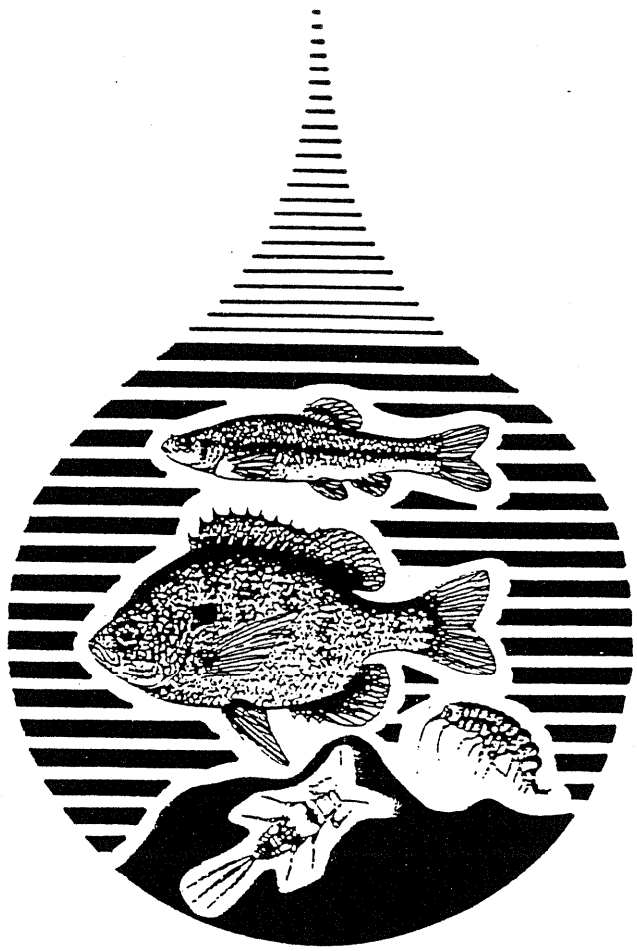
Southeastern Water Pollution Biologists Association Newsletter



October 1991

HIGHLIGHTS

Highlights of this newsletter include: information about the 1991 Annual SWPBA meeting to be held in Hilton Head, SC; a paper concerning stream habitat assessment in Region V states (Fisheries. Vol 16 (3), May - June 1991) (I thought this paper might be of interest as habitat assessment is a component of routine stream ecological assessments.); and a listing of freshwater invertebrates of the Gulf Coast States which are candidates for Federal Protection (The listing was taken from the Florida Benthological Newsletter, Vol. 5 (2), August 1991.)

As some of you might be aware, the zebra mussel has been reported from Kentucky Lake (Tennessee River). A newspaper clipping is included in the Kentucky state report announcing this discovery. Skip Call will be discussing the current status of the zebra mussel at the SWPBA meeting.

Due to financial constraints, only one newsletter is being sent to each state. If more than one newsletter is desired, it is being left up to the states to provide additional copies. Sorry.

I have enjoyed the opportunity to serve as the SWPBA Newsletter editor. Thanks to all who contributed to the newsletter. I hope the newsletter has been informative and useful.

PLEASE CIRCULATE YOUR NEWSLETTER. THANKS!

The Southeastern Water Pollution Biologists Association (SWPBA) Newsletter is a publication for those interested in aquatic biological monitoring in U.S. Environmental Protection Agency IV.

SWPBA 1990-1991 President: Lythia Metzmeier, Kentucky Division of Water, 18 Reilly Road, Frankfort, KY 40601.

SWPBA 1990-1991 Secretary: Vickie Bauer, Alabama Department of Environmental Management, Field Operations Division, 1751 Congressman W.L. Dickenson Drive, Montgomery, AL 36130.

SWPBA Newsletter Editor: Giles Miller, Kentucky Division of Water. Same address as President.

Dear SWPBA Members,

Following this note is an agenda for the upcoming SWPBA meeting. Hopefully, everyone who plans on presenting is on the agenda, and everyone who's on the agenda plans on presenting. Please check--if there's a problem, call me ASAP.

IMPORTANT NOTE TO PRESENTERS

Unless you requested otherwise, you will have 15 minutes for your presentation. PLEASE plan to stay within that 15 minute time period so we can stay on schedule.

Posters

We are working on getting a room to set up for posters, displays, and equipment demonstrations. Please bring your own thumbtacks (or whatever you need to set up your poster).

Session moderators

I need two people to moderate sessions: "Monitoring and Assessment" and "Toxicity Testing." Call me if you wish to volunteer.

If you have any questions about the meeting, feel free to call me. Looking forward to seeing y'all at Hilton Head.

Sincerely,

Lythia Metzmeier
(502) 564-3410

Southeast Water Pollution Biologists Association

Annual Meeting - November 12-14, 1991

Hilton Head, South Carolina

Tuesday, November 12

11:00-12:00	Executive Committee Meeting	
10:00-4:30	Registration	
1:00-1:15	Welcome	Mr. Michael Jarrett, Commissioner South Carolina Department of Health and Environmental Control

1:15-3:15 State and Region IV Program overviews

Alabama	Vickie Bauer
Florida	Tom Savage
Georgia	TBA
Kentucky	Lythia Metzmeier
Mississippi	Mike Beiser
North Carolina	Jimmie Overton
Tennessee	Dale Rector
South Carolina	Earl Hunter
EPA Region IV	Del Hicks

3:15-3:30	Zebra Mussels "They're Here!"	S. Call
3:30-4:30	Chlorophyll a analysis - a discussion session	D. Schultz

Wednesday, November 13

Nonpoint Source Pollution Corrine Wells, moderator

8:30-8:50	Kentucky nonpoint source demonstration projects	C. Wells
8:55-9:10	Experimental design of a basin-wide nonpoint source pollution study in Florida	R. Frydenborg
9:15-9:30	Results of a basin-wide non-point source pollution study in Florida	K. Lurding
9:35-9:50	Nutrient criteria development in North Carolina	D. Reid
9:55-10:10	Break	

Biocriteria Dave Penrose, moderator

10:10-10:30	Regional biocriteria guidance standards meeting - the results	J. Harrison
10:35-10:55	US EPA guidance on narrative biocriteria development	G. Gibson
11:00-11:20	Biocriteria initiatives in North Carolina	S. Tedder
11:20-11:40	Biocriteria in South Carolina	R. Sherer
11:40-12:00	Discussion	
12:00-1:30	Lunch	

Monitoring and Assessment

1:30-2:00	The role of biologists in hazardous waste management	D. Guinyard
2:05-2:20	Water resource management in the A-F-C river basin moves ahead: the development of a comprehensive plan of study	T. Savage
2:25-2:40	Computer control system for water quality and facilities monitoring - Part 1	D. Chestnut
2:45-3:00	Part 2 of above	W. Leschak
3:00-3:15	Break	
3:15-4:30	Business Meeting	

Thursday, November 14

Toxicity Testing

8:30-8:45	New chronic test protocols for whole effluent chronic toxicity	L. Ausley
8:50-9:05	Effects of natural solids content on the aquatic toxicity of zinc and copper on Ceroidaphnia	C. Prescott
9:10-9:25	South Carolina's certification of toxicity testing labs	D. Sauer

9:30-9:45	Development and use of an ongoing biocidal product toxicity database	D. Rowe
9:50-10:05	Break	
10:10-10:40	EMAP - Not just another map	D. Hicks

Bioassessment Part 1 Vickie Bauer, moderator

10:40-10:55	TVA's reservoir monitoring program	D. Dycus
11:00-11:15	Dioxin in the Leaf River	H. Folmar
11:20-11:35	Justification for MS DEQ's use of a modified "fence shocking unit" while conducting fish tissue contamination surveys	B. Justus
11:40-11:55	Constructed wetlands projects in Region IV	H. Howard
12:00-1:30	Lunch	

Bioassessment Part 2 Skip Call, moderator

1:30-1:45	Water Quality of Perry Creek, a stream impacted by oil field activity	M. Beiser
1:50-2:05	AL/MS Joint ecoregional reference site project - a progress report	V. Bauer
2:10-2:25	Kentucky's reference reach program	K. Smathers
2:30-2:45	North Carolina's use of the Index of Biotic Integrity	V. Schneider
2:50-3:05	Break	
3:10-3:25	Testing of a new method of benthic estuarine sampling in North Carolina	L. Eaton
3:30-3:45	Invertebrate Environmental tolerances used in rapid bioassessment	F. Parrish
3:50-4:05	Application of water quality standards to wetlands	B. Pruitt

4:10-4:30 Closing remarks and announcements

Poster Session

An introduction to the Ecological Support Section of EPA	B. Pruitt
Landscaping with wetlands	B. Pruitt
AL/MS Joint ecoregional reference site project	V. Bauer
Bioassessments in Florida as related to biological criteria development	R. Frydenborg/ K. Lurding
Dairy farm runoff in the Nolichucky watershed - a nonpoint source study	D. Arnwine
Beaver Creek, Shelby County, TN nonpoint source study	D. Gillis
Nonpoint source monitoring in Bedford County, TN	D. Wingfield
Nonpoint source biomonitoring	D. Stucki
Strip mine NPS pollution treatment and biomonitoring in the Big South Fork of the Cumberland River drainage	D. Rector
Water quality indicators for rivers and streams	J. Harrison
The immature stages of Ablabesmya cinctipes (Johannsen) (Diptera: Chironomidea) with comments on ecology	B. Caldwell
A diatom biotic index for use in water quality bioassessments	L. Metzmeier

UPDATE

Southeastern Water Pollution Biologists Association
1991 Annual Meeting
November 12-14, 1991

Directions to the Mariner's Inn, site of this years meeting.

From I-95 Northbound: Take exit 5 (Hardeeville, SC route 170) and follow the signs to US highway 278 and Hilton Head Island.

From I-95 Southbound: Take exit 28 (Coosawhatchie, SC route 170) and follow the signs to US highway 278 and Hilton Head Island.

Once on the Island, remain on US 278. Turn left into the Palmetto Dunes Resort (Queen's Folly Road, opposite Shelter Cove) and follow the signs to Mariner's Inn.

Stream Habitat Assessment Programs in States of the AFS North Central Division

L. L. Osborne, B. Dickson, M. Ebbers, R. Ford, J. Lyons, D. Kline, E. Rankin, D. Ross, R. Sauer, P. Seelbach, C. Speas, T. Stefanavage, J. Waite, and S. Walker

Introduction

Streams and rivers in the North Central Division (NCD) of the American Fisheries Society (AFS) range in size from intermittent headwater streams to the Mississippi River, and represent both warm- and coldwater systems. In recognition of the diverse objectives and needs of fisheries management agencies, the NCD's Rivers and Streams Committee (RSC) was established in 1988 (1) to facilitate communication of stream-related information among NCD members and (2) to identify stream and river research and management problems.

At the initial RSC meeting, the need for accurate and rapid habitat assessment methodologies was identified. We learned that some NCD states had well-established habitat assessment programs while others were just beginning to incorporate minimal habitat assessment in conjunction with fish sampling. We therefore surveyed habitat assessment programs used by each NCD state to identify (1) the principal agency(ies) responsible for habitat assessment; (2) their goals; (3) the physical habitat variables measured and the protocols used; and (4) concerns and needs that may require a substantive, organized research effort.

Lewis Osborne is an associate professor of environmental planning at the University of Illinois and an associate scientist with the Illinois Natural History Survey, 607 East Peabody Drive, Champaign, IL 61820. Bruce Dickson, graduate research assistant, Department of Urban and Regional Planning, University of Illinois; Mark Ebbers, Trout and Salmon Program coordinator, Minnesota Department of Natural Resources; Dick Ford, coldwater fisheries biologist, South Dakota Department of Game, Fish, and Parks; John Lyons, stream fisheries research biologist, Wisconsin Department of Natural Resources; Don Kline, research biologist, Iowa Department of Natural Resources; Ed Rankin, water quality scientist, Ohio Environmental Protection Agency; David Ross, assistant executive administrator, Fish Management and Research Group, Ohio Department of Natural Reseources; Randy Sauer, Streams Program biologist, Illinois Department of Conservation; Paul Seelbach, research biologist, Institute for Fisheries Research, Michigan Department of Natural Resources; Clay Speas, research biologist, USDA Forest Service; Tom Stefanavage, district fish management biologist, Indiana Department of Natural Resources; Jana Waite, associate supportive scientist, Illinois Natural History Survey; Steve Walker; supervisor, Surface Water Section, Nebraska Department of Environmental Control.

Stream habitat encompasses both physical and chemical aspects of the stream environment and is most simply defined as "the conditions that exist where the organism lives." However, we restricted the survey to only physical habitat assessment. Physical habitat assessment can identify, estimate, or predict alterations due to anthropogenic or natural causes; identify limiting factors critical to target organisms; and facilitate classification of streams. Habitat assessment can range from a micro-level scale (an individual species' instream flow requirements) to a watershed perspective.

Primary Agency and Program Purpose

Eleven of 12 NCD states responded to the survey. Physical habitat information is collected in 10 states (Table 1); it is not routinely measured in North Dakota. Two agencies collect physical habitat information in Illinois and Ohio. In Illinois, the Department of Conservation and the Illinois Environmental Protection Agency conduct a coordinated, standardized, cooperative sampling program (Table 2). A perceived advantage of this program is that it maximizes information while minimizing duplication of effort and costs. Although initially there were problems developing specific details of sampling protocol, scheduling, and data retrieval, this interagency program is now quite successful. A similar interagency cooperative effort is being initiated by the Ohio Department of Natural Resources and the Ohio Environmental Protection Agency. Data acquisition on stream physical habitat in the remaining eight states is the responsibility of a single agency (Table 2), although habitat and biological data are collected by different groups (e.g., programs) within the same state agency.

Standardized and comprehensive assessment programs are only used in Illinois, Missouri, and Ohio (Table 2). In Illinois, the Biological Stream Characterization (BSC) program (Hite and Bertrand 1989) was developed and implemented to assess the quality of streams in terms of management, protection, and enhancement. BSC is largely dependent upon the index of biotic integrity (IBI; Karr et al. 1986) while habitat data are used to assess the biotic potential of a given stream reach.

The Missouri Stream Management Program has developed three standardized procedures to assess stream habitat. The Stream Habitat Assessment Device (SHAD) is used in conjunction with the Soil Conservation Service to evaluate

stream habitat on public lands. SHAD is essentially a communication tool between the resource manager and the landowner and is not intended to determine habitat requirements or deficiencies of stream habitat for fish populations. SHAD II is used to qualitatively assess habitat along representative stream reaches that were selected on the basis of size and local geomorphologic characteristics (e.g., gradient). The third procedure consists of quantitative methods to evaluate Experimental Stream Management Areas. In this latter procedure, detailed analyses of specific habitat variables are made prior to and following specific channel or site modifications.

The Ohio Department of Natural Resources adopted a standardized habitat assessment protocol in 1985 that yields quantitative results and can be replicated from year to year. They are now combining their efforts with that of the Ohio Environmental Protection Agency who developed and use the qualitative habitat evaluation index (QHEI). QHEI is designed to assess changes in fish communities as measured by IBI (Karr et al. 1986) and the modified index of well-being, IWB (Ohio EPA 1987a, 1987b). Because QHEI is fundamentally a visual index, quality control depends on the use of common and consistent definitions and methods. For these reasons, a manual of definitions and terms has been developed and an annual training session is offered.

Interstate Comparisons

Reasons why NCD states assess physical habitat were grouped into eight categories (Table 3). The most common were to relate information to game-fish populations (six states), to identify areas needing habitat improvement (six states), to identify factors limiting nongame fish populations and production (six states), and to assess effectiveness of habitat improvement projects or management policies (five states). There was substantial overlap in the states that listed game-fish and nongame fish populations as primary

Table 1. Physical habitat variables measured or visually assessed (Y) in responding North Central Division's state programs. No (N) indicates that the physical habitat parameter is not considered. Some states have more than one stream assessment program. The approximate spatial scale of assessment of each variable is indicated by a (T) — transect, (R) — reach, and (W) — watershed.

Program Characteristics	IL EPA & DOC	IN DNR	IA DNR	MI SWQD/Fish Res	MN DNR	MO SHAD I & II/ESMA	NE DEC	OH DNR/EPA	SD DNR	WI DNR
Measured Variables										
(R) Channel morphology	Y	Y	Y	Y/Y	Y	Y/Y	Y	Y/Y	Y	Y
(T) Depth	Y	Y	Y	Y/Y	Y	Y/Y	Y	Y/Y[1]	Y	Y
(T) Velocity	Y	Y	Y	Y/N	Y	N/Y	N	Y/Y	Y	Y
(T) Discharge	Y	Y	N	Y/Y[1]	Y	N/Y	N	N/N	Y	Y
(R) Percent pools	Y	Y	Y	N/Y	Y	Y/Y	Y	N/Y	Y	Y
(T) Instream cover	Y	Y	Y	Y/Y	Y	Y/Y	Y	N/Y	Y	Y
(T) Substrate type	Y	Y	Y	Y/Y	Y	Y/Y	Y	Y/Y	N	Y
(T) Substrate size	Y	Y	Y	Y/Y	Y	N/Y	Y	Y/Y	N	Y
(T) Substrate embeddedness	N	Y	N	Y/Y	N	N/N	N	Y/Y	Y	Y
(R) Cover surface area	Y[2]	Y	N	Y/Y	N	N/N	N	N/Y	Y	Y
(R) Channel alterations	Y[2]	N	Y	Y/Y	Y	Y/Y	Y	Y/Y	Y	Y
(T) Streambank erosion	Y[2]	N	Y	Y/Y	Y	Y/Y	Y	Y/Y	Y	Y
(T) Streambank vegetation condition	Y[2]	N	Y	Y/Y	Y	Y/Y	Y	Y/Y	N	Y
(R) Riparian vegetation condition	Y[2]	N	Y	N/Y	Y	Y/Y	Y	Y/N	N	Y
(R) Width of riparian zone	N	N	N	N/Y	Y	Y/N	Y	Y/Y	N	Y
(R) Riparian vegetation quality	N	N	Y	N/N	N	Y/Y	Y	Y/N	N	Y
(R) Riparian management	N	N	Y	Y/N	Y	Y/N	N	Y/N	N	Y
(T) Percent shading	Y	N	N	Y/Y	Y	N/N	N	Y/Y	Y	Y
(T) Vegetation overhang	N	N	N	N/N	N	N/N	N	N/N	Y	N
(T) Percent bank slope	N	N	Y	Y/Y	N	N/Y	Y	N/N	Y	N
(T) Undercut banks	Y	N	N	Y/Y	N	Y/Y	N	N/Y	Y	Y
(W) Nearness to dam	Y	N	Some	Y/Y[3]	Y	Y/Y	Y	Y/Y	N	Some
(R) Channel gradient	N	N	N	Y/Y[3]	Y	Y/Y	Y	N/Y[3]	Y[3]	Y[3]
(R) Channel sinuosity	N	Y	N	N/Y[3]	Y	N/N	N	N/Y	N	Y[3]
(W) Watershed land use	N	N	N	N/Y[3]	Y	N/N	Y	Y/Y	N	Some
(W) Watershed geology	N	N	N	N/Y[3]	Y	N/N	N	N/N	Y[3]	N
(W) Watershed soils	N	N	N	N/Y[3]	Y	N/N	N	N/N	Y[3]	Some
(W) Flow stability	N	N	N	Y/Y[3]	Y	N/Y	N	N/N	N	Some
Sampling Program										
Temporal variation	N	N	N	Some/N	N	N/Y	N	N/N	N	Some
Spatial variation (reach replication)	Y	Y	Some	Y/Y	Y	N/Y	Y	Y/Y	Y	Y
Integration with water chemistry	Y	N	Some	Y/Y[3]	Y	N/N	Some	Y/Y	N	Some

[1]Maximum depth only, other depths estimated.
[2]Data are obtained but not included in present analysis protocol.
[3]Data obtained from existing tables or maps.

Table 2. The agency(ies) involved or responsible for collection of stream physical habitat data in each North Central Division state that responded to the survey and general comments and characteristics of each habitat assessment program.

State	Agency	Comment
Illinois	Dept. Conservation Environmental Protection Agency	Interagency cooperative program. Assessment done using Biological Stream Characterization (Hite and Bertrand 1989)
Indiana	Dept. Natural Resources	Program in infancy. Assessment limited to 2-3 drainage basins within state
Iowa	Dept. Natural Resources	No standardized assessment procedures; general guidelines sometimes used
Michigan	Dept. Natural Resources	The Department's Surface Water Quality and Fisheries Division and the Fisheries Research Unit collect habitat data. Assessment procedures vary among 13 state districts. Statewide program being conducted to identity critical watershed and habitat variables limiting fish populations
Minnesota	Dept. Natural Resources	Previously concentrated on coldwater systems; recently began compiling data on warmwater systems. Surveys measure standardized set of habitat characteristics
Missouri	Dept. Conservation	Use three standardized procedures. SHAD used with Soil Conservation Service. SHAD II used to describe habitat condition in 40 drainage basins. A number of quantitative methods are used in evaluating a few experimental areas (Platts et al. 1983, 1987; Hamilton and Bergersen 1984)
Nebraska	Dept. Environmental Control	General habitat characteristics measured in all perennial streams once during 1982-88 to delineate stream segments and assign beneficial uses
Ohio	Environmental Protection Agency Dept. Natural Resources	Instituting cooperative interagency program. Employing QHEI to reflect changes in fish communities as measured by IBI (Karr et al. 1986) and modified IWB (Ohio EPA 1987a, 1987b)
S. Dakota	Dept. Game, Fish, and Parks	Employ line transect method (Platts et al. 1983), but generally assessments restricted to Black Hills streams
Wisconsin	Dept. Natural Resources	Currently no statewide program to regularly survey or monitor habitat. Habitat measures often associated with specific projects

program emphases. One could expect a greater emphasis on sport-fish management compared with nongame fish populations because of the substantial revenues generated by the sale of sportfishing licenses. Such an emphasis could be expected to occur most often in states with programs suffering from severe economic or funding constraints. The relatively high overlap (4 of 6) among states concerned with both nongame fish populations and game-fish populations, however, reflects a fundamental awareness of the importance of maintaining a diverse fish assemblage and not just harvestable game-fish populations.

Only Iowa and Ohio currently collect habitat information to study or manage endangered species, but given national and international initiatives on biodiversity, such uses of habitat information by NCD states will probably increase. One fundamental position in conservation biology is that endangered populations are best protected or managed by maintaining the habitat and community to which the population belongs. Thus, programs using habitat measurements to manage or monitor general fish communities ("community integrity") may be expected to increase in association with the greater emphasis on biodiversity.

Less than half the states use habitat measures to assess the effectiveness of habitat improvement projects or management policies (Table 3). Either there are few habitat improvement initiatives, or opportunities are being missed to test the adequacy of management policies. Follow-up conversations suggested that many states have not yet instituted restoration projects or watershed management policies. States who anticipate initiating such projects should also consider the importance of collecting habitat information to assess the success of their programs.

Table 3. Reasons for assessing habitat conditions supplied by responding state representatives in the North Central Division.

Purpose	IL	IN	IA	MI	MN	MO	NE	OH	SD	WI
Provide baseline assessment information to relate to sport/gamefish populations	X	X			X			X	X	X
Identify areas in need of habitat improvement (either in-channel or riparian)		X	X	X		X			X	X
Identify factors limiting fish populations/production	X			X	X		X	X		X
Assess effectiveness of habitat improvement projects or management policies				X		X		X	X	X
As a component of biological assessment or use designation	X						X	X		X
Evaluate endangered species habitat			X					X		
Classify reaches or streams according to habitat and/or identify "reference reaches"							X	X		X
Facilitate basin planning						X				

Habitat Variables Measured

Six states do not have a coordinated, standardized habitat assessment program. Also, most do not have a consistent list of variables measured during each stream survey. In many cases, habitat assessments are conducted by several agency personnel who measure different variables, depending on specific project goals, available resources, and individual perspectives. Despite this limitation, a list of 28 variables commonly incorporated into stream habitat assessments was compiled (Table 1). Wisconsin and Iowa reported that the absence of standardized statewide sampling significantly limited their programs.

The physical habitat variables measured reflect habitat at three spatial scales—an individual, and generally replicated transect; a stream reach, sometimes replicated for individual streams; and general watershed or basin variables. Only channel morphology and depth were assessed in all state programs (Table 1). Substrate type, substrate size, and channel alterations were measured in all but one program (Table 1). The mean number of physical habitat variables measured per program was 18 ± 4 (mean ± SD). Michigan's Fisheries Research Program consistently measured the most (24), while Indiana's program measured the least (11). Indiana's program reflects its newness and the limited financial resources directed toward stream habitat assessment; correspondingly, its goals are narrow, concentrating only on sport-fish habitat (Table 3).

All programs emphasized within-channel hydrological variables (e.g., depth or substrate type) and generally assessed them along transects positioned in representative stream reaches, thereby providing an indication of inter-reach variability. The frequency that channel morphology, depth, velocity, and discharge are measured reflects not only their perceived importance to fish, but also the availability of relatively simple, inexpensive, replicable, and rapid procedures. Substrate type, substrate size, and in-stream cover, which can also affect the distribution of stream fishes and their prey (see review in Fausch et al. 1988), are often visually estimated. Embeddedness, which is useful for determining substrate suitability for fish spawning, egg incubation, and aquatic invertebrate habitat (Platts et al. 1983), is overlooked in most NCD states (Table 1). Many variables are visually estimated because more accurate methods, if available, are time consuming and expensive. The accuracy and precision of visual estimates have not been extensively investigated but can be expected to vary with investigator experience or with the classification system

Table 4. Needs of state habitat assessment programs of the North Central Division, as identified by survey respondents.

Need	IL	IN	IA	MI	MN	MO	NE	OH	SD	WI
Increased capacity to identify streams with populations limited by physical habitat	X			X						
Improved procedure for measuring or estimating habitat variables not presently incorporated because of time, methodological limitations, or economic constraints (e.g., stream gradient, sinuosity, mean width of riparian zones, and flow duration)	X			X						
Validation of visual assessment techniques, their relationship to fish population densities, and their limitations under different environmental conditions (e.g., depth)		X				X	X			
Method for rating habitat suitability (index) on a statewide rather than a watershed level	X	X								
Document describing qualitative and quantitative methods of habitat assessment	X	X				X				
Standardization of type and definition of habitat parameters and methods for measuring them			X							X
Documented and verified (proven) models for translating habitat data into management recommendations										X
Development of methods to quantitatively measure and evaluate habitat in large rivers										X
Continued development of models to predict fish population densities associated with physical habitat, particularly on an annual basis rather than on data collected during nice weather							X			
Assessment of importance of temporal variability in habitat conditions and their impact on fish populations									X	
Document variability between investigators assessing habitat, particularly those where the parameter is subjectively estimated								X		
Assess the difference in habitat parameters between warm- and coldwater stream systems. How similar do programs have to be?										X

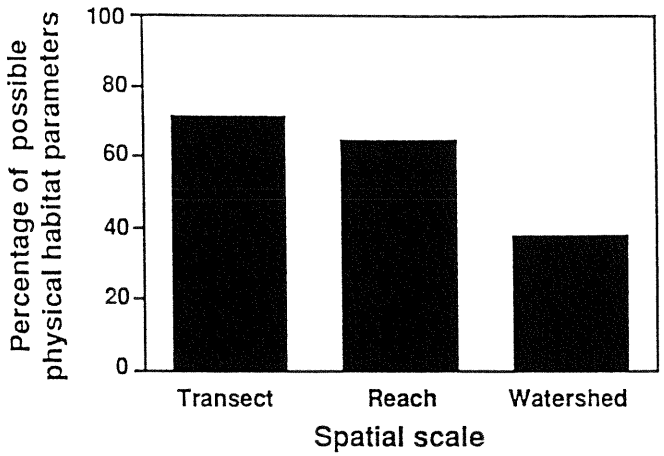


Figure 1. The percentage of total physical habitat parameters in each spatial scale category measured by the 13 assessment programs that responded to the survey.

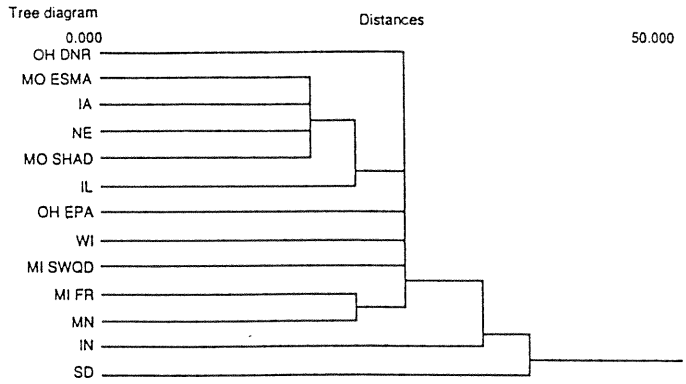


Figure 2. Cluster dendrogram of dissimilarity in habitat parameters measured in the 13 assessment programs that responded to the survey. Distance metric is normalized percent disagreement single linkage method (nearest neighbor).

used. To minimize variability, several states use standardized data sheets.

We summed the total number of programs that measured a physical habitat parameter (Table 1) within a scale category and divided the value by 13 (the total number of surveyed programs) to determine if spatial scale affected the probability of a parameter being incorporated into an assessment program. We found a negative relationship between the spatial scale of a parameter and the probability of the parameter being included in a sampling program (Fig. 1). Surveyed programs measured 71% of the possible transect parameters and 65% of the reach parameters, but only 38% of the watershed parameters. There are several possible explanations for this negative relationship: (1) lack of appreciation by program directors of the importance of large-scale influences on stream fish community structure; (2) limited resources (time, money, manpower, technology, etc.) for assessing large-scale habitat parameters; or (3) large-scale parameters are not immediately related to specific program goals.

Generally, development of simple and standardized riparian habitat assessment procedures has been slow. Few inexpensive and simple quantitative procedures are available, and the accuracy of many remain unknown (see Platts et al. 1987). Furthermore, quantifying watershed-scale parameters such as land use or cover is expensive and time-consuming (e.g., Barton et al. 1985). Even the application of geographic information systems is expensive if basic land-use data must be generated (Osborne and Wiley 1988).

To determine the similarity in state programs, we ran a cluster analysis (Wilkinson 1988) on the data in Table 1. Percentage dissimilarity in the measured variables (Pielou 1984) was used as the distance measure in the single linkage (nearest neighbor) algorithm (Fig. 2). Given the number and diversity of objectives (Table 3), the differences in variables measured are surprisingly minimal (Fig. 2). This suggests that several of the state programs could, with few additions or modifications to their assessment program, better use habitat information to meet additional management objectives. Most programs would benefit from a standardized list of variables and a clear, concise definition of parameters and methods.

Significant Limitations

The most disturbing findings from this survey were the inability of programs to account for temporal variation in physical habitat (e.g., discharge, depth, cover), and the scarcity of programs that integrate physical habitat with water quality information (Table 1). Most programs generally restricted sampling to warm, low-flow months; further, this deemphasis of temporal variability (diel, seasonal, and year-to-year variation) is not a simple oversight, but rather a response to limited time, manpower, and financial resources (personal communication with state representatives). Even with additional resources, the successful identification of a limiting parameter will likely remain problematic if that parameter is temporally out of phase with the sampling time.

Although this survey was restricted to physical habitat parameters, water quality data are also important in assessing stream habitat. Currently, only Illinois and Ohio can effectively integrate physical and chemical habitat data, apparently due to interagency cooperative arrangements in each state that maximize data acquisition while minimizing costs. Such cooperative efforts also lead to information and methodological exchanges. However, conflicts may arise because of contrasting agency goals; programmatic goals should be vigorously addressed at the onset of any cooperative proposal.

Needs and Recommendations

In general, the needs identified by each state center around improving the ability of personnel to identify and quantify limiting in-channel and nonaquatic physical habitat (Table 4). Because each aquatic system differs in structure, composition, or functional capability, no one limiting parameter will be identified in all systems, even in the same region. Moreover, biological systems may be constrained by more than one habitat parameter over an annual period. Even if a manager identifies a limiting factor and implements procedures to increase population levels, some other environmental parameter will ultimately establish a new carrying capacity. Therefore, habitat assessment programs, especially those that sample only once a year, should not

be restricted to a few in-channel parameters. Streambank and riparian measurements (e.g., Larimore and Smith 1963; Hynes 1975; Vannote et al. 1980; Wiley et al. 1990) need to be incorporated into monitoring and assessment programs in order to study the importance of riparian characteristics on fish distribution and production patterns. The ideal assessment program would incorporate a suite of probable indicator variables that reflect both local and basin-wide processes. Because financial and time constraints ultimately limit program capabilities, accurate, replicable, easily applied, and inexpensive methods must be developed.

Methods also need to be field tested. To date, few visual assessment procedures have been appropriately tested, and their precision and relevance are still in question (Table 4). Verification efforts should include an assessment of multi-investigator variance and consider procedures for incorporating the estimated variance into subsequent analyses. Some states have already instituted procedures to address investigator variability; Ohio EPA requires periodic training programs and has established clear, concise definitions and categories for each physical habitat parameter measured in the field.

To identify the appropriate suite of assessment parameters for a region, we need to draw on information obtained from current programs. Identification of controlling or limiting parameters will likely require the use of multivariate statistical techniques, which in turn will require personnel trained in advanced statistical procedures. American Fisheries Society Chapters and Divisions can foster application of multivariate analytical techniques by sponsoring workshops and technical training seminars. For instance, the Illinois Chapter sponsored an introductory statistics workshop in January 1990 for biologists and fisheries managers.

Two points became evident in compiling this information. First, many of the problems and needs are similar across states (Table 4). Several states are addressing problem areas and have incorporated procedures into their programs to overcome some obvious limitations, including cooperative interagency agreements, adoption of approaches to incorporate large-scale metrics into routine stream surveys, and evolution of an index of habitat conditions. AFS, through committees like RSC, in the NCD, is in a unique position to help address these needs through dissemination of information. This survey, sponsored by RSC, is one example of information exchange among state representatives. The Stream Restoration and Spatial and Temporal Scale in Fisheries Management symposium scheduled for the 1990 Midwest Fish and Wildlife Conference provided a forum to help broaden the perspective of many fisheries program directors, managers, and personnel. Additional workshops, seminars, and manuals on methods for habitat assessment in midwestern streams should be developed. A round-table discussion could help resolve whether controlling habitat parameters are different in coldwater and warmwater streams and could significantly affect the structure and content of habitat assessment and monitoring programs.

Second, verification of current assessment procedures and development of new procedures are needed. With more information on factors that limit the distribution and abundance of fish on several spatial scales and on a longer temporal scale (i.e., greater than 1-2 years), investigators could begin to address factors limiting fish populations

throughout the annual cycle, such as the relationship between high and low flow constraints and summer versus winter habitat needs. Although the subunits of AFS cannot fund such an array of research programs, members can advocate the support of such research endeavors within their own state or research units and disseminate results to the larger membership. Variables limiting fish populations on a regional level may be identifiable from existing state program databases; AFS sponsorship of multi-state cooperative data analysis initiatives (i.e., each state provides data from two or three of their best studied basins) could help identify at a regional level the "most important" habitat variables controlling recruitment, production, and standing stock of fish populations in streams. Such information could then be used to develop basic regional models for predicting characteristics of stream fish populations. Such a cooperative initiative could also be used to identify habitat parameters that need better and more accurate methods of assessment or to identify those variables being measured that are not very useful.

In summary, several programmatic and protocol issues and needs have been identified by conducting this survey, many of which are similar across the Midwest and probably the nation. Although many problems are being addressed locally, interprogram and interstate communication is needed for a more rapid resolution of these problems. National and regional AFS sponsorship of appropriate technical and training programs and activities, in combination with increased participation by the membership in these activities, will improve our ability to protect and manage stream habitats and their associated fish populations, as well as extend our knowledge and understanding of aquatic systems.

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Category and Common Name	Scientific Name	Family	Historic Range

The following freshwater invertebrate species are currently under review for federal protective status under the List of Endangered and Threatened Wildlife and Plants (50 CFR Part 17). Category 1 = Recommended for listing; 2 = More data required prior to listing; 3A = No longer a candidate, suspected to be extinct; 3B = No longer a candidate, uncertain taxonomic nomenclature precludes listing; 3C = No longer a candidate, more abundant and widespread than previously thought; * = Species has not been reported since 1963.

SPONGES (Porifera)

2	Oklawaha sponge	Dosilia palmeri	Spongillidae	FL,Mexico
2	Kissimmee sponge	Ephydatia subtilis	Spongillidae	FL

AMPHIPODS (Crustaceans, Order Amphipoda)

2	Diminutive amphipod	Gammarus hyalleloides	Gammaridae	TX
2	Pecos amphipod	Gammarus pecos	Gammaridae	TX
3C	Appalachian Valley cave amphipod	Crangonyx antennatus	Crangonyctidae	AL,IL,TN,VA
2	Florida Cave amphipod	Crangonyx grandimanus	Crangonyctidae	FL
2	Hobb's Cave amphipod	Crangonyx hobbsi	Crangonyctidae	FL
2	Balcones cave amphipod	Stygobromus (=Stygonectes) balconis	Crangonyctidae	TX
2	Bifurcated cave amphipod	Stygobromus (=Stygonectes) bifurcatus	Crangonyctidae	TX
2	Cascade Cave amphipod	Stygobromus (=Stygonectes) dejectus	Crangonyctidae	TX
3C	Central Kentucky cave amphipod	Stygobromus (=Stygonectes) exilis	Crangonyctidae	AL,KY,TN
2	Ezell's Cave amphipod	Stygobromus (=Stygonectes) flagellatus	Crangonyctidae	TX
2	Devil's Sinkhole amphipod	Stygobromus (=Stygonectes) hadenoecus	Crangonyctidae	TX
2	Long-legged cave amphipod	Stygobromus (=Stygonectes) longipes	Crangonyctidae	TX
2	Peck's cave amphipod	Stygobromus (=Stygonectes) pecki	Crangonyctidae	TX
2	Alabama well amphipod	Stygobromus smithi	Crangonyctidae	AL

Note: Species in categories 1 and 2 are candidates; species in Category 3 are not (see top of list for explanation of categories).

Category	Common Name	Scientific Name	Family	Historic Range
CRAYFISHES AND SHRIMPS (Crustaceans, Order Decapoda)				
2	Chickamauga crayfish	Cambarus extraneus	Cambaridae	GA,TN
2	Oktibbeha rivulet crayfish	Hobbseus orconectoides	Cambaridae	MS
2	(Crayfish, no common name)	Orconectes williamsi	Cambaridae	AL
2	Palm Springs Cave crayfish	Procambarus acherontis	Cambaridae	FL
2	Jackson Prairie crayfish	Procambarus barbiger	Cambaridae	MS
2	Mississippi flatwoods crayfish	Procambarus cometes	Cambaridae	MS
2	Carrollton crayfish	Procambarus ?onnus	Cambaridae	MS
2	(Crayfish, no common name)	Procambarus liberorum	Cambaridae	MS
2	Shutispear crayfish	Procambarus lylei	Cambaridae	MS
2	Bearded red crayfish	Procambarus pogum	Cambaridae	MS
2	Texas cave shrimp	Palaemonetes antrorum	Palaemonidae	TX
1	Squirrel Chimney cave shrimp	Palaemonetes cummingi	Palaemonidae	FL
MAYFLIES (Insects, Order Ephemeroptera)				
2	Berner's two-winged mayfly	Heterocleon berneri	Baetidae	GA
2	American sandburrowing mayfly	Bolania americana	Behningiidae	FL,GA,SC,NC
2*	Yellow brachycercus mayfly	Brachycercus flavus	Caenidae	LA*
2	Argo ephemerellan mayfly	Ephemerella argo	Ephemerellidae	GA,IL,IN,SC
2*	Frison's seratellan mayfly	Seratella frisoni	Ephemerellidae	AL*,IL*,MO*
3B	Meridion blackwater mayfly (synoym of p. Centralis)	Pseudirion meridionalis	Heptageniidae	FL,GA
2	Cahaba sandfiltering mayfly	Homoeoneuria cahabensis	Oligoneuridae	AL,MS
2	Blackwater sandfiltering mayfly	Homoeoneuria dolani	Oligoneuridae	AL,GA,SC
2	Balmorhea damselfly	Argia sp.	Coenagrionidae	TX
2	Say's spiketail dragonfly	Cordulegaster sayi	Cordulegastridae	FL,GA
2	Big Thicket emerald dragonfly	Somatochlora margarita	Corduliidae	TX

Note: Species in categories 1 and 2 are candidates; species in Category 3 are not (see top of list for explanation of categories).

Category	Common Name	Scientific Name	Family	Historic Range
2	Cherokee clubtail dragonfly	Gomphus (Gomphurus) consanguis	Gomphidae	SC,AL,NC,TN,VA
2	Septima's clubtail dragonfly	Gomphus (Gomphurus) septima	Gomphidae	AL,NC
2	Bronze clubtail dragonfly	Gomphus (Stylurus) townesi	Gomphidae	FL,AL,SC,NC,TN
2	Alleghany snaketail dragonfly	Ophiogomphus incurvatus alleghaniensis	Gomphidae	WV,VA,AL,TN?
2	Variegated clubtail dragonfly	Progomphus bellei	Gomphidae	FL,NC
2	Wabash belted skimmer dragonfly	Macromia wabashensis	Macromiidae	OH*,IN*,TX
2	Natchez stonefly	Alloperla natchez	Chloroperlidae	MS
2	Chukcho stonefly	Haploperla chukcho	Chloroperlidae	MS
3B	Schoolhouse Springs leuctran stonefly	Leuctra szcytkoi	Leuctridae	LA
3C	Georgia beloneurian stonefly	Beloneuria georgiana	Perlidae	GA,NC
2	Cheaha beloneurian stonefly	Beloneuria jamesae	Perlidae	AL
2	Leon River winter stonefly	Taeniopteryx starki	Taeniopterygidae	TX
	BEETLES (Insects, Order Coleoptera)			
2	Bonita diving beetle	Deronectes neomexicana	Dytiscidae	NM,TX
2*	Fig seed diving beetle	Desmopachria cenchamis	Dytiscidae	FL*
2	Texas cave diving beetle	Haideoporus texanus	Dytiscidae	TX
2	Folkerts's hydroporus diving beetle	Hydroporus folkertsi	Dytiscidae	AL
2	Little riffle beetle	Dubiraphia parva	Elmidae	OK,LA
2	Gammon"s stenelmis riffle beetle	Stenelmis gammoni	Elmidae	NC,AL,VA
2	Stark's false water penny beetle	Alabameubria starki	Eubriidae	AL
2	Red Hills unique whirligig beetle	Spanglerogyrus albiventris	Gyrinidae	AL
2	Texas minute moss beetle	Limnebius texanus	Hydraenidae	TX
2	Seclusive water scavenger beetle	Paracymus seclusus	Hydrophilidae	MS

Note: Species in categories 1 and 2 are candidates; species in Category 3 are not (see top of list for explanation of categories).

Category	Common Name	Scientific Name	Family	Historic Range
CADDISFLIES (Insects, Order Trichoptera)				
2	San Marcos saddle-case caddisfly	Protoptila arca	Glossosomatidae	TX
2	Flint's net-spinning caddisfly	Cheumatopsyche flinti	Hydropsychidae	TX
2	Provost's ochrotrichian micro caddisfly	Ochrotichia provosti	Hydroptilidae	FL
2	Florida oxyethiran micro caddisfly	Oxyethira florida	Hydroptilidae	FL,TX?
2*	Florida ceraclean longhorn caddisfly	Ceraclea floridana	Leptoceridae	FL*
2*	Little oecetis longhorn caddisfly	Oecetis parva	Leptoceridae	FL*
2*	Three-tooth long-horned caddisfly	Triaenodes tridonta	Leptoceridae	OK*,FL*
2	Stannard's agarodes caddisfly	Agarodes stannardi	Sericostomatidae	MS,TN
2	Zigzag blackwater caddisfly	Agarodes ziczac	Sericostomatidae	FL
SNAILS (Mollusks, Class Gastropoda)				
2	Tulotoma (Alabama livebearing snail)	Tulotoma magnifica (Conrad, 1834)	Viviparidae	AL
2	Blue Spring hydrobe	Aphaostracon asthenes (Thompson, 1968)	Hydrobiidae	FL
2	Wekiwa hydrobe	Aphaostracon monas (Pilsbry, 1899)	Hydrobiidae	FL
2	Dense hydrobe	Aphaostracon pycnus (Thompson, 1968)	Hydrobiidae	FL
2	Fenney Spring hydrobe	Aphaostracon xynoelictus (Thompson, 1968)	Hydrobiidae	FL
2	Crystal siltsnail (helicoid spring snail)	Cincinnatia helicogyra (Thompson, 1968)	Hydrobiidae	FL
2	Ichetucknee siltsnail	Cincinnatia mica (Thompson, 1968)	Hydrobiidae	FL
2	Enterprise siltsnail	Cincinnatia monroensis (Dall, 1885)	Hydrobiidae	FL
2	Pygmy siltsnail	Cincinnatia parva (Thompson, 1968)	Hydrobiidae	FL
2	Ponderous siltsnail (=Ponderous spring snail)	Cincinnatia ponderosa (Thompson, 1968)	Hydrobiidae	FL
2	Seminole siltsnail (=Seminole Spring snail)	Cincinnatia vanhyningi (Vanatta, 1934)	Hydrobiidae	FL
2	Wekiwa siltsnail (=Wekiwa Spring snail)	Cincinnatia wediwae (Thompson, 1968)	Hydrobiidae	FL
2	Genus (no common names)	Clappia 2 spp.	Hydrobiidae	AL

Note: Species in categories 1 and 2 are candidates; species in Category 3 are not (see top of list for explanation of categories).

Category	Common Name	Scientific Name	Family	Historic Range
2	Phantom cave snail	Cochliopa texana (Pilsbry, 1935)	Hydrobiidae	TX
2	Davis County springsnail	'Fontelicella' davisi (Taylor, 1987)	Hydrobiidae	TX
2	Presidio County springsnail	'Fontelicella' metcalfi (Taylor, 1987)	Hydrobiidae	TX
2	Mimic cavesnail	Phreatodrobia imitata (Herschler and Longley, 1986)	Hydrobiidae	
2	Beaver pond marstonia (snail)	Pyrgulopsis (=Marstonia) castor (Thompson, 1977)	Hydrobiidae	GA
2	Armored (=thick-shelled) marstonia	Pyrgulopsis (=Marstonia) pachyta (Thompson, 1977)	Hydrobiidae	AL
2	Savannah pebblesnail	Somatogyrus tenax (Thompson, 1969)	Hydrobiidae	GA
2	Sculpin snail	Stiobia nana (Thompson, 1978)	Hydrobiidae	AL
1	Diamond Y Spring snail	Tryonia adamantina (Taylor, 1987)	Hydrobiidae	TX
2	Brune's tryonia snail	Tryonia brunei (Taylor, 1987)	Hydrobiidae	TX
2	Cheatum'snail (Phantom tryonia)	Tryonia cheatumi (Pilsbry, 1935)	Hydrobiidae	TX
1	Gonzales Spring snail	Tryonia stocktonensis (Taylor, 1987)	Hydrobiidae	TX
1	Pecos assiminea snail	Assiminea pecos (Taylor, 1987)	Hydrobiidae	NM,TX
3B	Anthony's river snail	Athearnia anthonyi (Redfield, 1854)	Pleuroceridae	GA,TN
2	Black-crest elima (=Albany snail)	Elimia (=Goniobasis) albanyensis (Lea, 1864)	Pleuroceridae	FL
2	Boulder (=crass river) snail	Leptoxis (=Athearnia) crassa (Haldeman, 1841)	Pleuroceridae	GA,TN
2	Warty rocksnail (=Elk River file snail)	Lithasia lima (Conrad, 1834)	Pleuroceridae	TN,AL
3B	Spruce Creek king's crown	Melongena sp.	Melongenidae	FL
3C	New Mexico rams-horn (snail)	Pecosorbis kansasensis (Case, 1966)	Planorbidae	NM,TX
3B	Comanche physa (=Diamond-Y pond snail)	Physella bottomeri (=P. virgata bottomeri) (Clench, 1924)	Physidae	TX

Note: Species in categories 1 and 2 are candidates; species in Category 3 are not (see top of list for explanation of categories).

Category	Common Name	Scientific Name	Family	Historic Range
CLAMS & MUSSELS (Mollusks, Class Bivalvia)				
2	Specticle case (pearly mussel)	Cumberlandia monodonta (Say, 1929)	Margaritiferidae	AL,AR,IA,IN,IL,KY,MO,NE? OH,TN,VA,WI
2	Alabama pearlshell	Margaritifera marrianae (Johnson, 1983)	Margaritiferidae	AL
2	Atlamaha arc-mussel	Alamidonta arcula (Lea, 1838)	Unionidae	GA
3A	Coosa elktoe (mussel)	Alasmidonta maccordi (Athearn, 1964)	Unionidae	AL
2	Florida arc-mussel	Alasmidonta wrightiana (Walker, 1901)	Unionidae	FL
2	Fat three-ridge (mussel)	Amblema neislerii (I. Lea, 1858)	Unionidae	FL,GA
2	Fanshell (mussel)	Cyprogenia stegaria (=C. irrorata) (Rafinesque, 1820)	Unionidae	AL,IL,IN,KY,OH,PA,TN,VA,WV
2	Salina mucket (mussel)	Disconaias salinasensis	Unionidae	TX, Mexico
2	Winged spike (=recovery pearly mussel)	elliptio nigella (Lea, 1852)	Unionidae	AL,GA
2	Altamaha spinymussel (=Georgia spiny mussel)	Elliptio shepardiana (I. Lea, 1834)	Unionidae	GA
2	Purple bankclimber (mussel)	Elliptoideus sloatianus (I. Lea, 1840)	Unionidae	AL,FL,GA
3A	Sugarspoon (-arc-form pearly mussel)	Epioblasma arcaeformis (Lea, 1831)	Unionidae	AL*,TN*
3A	Angled riffleshell	Epioblasma biemarginata (Lea, 1857)	Unionidae	AL*,TN*
2	Cumberlandian combshell	Epioblasma brevidens (Lea, 1831)	Unionidae	AL,KY,TN,VA
2	Oyster mussel	Epioblasma capsaeformis (Lea, 1834)	Unionidae	AL,KY,TN,VA
3A	Leafshell (=arcuate pearly mussel)	Epioblasma flexuosa (Rafinesque, 1820)	Unionidae	AL*,TN*
3A	Acornshell (=acron pearly mussel)	Epioblasma haysiana (Lea, 1834)	Unionidae	AL*,TN*VA*
3A	Forkshell (Lewis' pearly mussel)	Epioblasma lewisi ((Walker, 1910)	Unionidae	AL*,TN*,KY*
2	Upland combshell (mussel)	Epioblasma metastriata (Conrad, 1840)	Unionidae	AL,GA
2	Purple catspaw (mussel)	Epioblasma obliquata obliquata (=E. sulcata sulcata) (Rafinesque, 1820)	Unionidae	AL,IL,IN,KY,OH,TN
2	Southern acronshell (mussel)	Epioblasma othcaloogensis (I. Lea, 1857)	Unionidae	GA
3A	Round combshell (=fine-rayed pearly mussel)	Epioblasma personata (Say, 1829)	Unionidae	AL*,TN*
3A	Tennessee riffleshell (=nearby pearly mussel)	Epioblasma propinqua (Lea, 1857)	Unionidae	AL*,TN*

Note: Species in categories 1 and 2 are candidates; species in Category 3 are not (see top of list for explanation of categories).

Category	Common Name	Scientific Name	Family	Historic Range
3A	Cumberland leafshell (=Steward's pearly mussel)	Epioblasma stewardsoni (Lea, 1852)	Unionidae	AL*,TN*
2	Narrow pigtoe (mussel)	Fusconia escambia (Clench and Turner, 1956)	Unionidae	AL,FL
2	Cracking pearlymussel	Hemistena lata (Rafinesque, 1820)	Unionidae	AL,IL,IN,KY,TN,VA
2	Fine-lined pocketbook (mussel)	Lampsilis altilis (Conrad, 1834)	Unionidae	AL,GA
2	Southern sandshell (mussel)	Lampsilis australis (Simpson, 1900)	Unionidae	AL,FL
2	Lined pocketbook (mussel)	Lampsilis binominata (Simpson, 1900)	Unionidae	AL,GA
2	Orange-nacre mucket (mussel)	Lampsilis perovalis (Conrad, 1834)	Unionidae	AL,GA,MS
2	Shiny-rayed pocketbook (mussel)	Lampsilsis subangulata (I. Lea, 1840)	Unionidae	AL,FL,GA
2	Tennessee heelsplitter (mussel)	Lasmigona holstonia (Lea, 1838)	Unionidae	AL,GA,IL,IN,KY,TN,VA
2	Ring pink (Golf stick pearly mussel)	Obovaria retusa (Lamarck, 1819)	Unionidae	AL,IL,IN,KY,OH,PA,TN,WV
2	Round ebonyshell (mussel)	Obovaria rotulata (Wright, 1899)	Unionidae	AL,FL
2	Clubshell (mussel)	Pleurobema clava (Lamarck, 1819)	Unionidae	AL,IL,IN,KY,MI,OH,PA,TN,WV
2	Warrior Pigtoe (mussel)	Pleuroblema rubellum ((Conrad, 1834)	Unionidae	AL
3B	Pink pigtoe (mussel)	Pleurobema rubrum (Rafinesque, 1820)	Unionidae	AL,KY,TN
2	True pigtoe (mussel)	Pleurobema vernum (I. Lea, 1860)	Unionidae	AL
2	Texas hornshell (mussel)	Popenaias popei (I. Lea, 1857)	Unionidae	NX,TX, Mexico
2	Texas heelsplitter (mussel)	Potamilus amphichaenus (Frierson, 1898)	Unionidae	LA,TX
2	Alabama heelsplitter (mussel)	Potamilus inflatus (Lea,1831)	Unionidae	AL,LA,MS
2	Southern kidneyshell (mussel)	Ptychobranchus jonesi (Van der Schalie, 1934)	Unionidae	AL,FL
2	False spike (mussel)	Quincuncina mitchelli (Simpson, 1896)	Unionidae	TX
2	Savannah lilliput (mussel)	Toxolasma pullus (Conrad, 1838)	Unionidae	GA,NC,SC
2	Mexican fawnsfoot (mussel)	Truncilla cognata (I. Lea, 1860)	Unionidae	TX, Mexico
2	Choctaw bean (= Choctaw pearly mussel)	Villosa choctaensis (Athearn, 1964)	Unionidae	AL,FL
2	Rayed bean (mussel)	Villosa fabalis (Lea, 1831)	Unionidae	AL,IL,IN,KY,MI,OH,TN, PA,VA,WV, Canada

Contributor: David L. Evans

Note: Species in categories 1 and 2 are candidates; species in Category 3 are not (see top of list for explanation of categories).

ALABAMA

Another summer has come and gone here in the great state of Alabama! We are completely settled in our new (used) facilities and appreciating the extra space.

On with the events of the summer... As a part of the AL/MS Joint Ecoregion project, Vickie, Brien, and Fred spent a large part of April and May visiting candidate reference sites in several of the sub-ecoregions of Alabama's Southeastern Plains ecoregion. Eleven sites were chosen to complete more intensive surveys that included habitat assessment, physical and chemical parameters, and collection of aquatic macroinvertebrates. All of this data is currently being analyzed. We hope to spend part of early next spring visiting candidate sites in several of the other sub-ecoregions.

Our water quality demonstration studies for this season are nearing completion. These studies are used to document change in water quality of the receiving waters due to upgrade of a wastewater treatment facility. Data was gathered from Buck Creek, Alabaster, to document the water quality prior to upgrade of that facility and from Big Wills Creek near Ft. Payne, to show any change in water quality after upgrade of their facility. Biological monitoring utilizing aquatic macroinvertebrates was included in both of these studies.

Monthly monitoring continues on the Black Warrior River in west-central Alabama to document any changes in water quality possibly associated with the coalbed-methane industry. Ten different sites along the river are being studied. Vertical profiles of temperature, dissolved oxygen, pH, and conductivity are collected at each site along with composite bottom and photic zone water samples for laboratory analysis. Hester-Dendy multiplate samplers are also deployed each year to attempt to detect any adverse impact to the macroinvertebrate community.

The 1991 Lakes Water Quality Monitoring is completed for this season. Eleven reservoirs were included in this year's rotation. The water quality data collection will be compiled and entered in STORET. Trophic state index values for each reservoir will be calculated from corrected chlorophyll-a concentrations.

As a follow-up to the 1989 Clean Water Strategy Water Quality Assessment Report, sites that were shown to be in violation of standards and that have had some sort of remedial action taken within the last two years, were sampled from May through October of this year to document improvement in water quality.

So far this year we have completed one and one-half intensive survey waste load allocations: Walnut Creek at Troy (which we will repeat the third week of October), and the Little Cahaba River at Leeds. The half study is the latter one which was attempted during two different weeks and was rained out prior to completion on both occasions.

Our main effort the last few weeks has been to collect the elusive Largemouth Bass and Channel Catfish for fish tissue analysis for PCB's, Mercury, and a pesticide scan. This monitoring effort is part of ADEM's statewide fish tissue monitoring program - a cooperative effort between the Department, the TVA, the Alabama Department of Public Health, and the Alabama Department of Conservation and Natural Resources. Bleach Kraft paper mills are monitoring fish for dioxin as part of their NPDES permit requirements.

ADEM has also been participating for the first time in the Alabama State Fairs in Mobile, Birmingham, and Montgomery. The Mining and Nonpoint Source Section of the Water Division has coordinated the volunteers for an information/education booth to be located in the exhibit buildings. The main interest from our standpoint was to educate the citizens of Alabama as to some of the work being done by the Department, along with some of the educational opportunities available through different programs coordinated by, or participated in, by our Department. The Fair in Montgomery is being held this week and, from what I understand, the booth is being generally well received.

The Toxics Unit has started running toxicity tests again now that Norman's flow-through water system is in place. This much-needed renovation makes culturing of the fish more efficient and trouble free.

The Unit has performed 10 chronic and 4 acute tests since September 3, including a special study in cooperation with the TVA to compare the results of the Ceriodaphnia dubia test to a juvenile freshwater mussel 9-day test that the TVA has developed. This study utilized sediment extracted porewater at stations on Wheeler Reservoir that exhibited toxic results to the juvenile mussels during earlier studies. Preliminary results indicate toxicity to the Ceriodaphnia also.

Cathy spent one week this summer with Don Schultz, EPA, Athens, learning the Algal Growth Potential Testing Procedures. The Unit has had several requests for the development of this procedure in-house. The first test was set up this week, and pending the results, they plan to perform 17 more tests this fall.

We hope to see a great turnout at Hilton Head!!!

KENTUCKY

Autumn has arrived in Kentucky. According to the Kentucky Department of Fish and Wildlife Resources calender, the last two weeks are an active time outdoors; fox and raccoon litters are dispersing; chimney swifts migrate south for the winter; turkeys start feeding on mast in forests; deer rut begins; fall mallard migration peaks; ospreys and wood ducks leave state; bald eagles begin migrating into state; and groundhogs begin hibernating; leaf color is at its peak.

Now on with the news!

Standards & Specifications Section

- Review of the ambient monitoring network continues
- Ambient lake sampling has been completed; special studies lake sampling will continue through December
- Several WLA (wasteload allocation) studies were conducted this summer; reports are being prepared
- Ambient water quality is being edited prior to uploading to STORET

Ecological Support Section

- Biological monitoring program (BMP) sampling has been completed for year
- Intensive surveys were conducted in Little Sandy River, Big South Fork of Cumberland River, and Little Pitman Creek; reports are being developed
- Reference reach fall sampling at or near completion; work underway to select reference sites in all ecoregions; will recon sites this winter
- Lythia and John attended algal taxonomy/ecology workshop in Athens

- Assisted ORSANCO in conducting four lock chamber studies in Ohio River

Bioassay Section

- Completed 1991 monitoring inspections; since May, 21 acute and four chronic studies conducted; reports being prepared

Nonpoint Section

- Work continuing on Mammoth Cave Area and Salt River Basin projects
- Joint project with Tennessee is continuing; project is documenting success of reclamation in Bear Creek Basin as reflected in improved water quality and biological community structure

THE COURIER-JOURNAL

9-20-91

Destructive zebra mussel has pushed its way into Kentucky Lake, TVA says

Associated Press

NASHVILLE, Tenn. — A tiny mussel that reproduces at an astounding rate and has no natural predators has made its way into Kentucky Lake, an ill omen for every boat hull and water intake valve in sight.

The Tennessee Valley Authority says a single zebra mussel was pulled from Kentucky Lake on Sept. 10 by a mussel fisherman. TVA mussel specialist John Jenkinson said the 1-inch-long zebra mussel was attached to a native mussel.

TVA scuba divers and biologists from Kentucky searched the area this week, but so far no additional zebras have been found, Jenkinson said.

But "we're dealing with a needle in a haystack phenomenon," he added. "The chances that we found only one of two out there are pretty remote."

The discovery in Kentucky Lake is the southernmost citing of a zebra mussel, which first appeared in the United States in the Great Lakes and quickly made a tremendous pest of itself.

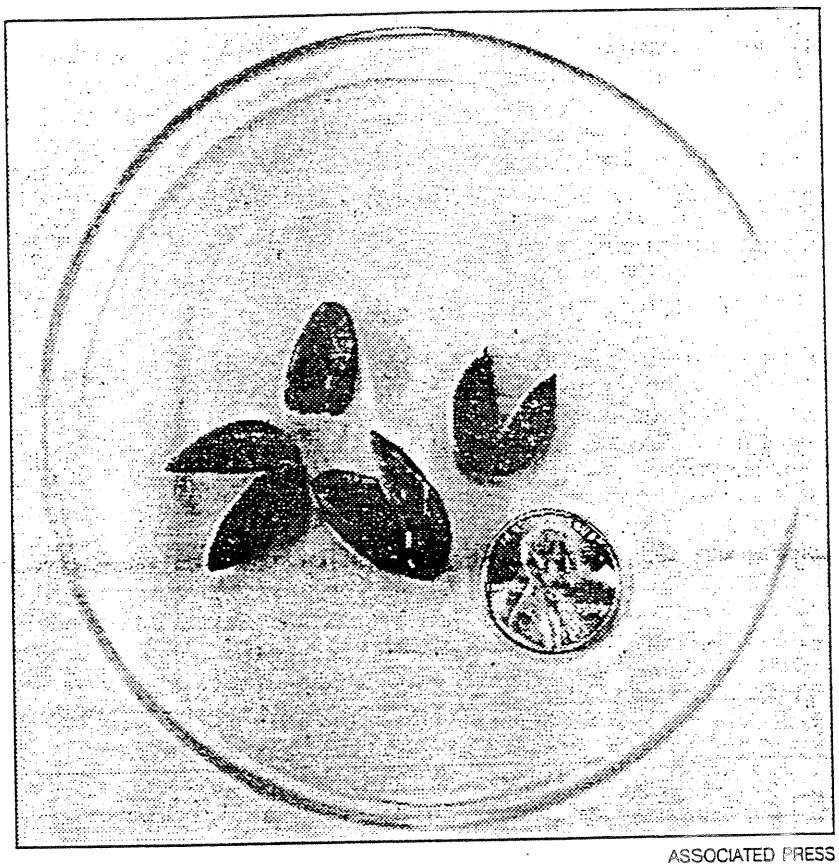
Estimates are it will cost up to $1 billion to combat the mussel in the Great Lakes.

Jenkinson said aquatic scientists have been dreading the mussel's migration south.

No effective way to control it in large areas has been discovered either here or in Europe, from where it was carried to the Great Lakes in shipping.

Zebra mussels were first found in Lake Saint Clair near Detroit in June 1988. By October 1990, they had spread to all five Great Lakes.

Lake Erie contains up to 900,000 animals per square meter of lake bottom in some places, and native mussels there have been virtually eliminated by the zebras.



ASSOCIATED PRESS

The tiny zebra mussel can cause big problems in waterways.

"They grow at an indecent rate," said Ray Norris, Nashville coordinator for Save Our Streams. "They cluster so much, they make these little balls of mussel colonies. They accumulate in such large numbers on such things as tillers and rudders that they have sunk the boats."

The mussel lives about five years and can produce up to 40,000 eggs per year.

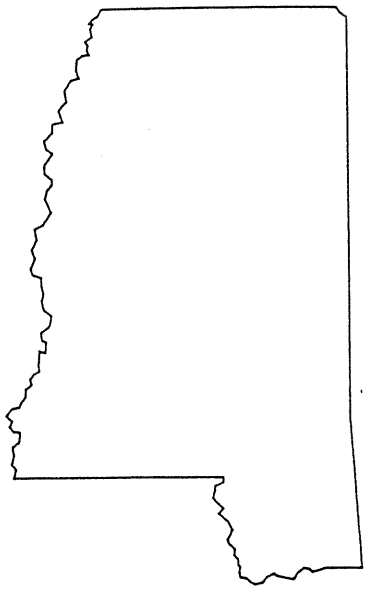
Tropical temperatures farther south are expected to stop its spread, said biologist Mason Sinclair.

"But all of Tennessee is fair game," he said.

"As far as contingencies, double intake lines could be built so that one could be cleaned while the other is down, but we don't have any real plans for it."

Zebra mussels also threaten recreation, not only damaging boats but making shorelines and beaches unattractive.

"When TVA or the Corps of Engineers lower lake levels, that's going to leave them all exposed and they'll die," Sinclair said. "There'll be a horrible stench."



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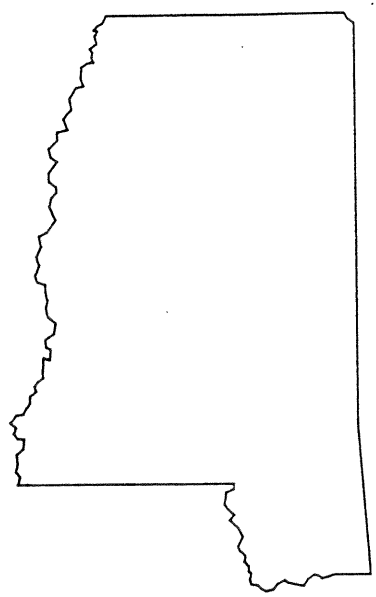


WE APOLOGIZE

Sorry that we were unable to contribute to the last issue of the newsletter. We'll try to do better in the future. Much has happened here since we last communicated with you. Ambient biological monitoring is in full swing, and about to wind down to a winter of head-capsule smashing. We're looking forward to the November SWPBA Meeting--be sure and bring the volleyball!

Thus far, the biological staff has bioassessed nearly 60 sites and have 20-25 more to go before the end of October. About 30 sites have been sampled for ambient fish tissue monitoring, and several other sites have been shocked for special studies. Fishery Biologist Billy "skeeter" Justus has "invented" an new and better way to collect catfish---but he'll tell you about it at the SWPBA Meeting.

GOOD-BYE AND HELLO

GOOD-BYE to Stanley Rodgers, biological section coordinator, who left in September for the greener?? pastures of East Millstone, New Jersey. Stan has taken a job with Exxon Biomedical, and will function as manager of the toxicity culturing section.

HELLO to Kevin Crothers, a native of Jackson, MS who will be working for Henry Folmer on the Dioxin studies currently being undertaken--WELCOME ABOARD.

ITS HAZARDOUS WASTE RUNOFF!

ITS OILY GOO!

ITS algae

Yes, its algae, and it caused a lot of excitement when it bloomed in some roadside ditches adjacent to the former Reichold Chemical Company site. Read on:

Officials eye 'oily goo' at Reichhold

■ Gavin's crusade, 7A
■ Illegal dumping suspected, 7A

By KELLY CARSON
AMERICAN Staff Writer

COLUMBIA — More than 5 inches of rain since May 1 have caused what is believed to be algae to form in a neighborhood around a former chemical company that is under federal cleanup orders.

"We will take a sample to verify that it is algae," said Michael Stack, an environmental engineer with the state Department of Environmental Quality's Bureau of Pollution Control. "It's hard to say just what it is at this point."

The Marion County area has received more than 35 inches of rain since the first of the year.

Stack was called Tuesday to Columbia after residents near the former Reichhold Chemical Co., noticed what looked like oily goo in drainage ditches leading from the site.

Stack was joined by Alec Van Ryan, a spokesman for the chemical company, and W. Scott Phillips, an environmental engineer with Malcolm Pirnie, a Jackson firm coordinating the cleanup following federal Environmental Protection Agency orders.

A few days of sunshine will help dry up the standing, stagnant water in which the algae is growing, Stack said.

"There is no health threat," he said.

Resident Yvonne Gavin called Stack's office Tuesday because she was concerned the goo was moving off the Reichhold Chemical site.

"You can see it, all you have to do is look down there. It's there," Gavin told Stack.

The site has been the subject of federal EPA scrutiny since 1984, when a former inspector with the federal Occupational Safety and Health Administration warned of possible contamination to groundwater wells in the city.

In 1987, drums of hazardous waste were found on the property and then removed under federal orders.

Reichhold currently is involved in a massive cleanup of the 81-acre site to ensure removal of all hazardous materials, including soil, asbestos and aban-

■ See GOO, section back

GOO

■ FROM page 1A

doned building material.

The company operated a chemcial plant on the site until a fire and explosion ripped through the property in the 1970s.

Later this summer, Van Ryan said, new fences will be installed around the property and massive cleanup efforts will begin.

Currently, environmental specialists are testing dirt and other material to see how it must be contained and removed, he said.

"There is no migration by air, water or any other pathway of hazardous material from the site," Van Ryan said. "We understand Mrs. Gavin's concerns and we will very definitely respond to all concerns."

Gavin also is urging Reichhold, or state or federal agencies to test the 400-plus children in the neighborhood surrounding the chemical company land, fearing they may have been exposed to hazardous waste.

She will attend a Washington, D.C. workshop next week on public health issues sponsored by the Agency for Toxic Substances and Disease Registry, a division of the federal Department of Health and Human Services. The workshop is designed to increase awareness about the registry and the department health assessment process.

Algae may have caused 'petroleum spill' in Columbia

COLUMBIA — Officials who thought they had discovered a petroleum spill in Columbia may have been fooled by naturally occurring algae brought to life by an abundance of rain.

"At first appearance it did look like a petroleum product, but after further investigation that doesn't seem to be the case," said Eleana Turner, a spokesman for the state's Bureau of Pollution Control.

A state environmental engineer was shown the pool of black water on a city street Tuesday by a Columbia resident concerned that hazardous waste may be washing off land at a nearby former chemical company plant.

Turner said the substance may be algae.

"We won't know if it's naturally occurring algae until we get the lab tests back," she said.

Columbia 'spill' may be algae

Environmentalists continue testing black water substance found

By KELLY CARSON
AMERICAN Staff Writer

What at first appeared to be a petroleum spill in Columbia may turn out to be more naturally occurring algae brought to life by an over abundance of rain.

"At first appearance it did look like a petroleum product, but after further investigation that doesn't seem to be the case," said Eleana Turner, a spokesman for the state's Bureau of Pollution Control, a division of the Department of Environmental Quality.

A state environmental engineer was shown the pool of black water on Park Avenue Tuesday by a Columbia resident concerned that hazardous waste may be washing off land at a nearby former chemcial company plant.

"We went to the site and pulled samples from a couple of different locations and have sent them to our Pollution Control lab here in Jackson," Turner said Wednesday. "We're expecting something back in two to 10 days."

The engineer, Michael Slack, said Tuesday he thought the substance might be a petroleum-based product that may have been dumped illegally.

Turner said the substance may be algae similar to growth found in drainage ditches along Mississippi Avenue, which Slack also inspected on Tuesday.

"We won't know if it's naturally occurring algae until we get the lab tests back," she said. "From a visual inspection, that's what it appears to be. It doesn't have an odor and doesn't exhibit any type of chemical properties."

The area, located across Park Avenue from the rear property line of the former Reichhold Chemical Co., is holding stagnant water, which promotes algae growth, she said.

"It's probably been holding water for a long time now," she said.

More than 35 inches of rain have fallen in the Columbia area since Jan. 1 with more than five inches of that since May 1, Marion County Civil Defense officials said.

Another Mississippi river recently was in the news. The Yazoo River, which drains the Mississippi delta region of the state received the dubious honor of being listed as a "hot spot" for DDT.

Yazoo Called 'Hot Spot'

JACKSON (AP) — High levels of DDT made the Yazoo River a nationally known "hot spot" of pesticide contamination, federal officials say.

The U.S. Fish & Wildlife Service monitored the Yazoo and 111 rivers in other states in a national pesticide survey.

DDT was still found in record levels in fish taken from the river at Redwood in 1985, the last time the agency monitored it, said Allan Mueller, Vicksburg field supervisor for the Fish & Wildlife Service. DDT was banned in the United States in 1972.

"That spot, for all of our samples, has always been the highest in the nation for DDT, and every year except 1978, for toxaphene," Mueller told the Mississippi Water Resources Planning Task Force Tuesday.

DDT and toxaphene are insecticides that were banned because of their long-lasting toxic effects on birds and animals. DDT is suspected of causing cancer and can affect the kidneys, lungs and liver. Toxaphene is considered a cancer risk.

DIOXIN

Dioxin continues to dominate much of our conversations here in Mississippi as well as in the news media. Here is a sampling:

Almost 3,000 Lawsuits Filed Over Alleged River Pollution

PASCAGOULA, Miss. (AP) — Attorneys representing more than 2,000 litigants in river pollution cases visited courthouses in Jackson and George counties to file lawsuits seeking nearly $7 billion in damages from two pulp mills.

Most of the suits were filed on behalf of people who claim they have suffered from exposure to hazardous substances — including dioxins — in the Escatawpa and Pascagoula rivers.

The rivers, along with the Leaf River, are off limits to fishermen because of a Hinds County chancery judge's order.

A total of 2,717 suits were filed in Circuit Court in Jackson County and George County. Of those, 989 name as defendants both Georgia-Pacific's Leaf River Pulp Operations in Perry County and International Paper Co. in Moss Point. Most of the suits are against the Leaf River mill. None name the International Paper plant without also naming the Georgia-Pacific plant as a defendant.

Officials at each mill maintain they have cleaned up their wastewater in recent years, almost to the point of eliminating dioxin production. They also say the mills are in compliance with all local, state and federal environmental regulations.

In Jackson County, suits were filed on behalf of 398 plaintiffs. Eleven of them are owners of businesses that depend on boaters and fishermen for their livelihood.

Lawyers filed 1,719 suits in George County on Friday, 1,553 of which named only the Leaf River mill.

"Most of the people who are plaintiffs are simply people who have been exposed to contaminants discharged into the rivers by the pulp mills," said attorney Darryl Hurt Sr., of Lucedale.

Generally, each plaintiff is suing for $1 million in compensatory damages and $2 million in punitive damages, Hurt said.

The cost to attorneys for filing the suits was $10 per plaintiff plus a minimum filing fee of $45.50 in Jackson County and $42.50 in George County.

The attorneys said about 1,700 more suits will be filed in George, Greene and Jackson counties in the next two weeks.

About 60 similar suits had been filed in various courts, including one with 1,835 plaintiffs who claim to have eaten fish from one or more of the rivers. Thirty-five had been filed this week on behalf of houseboat owners and renters and landowners along the Pascagoula and Escatawpa rivers.

All have been filed since a precedent-setting judgment of more than $1 million was awarded to Greene County landowner Wesley Simmons, represented by Deakle and two other lawyers.

Warren Richardson, general manager of the Leaf River mill, said the attorneys are seeking publicity and

Agency clears Escatawpa bass, bream for eating after dioxin-related tests

From Staff and Wire Reports

PASCAGOULA — The state Department of Environmental Quality announced Wednesday it is safe to eat bass and bream from the Escatawpa River, previously closed to fishing because of paper-mill pollution.

The agency based its decision on first-phase testing of fish tissue for concentrations of dioxin.

Dioxin, which causes cancer in laboratory rats and is suspected of causing cancer in people, is produced when chlorine is used to bleach wood pulp to make paper.

Phil Bass, with the DEQ's pollution control laboratory, said the field and laboratory data led to bass and bream being removed from the current advisory recommending limited consumption of certain fish and shellfish in the lower portion of the Escatawpa River. The advisory will remain in effect for catfish or any other fish in the stream.

"The data is encouraging," Bass said. "We just hope that trend is continuing. We're encouraged by this first-round sampling and we hope this same pattern continues."

In January, the Commission on Wildlife, Fisheries and Parks lifted a three-month commercial-fishing ban on the Escatawpa, Pascagoula and Leaf rivers after the DEQ said people could safely consume about a quarter-pound of catfish a month from the rivers.

The commission ordered the ban because of dioxin levels found in catfish caught below International Paper's mill on the Escatawpa River in Jackson County and Georgia-Pacific's mill on the Leaf River in Greene County. The Leaf River feeds into the Pascagoula River.

More than 2,000 south Mississippians have filed claims against the paper mills seeking more than $2.79 billion in damages because of the mills' dioxin discharge into the rivers.

The DEQ's year-long study of fish tissue, which began in February, will examine dioxin levels in fish and shellfish from the Escatawpa and Pascagoula rivers three times in 1991. It is being funded by Georgia-Pacific.

During the first phase, "we collected over 130 fish, plus oysters and crabs," Bass said.

The fish were filleted, processed and sent to a Kansas City laboratory for dioxin testing.

He said 37 samples totaling 130 fish, crabs and oysters were collected from three locations on the Escatawpa River and two locations on the east Pascagoula River.

Results showed that five of the 27 samples exceeded five parts per trillion of dioxin. This is the level above which DEQ will issue a limited-consumption advisory.

All five samples exceeding the criterion consisted of large catfish. Three of these were composite samples of flathead catfish averaging 12, 18 and 25 pounds. These larger, older fish tend to accumulate higher levels of dioxin than do smaller fish.

"We're advising people to be cautious in consuming large amounts of blue catfish from the Leaf and the Pascagoula rivers," Bass said. "That fish, we've seen some problems with on the Leaf."

Bass said bluegill, largemouth bass, blue crabs, oysters, striped mullet, red fish and speckled trout samples in February were all below 5.0 ppt.

State Dioxin Limit Wins EPA Approval

BILOXI — Although thousands of Mississippians have objected to the state-set limit on how much dioxin is allowed to be discharged into rivers and streams, it has won Environmental Protection Agency approval.

The limit is being appealed by a Pascagoula attorney who represents thousands of Southern Mississippi plaintiffs.

The plaintiffs are suing the paper and pulps mills that discharge dioxin.

The state Commission on Environmental Quality set the 1.0 parts dioxin per quadrillion parts of water limit in March, against the recommendation of the Department of Environmental Quality staff. The staff recommends a level about eight times lower, .12 parts per quadrillion.

Tests show some fish OK to eat

PASCAGOULA (AP) — The state Department of Environmental Quality says it is safe to eat bass and bream from the Escatawpa River, but warned against consuming other fish until more dioxin tests are completed.

Phil Bass, with the department's pollution control laboratory, said Wednesday that the bass and bream were cleared after field and laboratory data obtained thus far from the lower portion of the Escatawpa River. The advisory will remain in effect for any other fish in the stream.

"The data is encouraging," Bass said. "We just hope that trend is continuing. We're encouraged by this first-round sampling, and we hope this same pattern continues."

The study, which will last one year, began in February. It will examine dioxin levels in fish and shellfish from the Escatawpa and Pascagoula rivers three times in 1991.

During the first phase, "we collected over 130 fish plus oysters and crabs," Bass said.

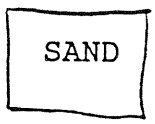
He said 37 samples totaling 130 fish, crabs and oysters were collected from three locations on the Escatawpa River and two locations on the east Pascagoula River.

"We're advising people to be cautious in consuming large amounts of blue catfish from the Leaf and the Pascagoula rivers," he said. "That fish, we've seen some problems with on the Leaf."

JUST NONSENSE

Here in Mississippi, we biologists miss the "Mystery Taxon" feature that was a part of this newsletter. It stimulated good conversation during lunch breaks as to what the correct answer was. SOOOOOOO, in the interest of sharing something fun with our colleagues from other states, we came across this a few weeks ago.

BRAINTEASERS

1. 

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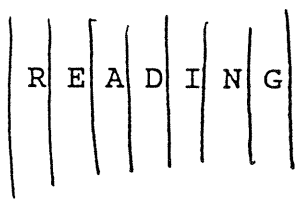
8. 

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NORTH CAROLINA

BENTHOS

Recent Surveys

Dischargers

-Swift Creek, 5 sites, 6/91. The Division continues to monitor Swift Creek near a new quarry discharge. This stream is of special interest due to its diverse mussel fauna. After one year of sporadic discharge from this quarry, we have found no changes in the fauna of Swift Creek.

-Carolina solite, 3 sites, 6/91.

-Dischargers to 0 30Q2 streams. The Division continues to be interested in studying the effects of dischargers to small streams, where there may be little dilution of the effluent. We looked at 4 such dischargers (6 sites, 8/91) which were in compliance with their permit limits. and found no substantial impact at most sites. (Report in preparation)

-Becker Minerals, Upper Little River, 3 sites, 7/91. Analysis of EPT samples from the Upper Little River showed impact from illegal discharge of mine tailings and other sediment.

-Burnt Swamp, 2 sites, 6/91. Runoff from a chemical company was not found to have a significant impact on downstream systems, specifically a small swampy stream.

Nonpoint source studies

-The Division continues to monitor several nonpoint source runoff projects (largely coordinated by SCS), in hope of eventually demonstrating the effectiveness of various BMP's. We have had little luck with these program to date, often due to lack of cooperation from all farmers in a catchment:

- -Duplin County, 4 sites, 9/91. Forced to compare high and low-flow years. We may have seen some minor improvements at the test site.
- -Long Creek, 6 sites, 4/91. The "before" part of this study.
- -L Yadkin River, 7 sites, 5/91. This study looks st the effects of many small ponds constructed in this catchment.

-Peak Creek, 3 sites, 4/91. Runoff from an abandoned mine may represent North Carolina's only documented "acid mine drainage" problem. This survey demonstrated the magnitude of impact prior to installation of BMP's.

High Quality Waters/Outstanding Resource Waters

-Waccamaw River and Lake Waccamaw. 6 sites, 6/91 (Report still in preparation). Portions of the Waccamaw River received an Excellent bioclassification using DEM macroinvertebrate collections, and were suitable for an ORW classification. We have also reviewed fish and mollusc collections by other investigators. Several rare species were found (see taxonomy section).

-Black River. One site on the lower Black River was resampled to confirm an Excellent bioclassification. The NC Wildlife Resources Commission is also resampling this area to determine the status of gamefish populations.

Benthic Macroinvertebrate Ambient Network. The Division is changing its ambient network sampling to emphasize different basins each year. This sampling will be done on a five-year rotation, with 2-3 basins being sampled each year. All the permits in a basin will be up for review at this same time, with an emphasis on the combined effect of all point and nonpoint source dischargers. The first set of basins was the Neuse and Lumber River basins. Benthic macroinvertebrate sampling is one of the the primary means of documenting existing water quality. In July we focused on the Neuse River basin collecting 20 standard qualitative samples and 36 EPT samples. A similar level of intensity is being applied to the Lumber River during August and September. This type of approach functions well to sample most flowing streams, but we have not obtained satisfactory results from swamp streams, and streams with no flow during summer months. Some of these areas will be sampled in the winter months, when they should have higher flow and a

more diverse invertebrate community. Prior to any widespread sampling, however, we will be developing and testing sampling methods for these systems.

Biocriteria

-As detailed above, we have been forced to consider biocriteria for swamps. Stay tune to this channel for further details. We are also participating in the tests of Deleware's "bank jab" technique.

-We continue to test our new tolerance values for freshwater invertebrates (a Hilsenhoff-type biotic index). Our primary concern is to find out where the tolerance values give misleading results and should not be used.

-We continue to test the use of biocriteria for small streams, especially looking at adjustment of EPT taxa richness values in small mountain streams. We developed correction factors based on spring sampling, but testing of these correction factors in April 1991 gave anomalous results, i.e., there was no increase in EPT taxa richness going from 3 meter streams to 11 meter streams. While we believe that this "flattening" of the stream size vs. taxa richness curve is unique to early spring, we will have to do further testing. Summer samples were collected for this purpose, but the results have no yet been examined.

Taxonomy

"To state the matter in its simplest terms, we may say that there are things and there are the names that we attribute to things. The first are real in a sense in which the latter are not.....Taxonomy undertakes to devise a nominal world that will fit the world of physical realities as closely as may be. This undertaking can never be more than partially successful, however, because of an inherent difference between the two worlds. The nominal world is by its nature a categorical world, while the real world is essentially uncategorical."

Louis Halle, The Owl of Athena, 1970.

New and/or rare critters

1. Waccamaw River, June 1991:

Ephemeroptera (Mayflies)

Choroterpes hubbelli . The Waccamaw River is the only known collection site in North Carolina where C. hubbelli is abundant. This species is widespread, although uncommon, in Florida's coastal plain streams (Berner and Pescador 1988). It is rare in Georgia and South Carolina, probably reaching its northern-most limit in North Carolina. In DEM collections, Choroterpes was limited to the main river, with maximum densities at station 4 (NC 130). Other collection localities for Choroterpes in North Carolina include several small slate-belt streams. This disparity in habitat suggests the presence of two species.

Caenis anceps. A single nymph keying to Caenis anceps was collected from the Waccamaw River near Crusoe Island. This species is primarily limited to the northeast United States, and published distribution ranges give Virginia as the southern limit along the east coast (Provonsha 1990). This is the first NC record for this species.

Chironomidae (Midges)

Ablabesmyia philosphagnos. This swamp species was originally described from Florida, but there are scattered records as far north as Canada (Roback 1985). It is not, however, common outside of Florida. There are, for example, no records from neighboring South Carolina (Hudson et al. 1990). Collections from upper Juniper Creek were the first DEM record of this species, although it had previously been recorded from North Carolina by other investigators.

Ablabesmyia n. sp. nr aspera (?). This species keys to A. aspera in Roback (1985), a species which is known to occur in most southeastern states, but has not been recorded in North Carolina (Hudson et al. 1990). Juniper Creek (at NC 211) specimens differ in having only one very dark claw on the anal prolegs (similar to A. hauberi).
Labrundinia n. sp.(?). Upper Juniper Creek specimens were similar to L. virescens, but differed in the structure of the "furcate claw of the posterior proleg". It seemed most similar to Roback's (1987) Labrundinia sp. 5 from Columbia.
Labrundinia beckae. Waccamaw River at NC 130. This species is widespread, but rare throughout its range.
Paracladopelma loganae. Waccamaw River at NC 130. This species is widespread, but rare throughout its range (AL/FL/GA/SC/NC). (Jackson 1977, Hudson et al. 1990)
Xestochironomus sublettei. Waccamaw River below dam. This species is widespread, but rare throughout its range (NM/FL/GA/SC/NC). (Borkent 1984, Hudson et al. 1990).
Cladotanytarsus sp. 2A. Waccamaw River near Crusoe Island. This rare (still undescribed) species has previously been collected in North Carolina from the Lumber River and the Trent River (July-September 1985).
Genus near Nimbocera. The only North Carolina collections for this taxon are from Bogue Swamp, November 1983. This genus has also been collected from coastal plain habitats (lakes) in Florida, Georgia and South Carolina.

"The lesser lights, the dearer still
That they elude a vulgar eye"
Robert Browning (1812-1889)

Oft in the stilly night,
When the mind is fumbling fuzzily,
I brood about how little I know,
And know that little so muzzily.
Ere slumber's chains have bound me,
I think it would suit me nicely,
If I knew one tenth of the little I know,
But knew that tenth precisely.
Ogden Nash, Versus, 1949

PHYTOPLANKTON

The Phytoplankton Group is welcoming aboard two new members as of October 1. They are Greg Price and Lisa Williams. Some of you may know Greg from his lake work in Jay Sauber's Intensive Survey Group. Lisa has a coastal plant background. We are looking forward to getting them up to snuff on their taxonomy as we are very far behind since we lost Steve Mitchell and Cherri Smith. Steve has gone to the Raleigh Regional Office to look at WWTP and Cherri will be making her reputation in Wetlands Program Development. In the immortal words of our dear VP, "Wet is wet and dry is dry!"

Karen and I just returned from the Algal Taxonomy and Ecology Workshop in Athens. What an excellent week!! It really renewed my interest in phytoplankton and gave me a better feel for the usefulness of periphyton. Drs. Rosen and Carricker did fantastic jobs during their lectures and labs. Thanks to you, Ron, for pulling this together. How about some more workshops? Perhaps on individual classes such as blue-greens, diatoms, and/or dinoflagellates?

We have several projects kicking. A draft report on baseline monitoring in the Albemarle/Pamlico Sound area (APES) is due October 31. Little does he realize but Greg and I will be eating, drinking, and sleeping APES for the rest of this month. Yes I am a little behind, but hopefully my in-stream nutrient criteria paper, which is being revised as we speak, will be justification for the delay in beginning the APES report. I have reviewed all the literature I could find, talked to all Region IV states and analyzed lots of our ambient monitoring data to determine if in-stream nutrient criteria should and/or could be included in our regs. I think I have made a good case for free flowing waters and lakes/reservoirs and some reasonable targets. The final report should be released by the end of the year.

Karen recently finished review of data from the Rocky River near Siler City to determine if it should be declared NSW. Available data indicated that NSW designation was not justified but that nonpoint source controls were definitely needed to decrease nutrients and sedimentation to the River.

See you at SWEPBA! PS Hi! Hunka!

"In my experience men and women who pull the laboring oar in public work usually would rather do good work than bad work - would rather work hard than waste their time - provided only that they have been shown, and have understood, that the work they are doing is worth while, and that they are themselves a part of a great public movement whose purpose is public good.

Loafers in public office I have seen in plenty. Political appointees who drew their salary and literally did nothing else have not been to me unknown. But the vast majority only need really good leadership to make the public service fully as efficient as private business at its best."

Gifford Pinchot, 1947, Breaking New Ground

"I meant to be idle, having a gift in that direction which I am seldom able to cultivate as it deserves. It is one of the best of gifts."

Bradford Torrey, 1898, A World of Green Hills

Data Assessment and Certification Group

Significant changes in North Carolina's toxicity permitting and compliance strategy have occurred over the last several months. Facilities required to perform chronic toxicity testing now have a choice between two test procedures. Facility compliance will be determined on a quarterly or monthly basis, depending upon which of the procedures is chosen. One option will be North Carolina's standard chronic pass/fail toxicity test ("North Carolina *Ceriodaphnia* Chronic Effluent Bioassay Procedure," Revised September 1989). However, a single failure will constitute noncompliance, whereas previously, two consecutive failures were required to become noncompliant. The second option will be a procedure which utilizes multiple range testing or a combination of pass/fail and multiple concentration testing ("North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure," July, 1991). Compliance will be determined on a quarterly basis, utilizing an average chronic value. The choice of procedures will only be available at the time of generation of a new permit or at the renewal time of an existing permit.

Laboratories performing toxicity testing for North Carolina facilities have formed a loose association and have met twice to discuss common problems and solutions to those problems. Aquatic Toxicology Unit staff were invited to the second meeting, which occurred on September 19. Dr. Debra Sauer, administrator of South Carolina DHEC's biological certification program, was also in attendance. Topics of discussion were the Phase II procedure cited above, computer statistical analyses, plastic materials recycling, two presentations of feeding investigations, and the future direction of the association.

The number of facilities required to perform toxicity monitoring steadily increases. Statewide, 472 NPDES permits now have toxicity testing selfmonitoring requirements. Additionally, 61 self-monitoring requirements have been required by administrative letter. Since January 1, DAC Group personnel have also processed 37 applications for the use of biocidal compounds in cooling tower systems which have discharges to surface waters.

The Data Assessment and Certification Group welcomes Phil Bethea to its staff as an Environmental Specialist II. Phil comes to the Group from DAC's sister group within the Aquatic Toxicology Unit, the Toxicity Evaluation Group. Phil has a B.S. in Fisheries and Wildlife from NC State University and worked for a time as a Fisheries Technician in DEHNR's Wildlife Resources Division. His work with TEG included fish culturing, acute and chronic toxicity testing, onsite toxicity evaluations, and administration of the Group's quality assurance program. During the time that DAC's Environmental Specialist II position was frozen, Phil assisted the Group with administration of the biological laboratory certification program. Phil will now take the lead role in the administration of this program.

Toxicity Evaluation Group

This fall has seen a couple of personnel changes in our small group and promises at least one more. Environmental Biologist Phil Bethea has officially moved over to the Data Assessment and Certification Group as an Environmental Specialist. Not one to pass up a good thing, technician Susan Carroll has become our newest biologist, filling Phil's somewhat large shoes very capably. Her duties will include all fathead minnow cultures in addition to regular acute and chronic toxicity testing. Once we hire a replacement technician, we'll be up to full staff for the first time in a long while. We're sorry to see Phil leave the Group, but he's still in the building. Congratulations to Susan and Phil on their new jobs!!

Toxicity Evaluation Group testing totals for the fiscal year are: Acute - 78; Chronic - 33; Q.A. - 87; Contract Lab-related - 36; Ambient - 23; and Special Studies - 6. We look forward to the annual meeting at Hilton Head Island to fill you in on some of the work we have been doing, to catch up on the toxicity testing accomplishments of other Region IV states, and to play a little volleyball! See you on the beach.

ECOLOGICAL SUPPORT BRANCH ACTIVITIES, APRIL 1991

Archie Lee and Jerry Stober met with John Marlar, Russ Wright, Bobby Carroll and Linda Anderson-Carnahan to discuss ESDs activities to support the Regional Strategic Plan. John Marlar will coordinate a divisional response to the program division on areas where ESD can provide technical support on the plan.

Jerry Stober commented on Region IV near coastal extramural project plans for contaminants in fish and suggested they compile all state and industry fish tissue data obtained since the NBS study into a common user friendly database. This would allow the Region as well as states to conduct trend analysis on selected sites as an important means of monitoring pollution control strategies. This database should continue to increase annually as long as fish tissue is analyzed.

Jerry Stober participated in an Estuarine Assessment and Contaminant Problem Identification Workshop in Biloxi, MS. Presented a discussion on Region IV environmental indicators used in estuarine and near coastal areas. Workshop results will be published as a guidance manual for gulf coast estuaries.

Bill Peltier began revising the three aquatic toxicity testing manuals for the NPDES permit program. The revisions were the result of comments to the December 4, 1989 Federal Register notification of inclusion of the manuals in the Federal Register.

ECOLOGICAL SUPPORT BRANCH ACTIVITIES, MAY 1991

As part of an IAG with the Navy, Bruce Pruitt, Mel Parsons and Philip Murphy conducted the required field work on Brunson OLF, Pensacola, FL. The wetland inventory included remote sensing of National Wetland Inventory (NWI) maps, aerials and a flyover which were ground-truthed. In-situ methodology included a description of the hydric soils, hydrologic regime and characteristic hydrophytes. The work was funded under an interagency agreement with the Navy and is part of the mandated effort to have all wetlands delineated on all Navy bases by 1993.

Mark Koenig's work continues on developing the non-radioactive Krypton technique for measuring the stream reaeration rate. The first trial study was conducted during the week of May 28. Analytical results are still pending but the method development appears on track. Additional reaeration studies are planned throughout the summer.

Alan Auwarter completed toxicological input to the report of findings from ecological studies conducted at Robbins Air Force Base. ESD's efforts on this site have resulted in significant savings in time and dollars for this primarily contractor-implemented project.

Alan Auwarter accelerated expansion of toxicity testing capabilities into low pH environments, such as those often found associated with bogs, frequently in Florida.

ECOLOGICAL SUPPORT BRANCH ACTIVITIES, JUNE 1991

At the request of FL-DER and WMD, members of ESB conducted a water quality, hydrographic and benthic study of two POTW outfall locations on the St. John's River, near Jacksonville, FL. The study, conducted jointly with FL-DER during the period of June 29-30, was designed to define areas affected by wastewater plumes. FL-DER is initiating efforts to address and evaluate the overall health of the St. John's River system and is targeting evaluations of existing and proposed POTW discharges.

On June 16-17, 1991, Philip Murphy accompanied Larinda Gronner of the Water Division for a panel discussion with the Governor's Citizen Advisory Council for the Florida Keys National Marine Sanctuary. The panel convened to discuss the status of programs associated with development of the Sanctuary management plan. Following the panel discussion, EPA personnel met with NOAA, Florida DER, DNR, DCA, and Governor's Office to refine the outline for the water quality management plan and discuss the data management systems to be used for information which will serve as the basis for the plan.

On June 18-19, 1991, Hoke Howard visited two demonstration projects involving non-point source problems. One site, near Sand Mountain, AL is a multi-cell constructed wetland for treating hog farm effluent. The other site near Huntsville, AL is a proposed constructed wetland for a resource-limited hog operation.

ECOLOGICAL SUPPORT BRANCH ACTIVITIES, JULY 1991

Del Hicks, Russ Todd, and Bruce Pruitt met with Tom Welborn, Water Management Division to discuss the kind of study needed to evaluate recovery of bottomland hardwoods by mitigation and natural recovery.

Russ Todd, Alan Auwarter, Ron Raschke, and Jerry Stober met with ETAG to discuss the ecological data from Aberdeen Site in North Carolina and to comment on the COE proposed study plan to evaluate ecological risk at Lake Hartwell/12 Mile Creek resulting from PCB contamination from Sangamo, South Carolina.

On July 14-16, 1991, Philip Murphy assisted Water Division personnel at meetings in Tallahassee relative to the development of a Water Quality Management Program for the Florida Keys National Marine Sanctuary. Representatives from several Florida state agencies, Monroe Co., FL, NOAA,

and EPA participated in the meetings which were working sessions to refine outlines of tasks which must be accomplished by the respective agencies.

During the week of July 22-26, 1991, Murphy, Lawhorn, Smith, and Parsons conducted the second (annual) photographic and identification survey of live bottom organisms at the Charleston ODMDS live bottom site. Information gleened from this effort will be compared to 1990 survey data to determine changes in the communities possibly related to proximate dredged material disposal.

On July 16, 1991, Hoke Howard met with the staff of the USDA-SCS, Ocmulgee Soil and Water Conservation District, Dooly County Health Dept. on a proposed constructed wetland treatment system for a swine operation.

On July 22-25, 1991, Hoke Howard assisted the staff of the Alabama Dept. of Environmental Management with sampling of subregional reference sites for Alabama/Mississippi Ecoregion Project.

Tom Cavinder met with WMD and representatives from Proctor and Gamble Corporation to discuss impact assessments of the P & G paper mill to the Fenholloway River and Apalachee Bay near Perry, FL. ESD will provide technical overview of their investigations and limited field work, specifically SOD and reaeration.

At the request of the Water Management Division (Wetland Planning Unit), Bruce Pruitt and mel Parsons completed the "draft" Florida Keys Wetland Evaluation Procedure. The criteria will be used in the functional assessment of the wetlands in the Keys as an integral part of the wetland Advanced Identification (ADID) process. The procedure is being field tested by the interagency field team in the Florida Keys.

Prepared Recommended Toxicity Test Conditions for Dredge Materials as proposed for the EPA/COE Regional Implementation Manual.

Jerry Stober attended a mercury workshop in Tallahassee where the Electric Power Research Institute presented their mercury cycling model for review and possible use in Florida.

Jerry Stober provided continued comments to Headquarters OST on Federal-State Assistance on sampling analysis, risk characterization guidance and fish advisories.

Jerry Stober attended on-going meetings with State of Georgia DNR to advise on development of contaminants in fish-risk advisory protocol for State.

ECOLOGICAL SUPPORT BRANCH ACTIVITIES, AUGUST 1991

Mel Parsons, Don Lawhorn, and Dave Smith traveled to Delaware to assist Region III in the ongoing monitoring of the artificial reefs located in Delaware Bay. The study included video taping, still photography, fish and epifauna identification and quantification, and water quality analysis to determine habitat suitability.