, business leaders, environmentalists, and other concerned citizens.



For more information, contact:  
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COMMITTEE FOR THE  
NATIONAL INSTITUTE FOR THE ENVIRONMENT

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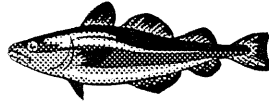
# Milestones The National Institute for the Environment



<b>Goal:</b>	<b>NIE established</b>
June 1994	Senators Tom Daschle, Barbara Mikulski, and nine bipartisan colleagues introduce NIE Bill (S.2242).
May 1994	CNIE President Richard Benedick testifies before House Science, Space and Technology Committee
May 1994	Three former EPA Administrators endorse NIE in a letter to President Clinton.
April 1994	NIE House Bill gains 70th cosponsor.
March 1994	Ambassador Richard Benedick, chief U.S. negotiator of the Montreal Protocol to protect the ozone layer, becomes president of CNIE.
August 1993	Representatives George Brown (D-CA) and Jim Saxton (R-NJ) introduce legislation to create the NIE (H.R. 2918).
June 1993	National Academy of Sciences' National Research Council report issued, citing NIE as a viable option.
May 1992	Committee for the NIE holds national conference and revises NIE proposal with input from representatives of the biological, physical, and social sciences, humanities, environmental groups, federal agencies, congressional staff, and business.
April 1991	National Academy of Sciences raises \$200,000 from National Science Foundation and the Department of Interior and Energy for study on federal environmental research.
October 1990	Congress appropriates \$400,000 for National Academy of Sciences (NAS) study of federal environmental research. EPA is sponsoring agency.
March, 1990	Committee for the NIE testifies before House Science, Space and Technology Environment Subcommittee and Senate Environment and Public Works Committee.
December, 1989	First meeting of the Committee for the NIE with 50 scientists, environmentalists, congressional and federal agency staff in Washington, D.C.

# MISSISSIPPI Happenings

Mike Beiser  
Mississippi Department of Environmental Quality  
Biological Services Section



## HOTLINE

A special after hours hotline for reporting fish kills occurring in state waters has been established by the Department. The new hotline number, (601) 961-5599, will make it possible for the public to easily report fish kills as they happen and will enable DEQ to respond more quickly. The earlier response will aid DEQ in successfully investigating the fish kill.

A biologist from the laboratory is on call each weekend to respond to messages left on the hotline number. Calls coming in during week nights will be checked each morning. When reporting fish kills, the caller is asked to give the exact location, and a telephone number where they can be reached. Other information will be useful in the investigation, such as the approximate number and kinds of fish affected, anything affected other than fish, and any unusual odors or color in the waters near the fish kill.

Conservation officers from the Department of Wildlife, Fisheries and Parks work closely with DEQ on fish kills. Many times the conservation officer is the first to find out about a fish kill, and is often the first to respond to reported kills. The conservation officer then determines if the fish kill should be investigated by the Department.

DEQ investigated 22 fish kills in 1994. These kills ranged from 10,000 shad at Woodward Creek near Macon in Noxubee County, to 12 gar at the Ross Barnett Reservoir. Some of the causes of the fish kills were runoff of pesticides, oxygen depletion, and fishermen disposing of their catch.

## NATURAL RESOURCES DAMAGE ASSESSMENTS

These assessments are similar to fish kill evaluations, but in these cases we know the source of pollution. Emergency Response personnel clean up the spills and we assess the total damage done to the aquatic systems with biological assessments, toxicity testing, and appropriate chemical sampling.

## ECOREGIONS

A tentative meeting has been scheduled with the Alabama folks during the second week in April. It is our joint sampling venture for QA/QC in our Ecoregion project. A report outlining the combined efforts of Mississippi and Alabama is in draft and hopefully will be available at the end of the year. The Mississippi Delta project is moving along. Soon we will be looking at sampling sites in the Alluvial Plains ecoregion. (Number 73 for those of you map watching.)

## CLEAN LAKES

We are almost finished writing on our next Clean Lakes report. It will cover nearly 30 lakes which is what we average a year. Besides covering basic limnological profiles and nutrients it will include fish tissue data. We are going to try to add Chlorophyll a measurements and possibly sediment samples for potential midge deformities in the next study. Midge identifications will be interesting. Lake Washington is in Phase II and almost 3/4 of the monitoring is complete. Toxicity testing has been conducted with sediment elutriate samples. Stay tuned for some preliminary results.

*That's all Folks !*

## NORTH CAROLINA

The Water Quality Section has completed 6 out of 17 river basin assessments and the Commission approved management plans for the Neuse, Lumber, Tar-Pamlico, and Catawba Basins. Assessment documents and management plans are in various stages of development for 6 other basins, and the Environmental Sciences Branch has work plans in place and is actively sampling in the Chowan-Pasquotank, Neuse, and Broad River basins now. Good progress is being made in our data base management, thanks to the efforts of Ken Eagleson, Norm Bedwell and others. Below is a brief update of activities since our last newsletter.

### Aquatic Survey and Toxicology Unit

Larry Ausley has been working on the steering committee of a proposed workshop on whole effluent toxicity issues being organized by SETAC and the SETAC Foundation for Environmental Education. This workshop will be one of 20 held in the "Pellston" series organized by SETAC and its predecessors over the last 15 years. Fellow SWPBAer, Bill Peltier is also serving on this organizing committee.

Toxicity Evaluation Group - Phil Bethea, Leader  
(Andy Blodgett, Susan Carroll, John Giorgino, Cheryl Price)

The aquatic toxicity testing business continues to be brisk for our group. While keeping our hands wet with NPDES permit monitoring, we also continue to support regional staff interested in acquiring aquatic toxicity information on specific compounds or classes of compounds. For the 1993-1994 federal fiscal year, we met our testing commitments made with the EPA (Table 1). For the 1994-1995 federal fiscal year, we set an aggressive testing pace to get as near our goals as possible before personnel shortages affect our programs (Table 2). The special projects that we have been assisting with have been the more interesting part of our responsibilities (Table 3).

Table 1. 1993-1994 Aquatic Toxicity Testing

<u>Test Type</u>	<u># Performed</u>
Acutes	78
Chronics	55
Quality Assurance	107
Splits/Performance Evaluations	32
Ambients	41
Special Studies	9

Table 2. October 1994 thru February 1995 Aquatic Toxicity Testing

<u>Test Type</u>	<u># Performed</u>
Acutes	49
Chronics	37
Quality Assurance	42
Splits/Performance Evaluations	4
Ambients	17
Special Studies	4

Table 3. TEG Special projects:

- Pilot study of stormwater runoff monitoring
- Investigation of stormwater engineered structure efficiencies
- General permits covering petroleum storage facilities

General permits covering a subset of water treatment facilities  
Comparisons of aquatic toxicity effluent test predictions with in-stream insect community  
survey findings

Data Assessment and Certification Group-Matt Matthews, Leader  
(Kevin Bowden, Lance Ferrell, Kristie Robeson, Melissa Rosebrock)

As we have reported previously, Melissa Rosebrock, Norman Bedwell and Larry Ausley have been working since December of 1991 on a special project examining the minimum significant difference (MSD) statistic and control organism reproduction coefficients of variation (CVs) in association with *Ceriodaphnia* chronic testing. Melissa and Norm presented the data in a poster session during last November's national SETAC meeting in Denver. The presentation received much positive comment.

The group recently completed rewrites of NC DEM's chronic toxicity testing procedures which are now in effect. The most significant revision constituted the test acceptability criterion regarding the proportion of control organisms which must produce a third brood. The new procedures require that 80% of the control organisms must produce their third brood for a test to be considered valid. All indications are that the laboratories have made a smooth transition to the new criterion.

Group members Kevin Bowden and Kristie Robeson continue to implement NC DEM's reporting and limit compliance tracking and enforcement strategies. Of the 544 facilities monitoring for whole effluent toxicity, 434 have limits. Since June 1994, facility compliance with whole effluent toxicity limits has averaged 92%.

Group members Matt Matthews and Lance Ferrell have completed 4 of an expected 20 biological laboratory inspections for this calendar year. Laboratory implementation of the new procedures adopted in December '94 will be an obvious point of emphasis during this year's inspections. There are currently four laboratories with pending certification applications.

Group Leader Matt Matthews attended the National Laboratory Accreditation Conference February 14-16. Attendees included state representatives, EPA staff, and members of the environmental laboratory community. The objective of the conference was to establish a National Environmental Laboratory Accreditation Program (NELAP). A conference constitution was adopted and subcommittees established to revise draft standards for the program. Major points of contention at the conference were the exclusion of private laboratory personnel as active voting members of the conference and EPA's decision to include GLP laboratory accreditation under the program's umbrella.

Intensive Survey Group-Jay Sauber, Leader  
(Howard Bryant, Jim Fisher, Parks Low, Debra Owen, Harold Quidley, Kurt Trumbower, Cathy Tyndall, Kara Warner, Ed Williams,

In the state of North Carolina, waters with quality higher than the standards can be evaluated based on biological and chemical studies and may be classified as High Quality Waters (HQW). According to North Carolina's regulations, HQW's can be protected from degradation through strict limits on point sources and through density controls on nonpoint sources. Streams have been traditionally evaluated for HQW status using chemical and macroinvertebrate community structure evaluations. However, the Environmental Sciences Branch is attempting to develop a methodology to identify lakes that have excellent water quality. The two main goals of this process are:

1. To develop a method to respond to petitions for reclassification of lakes as either High Quality Waters (HQW) or Outstanding Resource Waters (ORW) (reactive)
2. To determine which lakes in the state should be considered as having excellent water quality based on existing data (proactive).

The purpose of this work is to protect least impacted lakes which may be considered as having excellent water quality in different regions of North Carolina through appropriate classification and protection management plans. Emphasis will be placed on parameters associated with lake trophic status and biological integrity.

Intensive Survey also completed, among other things, 14 sediment oxygen demand studies last year with its dive team, time-of-travel studies on the Roanoke and Cape Fear Rivers, nutrient studies on the Deep River, approximately 60 long term BOD analyses, and numerous lakes evaluations. Intensive Survey has been active in inter-unit discussions and planning meetings on the Section's Basinwide Management initiatives including planning needed field evaluations and ambient station coordination.

### **Ecosystems Analysis Unit**

#### **Ecological Assessment Group- John Dorney, Leader**

The merging of the Wetland and Phytoplankton Groups has resulted in a new group with both permitting and monitoring responsibilities -- the Ecological Assessment Group. Accommodating the requirement for quick action with 401 Water Quality Certifications and political interventions, and the need to view monitoring data and needs in a longer time frame has been challenging. The higher profile permitting needs have taken priority during the fall and winter months since the merging of the two groups last fall. Training of phytoplankton staff in regulatory protocols initially shifted the focus of our efforts; however with the field season beginning, we are providing more attention to our monitoring needs. The Ecological Assessment Group will become a stronger and more knowledgeable group as a result of handling both permitting and monitoring activities.

The Group and everyone within the Environmental Sciences Branch and the Water Quality Section continue to provide our coworker, Ginny Coleman, with our love and support. Ginny was hit by a drunk diver last December. She has shown improvement and we hope for her quick return. Ginny is very bright and personable, and her absence from the water quality laboratory is noticed daily.

Although phytoplankton assessment activities have not been our primary focus during the past six months we are in an excellent position to begin the 1995 field season. Our backlog has been the smallest ever at this comparable point in time with 25 ambient samples, and samples from one special study in need of enumeration. Confounding our assessment efforts has been the absence of Ginny.

Wetland issues continue to be controversial and time consuming. Secretary Howes of the NC Department of Environment, Health and Natural Resources appointed a 23 member Wetlands Task Force to examine the existing wetland regulatory and management framework in NC and to make suggestions to the Secretary about the role of the state in wetland activities. The Task Force has met about six times and is now in the process of developing recommendations. The Task Force is structured to work by



consensus without voting, per se. Final revisions to and actions on the proposed wetland rules have been held up until the Task Force completes its work (end of March).

Work continues on several interesting, controversial wetland permitting activities including a regional Lowes distribution center in Statesville (4 acres of wetland/stream impact), a large regional mall in Raleigh (about 8 acres of wetland/stream impact), several dredging/marina projects in the coastal area, Texasgulf's plans to mine 5,000 acres of wetlands in the coastal plain, innumerable NC DOT road projects including an especially complex project for the Centennial Campus in Raleigh, and plans by the city of Wilson to flood about 1,300 acres of wetlands for an expansion of their existing water supply reservoir.

North Carolina has developed a wetland rating system that identifies and rates the functions and values of wetlands. The Fourth Version: Guidance for Rating Wetlands in North Carolina is available for distribution. Copies can be requested from Cherri Lee Smith at the NC DEM-Water Quality Lab, 4401 Reedy Creek Rd. Raleigh, NC 27607; (919) 733-1786. We have received considerable positive comments on this version from our field staff and other state and federal agencies.

We have received two grants from the Environmental Protection Agency to improve our understanding of wetland impacts and improve the permitting process. One grant will examine the impacts to water quality of fill in wetlands generally removed from surface waters such as pocosins and wet flats. The second grant will revise and improve greatly our database used to track 401 Certification applications. The improved database will allow regional offices to perform data analyses and send recommendations to the central office. The grant also supports an enforcement option should the applicant violate the permit conditions.

#### Biological Assessment Group- Trish MacPherson, Leader

##### **BENTHOS**

"Before Thomas Kuhn, most scientists followed the place-a-stone-in-the-bright-temple-of knowledge tradition, and would have told you that they hoped, above all, to lay many of the bricks, perhaps even set the keystone, of truth's temple - the additive or meliorist model of scientific progress. Now most scientists of vision hope to foment revolution.

We are therefore awash in revolutions, most self-proclaimed."

Steven Jay Gould, *An Urchin in the Storm*, 1987

##### Recent Activities

This section summarizes our activities since the last newsletter update, i.e., since August 1994:

##### **Basin Assessment**

Because of heavy rainfall, some of our summer collections had been postponed. Sample collections for some basins (Roanoke, Little Tennessee) continued through September.

Draft reports have been prepared for several of the areas sampled during the summer of 1994, including the Little Tennessee, Watauga, Roanoke, and Hiawassee basins. Several other groups are sampling in the Little Tennessee basin [TVA, USGS, VPI&SU (Fred Benfield), University of Georgia (Bruce Wallace)], and we hope to be able to make use of their information.

Planning has commenced for next year's basins: Neuse, Broad, Chowan, and Pasquotank. The Neuse River basin will be the first area in North Carolina to be re-

Boris Kondratieff - Completed a new list of Plecoptera for NC/SC, submitted to Brimleyana.

Mike Bolton - Chironomidae. Mike is working with several midge genera, most recently Stempellinella and Zavrelia; he continues to find new records for us.

Broughton Caldwell - Chironomidae. Broughton is updating the midge lists for the southeast US

Bob Waltz. Ephemeroptera: Baetidae. Bob is revising several baetid genera and has found several new taxa in NC samples, including a new Barbaetis, a new Acentrella, and a new Paracloeodes.

David Funk - Ephemeroptera: Eurylophella. See notes below.

#### *New or Interesting DEM Records*

1. **White Marsh Swamp.** Sampling at White Marsh swamp produced few EPT-type critters, although this might be expected in a system with no flow (under normal summer conditions), pH = 6, and DO = 2. However, some interesting species were found:

-Philobdella gracilis. First DEM record, a striped leech, well-illustrated by Don Klemm in the EPA leech keys.

-Neoperla striata (Pleidae: Pygmy backswimmers). Apparently very few records for this family, with the species ID provided through distribution records (no keys). -Epiaeshna (heros?). Collected only in a few of Neil's swamp samples. Since it does not key very well, it was left at the genus level.

-Phagocata (?) sp. A large white flatworm with a "rippled" appearance and unusual head shape. Keyed tentatively to genus based on head shape.

-Polypedilum tritum. In the P. illinoense group, but with a longer and thinner antenna. This was one of the dominant invertebrates in White Marsh Swamp.

Genus nr Nimbocera. Second antennal segment annulated, only one prior DEM record.

-Omisus pica. Three prior DEM records (swamps)

-Zavreliella varipennis. Five prior DEM records

2. **Eastman Creek.** Sampling of a slightly saline coastal plain stream (Eastman Cr, Carteret Co., 6/94) produced several interesting midges:

-Apedilum elaschistus (2nd NC record)

-Parachironomus sublettei (?) (1st NC record)

-Goeldichironomus devineyae (1st record north of Georgia).

#### 3. **Other Records**

-Paratendipes connectens group. Roanoke River, Bertie County, 9/94. Neil Medlin.

-Tanyptus concavus? Cashie R, Bertie County, 9/94. Identical with Roback's description of T. poss. concavus: ligula vary long and narrow, paraglossae 8-10 branched.

-Neozavrelia sp. Huffines Mill Cr, Rockingham Co., 1981, ID by Mike Bolton. First Southeastern record. Possibly confused by our taxonomists with Rheotanytarsus or Paratanytarsus.

-Oecetis sp. A. This species (in the inconspicua group) was not shown by Mike Floyd as occurring north of South Carolina, but we have numerous records throughout North Carolina.

-Triaenodes ochraceus. Merricks Cr, Pender Co., 5/93. A rare species in North Carolina, ID by James Glover.

-Orconectes virginianensis. Roanoke R, NC 45, Bertie Co., 9/94. Within the Roanoke basin, this is the third known specimen and second locality. ID by Dr. John Cooper.

4. **Ephemerella**. Manny Pescador is helping us with this difficult genus, and his work suggests that several new species may be present in North Carolina. He also added E. floripara (described by McCafferty in 1985) to the NC species list.

*Eurylophella of North Carolina, with notes on most southeastern species  
From Funk (1994), Funk (letter 2/95), and a review of NC specimens.*

Funk, David. 1994. The larvae of Eastern North American Eurylophella Tiensuu (Ephemeroptera: Ephemerellidae. Trans. Amer. Ent. Soc. 120: 209-286.

The new key to Eurylophella is well-written and well-illustrated. However, you may have to do trial identifications of specimens from several (many?) sites before you become comfortable with the key. Approximately 10 species may occur in the southeast, although I have found only seven in North Carolina. The number of species declines further south with five species in South Carolina, three species in Georgia, and only one species in Florida. For each species listed below, I have given the known distribution in the southeast. Useful sorting characters include:

- Dorsal tubercles. These should be viewed from both the top and the side; note size and shape of the tubercles, especially the relative spacing on segments 2-7. At the rough sorting stage, however, Funk suggests not paying too much attention to the size and shape of the tubercles, as there can be much variation between different size nymphs or nymphs from different streams.

- Posterolateral projections, esp. on segments 2-3 and 9.

- Presence of a few distinct bands (1-3) at the base of the tail (not used in key, but a useful sorting character).

- Size of the occipital tubercles on head. Males will differ from females, but both are illustrated.

- Structure of gill 4. Lift up dorsal operculum to find the gray, paired gills. Funk suggests holding a specimen in side view with one pair of forceps, gripping it dorsoventrally near the base of gill 4. Using another pair of forceps, gently pry up the operculum to obtain a side view of the gill. Note the number of dorsal and ventral subdivisions.

Dorsal color pattern seems to be of little use, due to extreme variability. Mature nymphs may have some quite distinct patterns that are not present on smaller nymphs. The degree of dorsal striping, amount of red color, and the amount of "speckling" are all highly variable.

Funk states that up to seven Eurylophella species may coexist in the same stream. However, I did not find more than 3 species in any of our samples and a review of site-specific data in Funk (1994) suggests a maximum of 4 species per stream in North Carolina.

The species groups may be separated based solely on the dorsal tubercles (from Dave Funk, letter 2/95):

- Tubercles narrower on segment 7 than on segment 2, tubercles appear to converge from 2-7: temporalis gr - 2 SE species
- Tubercles about the same distance apart on segments 2 and 7, rows from 2-7 subparallel: lutulenta gr - 2 SE species
- Tubercles on 7 distinctly wider than on 2, rows appear evenly divergent: bicolor gr - 3-4 SE species
- Tubercles on 7 distinctly wider than on 2 and rows diverge 2-4, then converge from 5-7: funeralis

A. Temporalis group. This group contains 4 species, but only one appears to be common in the southeast. The group is recognizable by having distinct dorsal subdivisions in gill 4, and tubercles that appear to converge between segments 2 and 7. Most of our prior identifications of Eurylophella have used the name "Eurylophella temporalis", but these specimens seem to be largely E. verisimilis or E. aestiva. Most

(all?) temporalis group specimens have distinct color bands at the base of the tail. For mature specimens, note the band of spines on the dorsum of segment 8, extending onto the lateral projections. Temporalis group species are more tolerant of slow-water habitats, including swamps and beaver ponds. In the southeast, E. doris can be separated from E. prudentialis by smaller posterolateral projections on segments 2 and 3 for E. prudentialis (Dave Funk, letter 2/95). Funk also states that most stream reaches in the southeast (especially coastal plain?) contain either doris or prudentialis, but not both.

Eurylophella doris. We found this species at both piedmont and coastal plain sites (especially the latter) April-July. Most coastal plain records may be E. doris. VA, NC, SC, GA, FL

Eurylophella prudentialis. This species has been recorded within the southeast in both South Carolina and Virginia, but had not been recorded in North Carolina. Funk states that it is "quite patchy in distribution". It typically should occur in quiet reaches of streams and rivers, especially where there is beaver activity. NC specimens were found by examining "Coastal B" (non-flowing) stream sites, although our specimens have characteristics of both E. doris and E. prudentialis. This species is separated from E. doris by its small occipital tubercles, smaller size, and thinner dorsal tubercles. VA, NC, SC

Eurylophella temporalis. Unlikely throughout most of the southeast, but with a single KY record.

B. Funeralis "group" = Eurylophella funeralis. This distinctive species may be the only Eurylophella that has been correctly identified in our data set. The long lateral projections on segment 9 (with the tips incurved) identify this species, although a variety of other characters are also distinctive. There are usually 1-3 dark bands at the base of the tail (as in the temporalis group), and large dorsal tubercles are present on segment 9. In North Carolina, we have found this species mainly in small mountain streams (mean width = 7 meters). Funk states, however, that it occurs in the piedmont (as far south as Virginia) in woodland spring seeps and wooded 1st order streams. VA, NC, SC, GA, TN

C. Lutulenta group. Here's where it's getting harder. Separation of the lutulenta group from the bicolor group is based on subtle characters of the gill, the shape of posterolateral projections on segment 9, and the degree of separation of tubercles on segments 1-2.

Eurylophella enoensis. Records of E. lutulenta in the southeast are probably E. enoensis. Some enoensis will have the "speckled" pattern formerly ascribed to lutulenta. Our records suggest that this species is *confined to the slate belt subecoregion* (within the piedmont region). NC, SC, TN, KY

Eurylophella aestiva. North Carolina is presently the southern limit for this species, with records in all ecoregions. The key will tend to push you toward this species for samples taken in June and July, because E. aestiva is known to be a late emerger. Many of our "verisimilis" ID's were shown to be (or included with) E. aestiva when checked by David Funk. VA, NC, TN, KY

Dave Funk states that this species should be easy to spot based on: subparallel rows of tubercles on 2-7, long posterolateral projections on 9, well developed occipital tubercles, and **short stout legs**. The last character is especially useful in separating aestiva from verisimilis. Furthermore, small aestiva (1/3-3/4 grown) have a distinctive dorsal color pattern of longitudinal stripes and dots. This pattern is very useful when comparing spring collections of Eurylophella, when you might expect aestiva to be smaller than other species.

D. Bicolor group.

Eurylophella verisimilis. This one of the most common Eurylophella in the piedmont and mountain areas of North Carolina. It is the only species in the bicolor group with well-developed occipital tubercles. On many specimens, the dorsal tubercles on segments 5-7 (between gills) are dark-colored. VA, NC, SC, GA

Eurylophella bicolor. Many of our old E. bicolor records may be immatures of other species, based only on the size of posterolateral projections of segments 2 and 3. Funk gives some other good characters, especially a change in the separation of the dorsal tubercles between segments 4 and 5. VA, NC, KY

Eurylophella minimella. A small, late-season, species. Rare and limited to the mountains. TN, NC (new state record)

Eurylophella macdunnoughi. In North Carolina, this species may eventually be recorded from streams in the New River basin. VA, TN

"Most children have a bug period, and I never outgrew mine."

Edward Wilson, 1994: Naturalist

## FISH

National Forum on Mercury in Fish: From September 27-29, 1994 the EPA sponsored a forum on mercury contamination in fish. The meeting was part of EPA's ongoing effort to provide technical assistance to state agencies concerned with mercury contamination in aquatic systems. Topics included mercury cycling, global and regional aspects of mercury contamination, wildlife and human studies, risk assessment, control strategies, and risk management. The Forum was targeted to regulatory personnel who must respond to concerns about possible human health effects resulting from mercury in fish tissues.

Coastal Plain Mercury Assessments: During studies conducted in 1992 and 1993 DEM personnel collected 668 fish tissue samples from 32 stations throughout the Lumber Basin from Richmond to Brunswick County. As a result, mercury levels exceeding FDA criteria were identified in several species of fish throughout the region. Mercury concentrations were highest in largemouth bass and bowfin. Of the 32 stations sampled, 15 contained largemouth bass and 8 contained bowfin with mean mercury levels in edible tissue equal to or exceeding the FDA limit of 1.0 ppm.. Having reviewed this data, the State Health Director recently issued a limited consumption advisory for largemouth bass and bowfin throughout the entire Lumber Basin. This advisory encompassed waters within Moore County and the Waccamaw drainage already under limited consumption advisories for similar mercury contamination. The observed mercury levels in the Lumber Basin prompted DEM staff to continue fish tissue assessments in major drainages along the Coastal Plain in an effort to further identify the level and extent of mercury in fish throughout the region.

From spring until late summer 1994 the DEM staff collected 580 fish tissue samples at 25 stations located from the Pee Dee River to Currituck Sound. Sampling stations were located within 7 major drainage basins along the Coastal Plain excluding the previously sampled Lumber Basin. Sampling was conducted in the lower, mainstem part of the drainages as a means to assess the effects from whole watersheds. Several of the stations also included waters within the Coastal Plain region where conditions were deemed favorable for mercury bioaccumulation (i.e.: low pH, low productivity, black water systems).

The 1994 survey demonstrated that mean mercury levels in bowfin collected at sites throughout the coastal plain exceeded the FDA limit at 10 of 25 sites. Mean concentrations in largemouth bass were generally higher than other species but exceeded 1.0 ppm only at the Phelps Lake station. As in previous surveys, results from this study do not indicate a clear boundary nor a point source for levels exceeding the FDA

limit. Mercury levels in bowfin and largemouth bass were comparable at stations from different drainage systems where conditions are favorable for bioaccumulation. The DEM staff plans to conduct further sampling of eastern North Carolina river drainages as part of the Water Quality Section Basinwide Management Program. Fish tissue samples will be collected in conjunction with physical, chemical, and biological assessments conducted by the DEM in major river basins on a revolving basis every 5 years. Basin assessments planned for 1995 include the Chowan/Pasquotank, Neuse and Broad catchments.

The DEM has recently purchased a small, 14 foot jon boat for electrofishing smaller nonwadable streams. The 14 foot boat will be outfitted with a gas-powered electrofishing unit and allow the DEM to collect fish from nonwadable streams that will not accommodate 18 foot electrofishing unit currently in use..

Fish Community Structure (NCIBI) work continues in the basinwide efforts. Ken is working to incorporate this information into the 4D data base. An effort is ongoing to evaluate the attributes and limitations of fish, habitat, and benthos information in evaluations.

Vince Schneider will be attending a IBI workshop in Columbia South Carolina on April 24. The draft agenda is attached for those interested. For more information call Jim Bulak with SCDNR at 803-353-8232.

## SOUTH CAROLINA

### Macroinvertebrates

We are pleased to announce that Dr. James B. Glover has joined our Section and will be working in the macroinvertebrate area. In 1988, Jim received his Master of Science in Biology from Marshall University, Huntington, West Virginia, and in 1993 he completed his Doctorate at the University of Louisville, Louisville, Kentucky. His dissertation was titled "The Taxonomy and Biology of the Larvae of the North American Caddisflies in the Genera *Triaenodes* and *Ylodes* (Trichoptera: Leptoceridae).

When Jim began work on his dissertation, there were 23 described North American species of *Triaenodes* and 4 species of *Ylodes*; however, only 6 and 1 were known as larvae, respectively. By completion of his dissertation, Jim had provided larval descriptions, illustrations, and a key for all but 4 of the North American species of *Triaenodes*. In addition, four new species of *Ylodes* were described and 2 associated with the adults. Pupal descriptions and illustrations were provided for 13 species.

The Ohio Biological Survey will be publishing Jim's keys to *Triaenodes* and *Ylodes* which will be available by the end of the summer. For information, write Dr. Brian Armitage, Ohio Biological Survey, 1315 Kinnear Road, Columbus, OH 43212-1192. In the meantime, however, Jim will be happy to look at any *Triaenodes* or *Ylodes* you may be having problems with.

Several new macroinvertebrate state records, all caddis larvae belonging to the family Leptoceridae, were found this past year in South Carolina. *Oecetis porteri* Ross which had only been reported from Florida, Alabama, and North Carolina, was discovered in a small pond in Lexington Co. and Robinson Lake in Chesterfield Co. Two species belonging to the *Oecetis inconspicua* Complex represents a more significant range extension. Dr. Michael A. Floyd's\* *Oecetis*. sp. C and *O.* sp. F were recovered from a pond in Lexington Co. and Bee Lake in Chesterfield Co., respectively. *Oecetis*. sp. C had only been reported from a small, sandy bottom, man-made pond in Florida while *O.* sp. F had been reported only from Lake Tohopekaliga in southern Florida. Two *Nectopsyche* species new to science were also discovered this past year. One, which appears to be a close relative to *N. pavidula* (Hagen), was collected from several streams in the southern part of the state while another was collected several years ago in North Carolina. Jim and Mike will be describing these two new species in addition to the larval stage of a species from southern Alabama.

\* Dissertation, Clemson University: "Larvae of the Caddisfly Genus *Oecetis* (Trichoptera: Leptoceridae) in North America"

## Lakes

One year of water quality sampling has been completed for the Broadway Lake Clean Lakes Phase III post-implementation monitoring project. BMP evaluation and additional biological sampling in the watershed will be conducted in spring and summer 1995. Phase III study objectives include determining the longevity and effectiveness of watershed management practices in reducing the sediment load to the lake, and of dredging in deepening the lake to improve overall quality and recreational use. One immediately obvious improvement is the absence of the nuisance aquatic plant densities that interfered with all recreational uses prior to dredging. We'll also be comparing pre- and post-implementation sediment loading, stream macroinvertebrate communities, turbidity, and lake transparency, chlorophyll *a*, and depth. The final report will be completed by January 1996.

Data analysis for the Clean Lakes Phase I study of Lake Wateree continues. Currently, we are using GIS to aid in identifying sediment and nutrient sources in the watershed. Lake Wateree is also the site of the state's latest invasion of hydrilla. While the only confirmed infestation was confined to four acres in a single cove, the lake homeowners' association is taking no chances, and has initiated an aggressive education campaign to limit the spread of the weed.

Speaking of weeds, the final report for the Clean Lakes Phase I study of Goose Creek Reservoir has been completed. Goose Creek Reservoir apparently provides ideal habitat for exotic plants: hydrilla and water hyacinth thrive there during the summer, and curlyleaf pondweed takes over (literally) all winter long. Final report recommendations include organic sediment removal, grass carp stocking, harvesting, and lake user education, in addition to the herbicide that has been applied in ever-increasing amounts annually, but has failed to permanently reduce densities.

This summer, we plan to assist with Region IV's Regional Environmental Monitoring and Assessment Program (R-EMAP) on Savannah River basin lakes, and to continue the statewide Lake Water Quality Assessment, this year in the Broad River basin.

## Phycology

The Phycology Department has been quite busy with sundry and diverse projects. Phytoplankton samples collected May - October for the Lake Wateree Clean Lakes Phase I study are currently being analyzed. A phytoplankton and chlorophyll *a* assessment will also be conducted for the Broadway Lake Clean Lakes Phase III monitoring project. In addition, planning is underway to



identify areas where phytoplankton/chlorophyll *a* data should be collected for Spring and Summer 1995. Consideration is being given to expanding the monitoring network for phytoplankton and chlorophyll *a*, particularly into those areas where eutrophication is an on-going issue.

## **Meetings**

Kathy Stecker, Mike Pearson, and Jake Bickley attended the North American Lake Management Society International Symposium in Orlando, Florida October 31 - November 5, 1994. As anticipated, much useful information was garnered on current efforts in lake management. Both continuing and new contacts were made with our colleagues representing various backgrounds concerned with this important work.