

Final Report

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Date of Report: April 1/2002

Title: The paradox of the Delta: Protecting the biodiversity we do not yet understand

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Research Category: SGER

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Objective(s) of the Research Project

In 1995 Mobile Bay, Mobile, AL, became a part of one of the country's 28 National Estuary Programs (NEP). Included in the NEP study area is the Bay proper and a large section of the Mobile/Tensaw Delta. The Delta comprises over 250,000 acres of wetland habitat, particularly cypress-gum swamps and bottomland hardwood forest. While we know the MTD is one of the country's treasures of biodiversity, little of this wealth has been documented. Because of this lack of basic knowledge, critical management decisions become little more than educated guesses. Of even greater concern is how our ignorance of the Delta's biota undermines our estimates of its health.

The results of our preliminary assessment of the insect biodiversity of the Mobile Tensaw Delta are the *initial steps* in a long term goal — the Total Insect Bioinventory Project (TIBP) of the delta. In its entirety, the TIBP will include the surveying, sorting, cataloging, quantifying, and mapping of entities such as genes, chromosomal inversions, species, demes, populations, ecotypes, species, habitats, and communities. TIBP is intended to be a long-term program (20 years duration) and involve an international panel of expertise. Though neglected in many previous biological inventories, the importance of hyper-diverse groups, such as the insects, is now being. This brief report presents a preliminary survey of the aquatic and aerial insects of the MTD

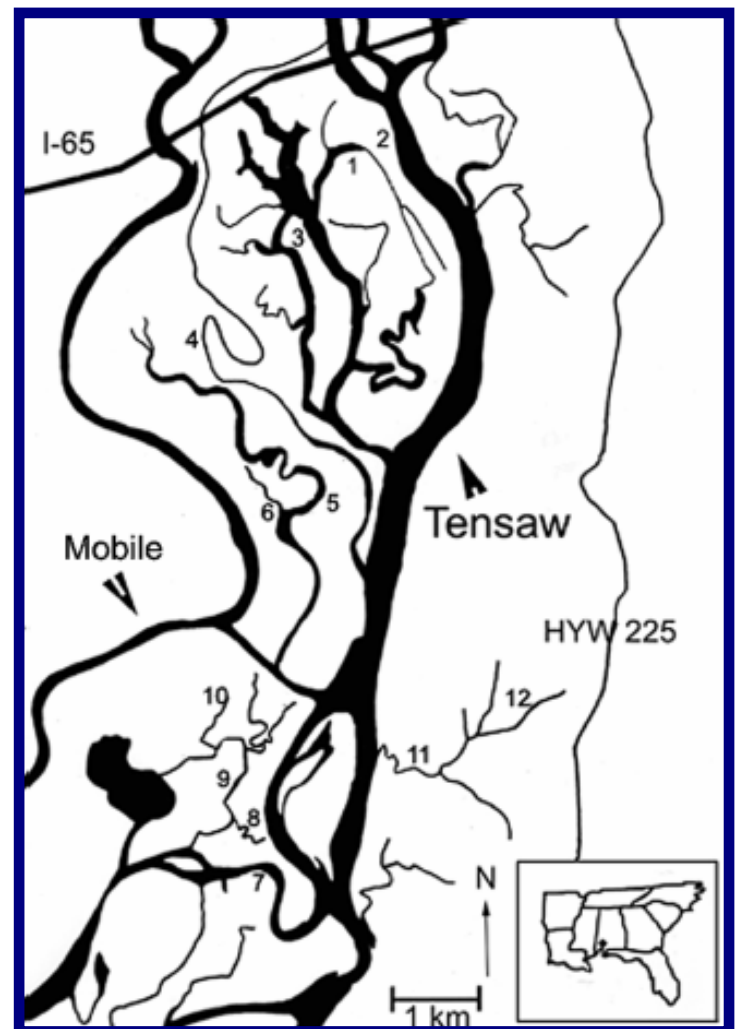


Fig.1. Sampling sites, Mobile / Tensaw Delta.

Progress Summary/Accomplishments

Methodology

The study area includes all waters and lands in the lower half of the Mobile/Tensaw Delta from 30.45° to 31.15° N and from 87.53° to 88.05° W. Four small (< 10 m), four medium (ca. 20 - 40 m), and four large (> 60 m) streams were sampled monthly from June 2000 to May 2001. Many species of aquatic insects have adult stages that are terrestrial. Furthermore, many immature aquatic insects can only be identified in the adult stage. Thus, three Malaise traps were used to collect adult insects.

Species identifications and data base

In the laboratory, specimens were identified to the lowest taxonomic unit (LTU), which is preferentially the species level. Identifications were conducted either by the authors of this report or by other taxonomic authorities. All specimens identified to date, along with all relevant collection data, have been entered into a FILE MAKER PRO v 6.0 data base. Voucher specimens from identifications have been deposited in both the University of South Alabama Arthropod Depository as well as the institutes of the assisting taxonomic authorities.

Bio-inventory

Table 1 provides a preliminary list of the families of insects identified to date. More than 50,000 insects have been sorted to the level of family. Many of these specimens have been sent to the leading taxonomic specialists. At the time of this report insects from 9 orders, 43 families, 170 genera, and 240 species have been identified. Table 2 shows our current (as of March 20, 2003) list of identified species. This list will continue to grow as our collaborating taxonomic authorities return their identifications. About 6% of these species are completely new to science, never before seen. Many additional species are state records for Alabama, and some represent the southernmost distribution records. For example, in the Chironomidae, a group of insects for which distribution records are well known, more than 50% of the species are state records.

To date, our data base contains over 900 entries and continues to grow as taxonomic authorities return their identifications to us. A list of species identified to date will be available upon request. as either FileMaker Pro or MS-DOS files.

Table 1. Summary of insect identifications from the Mobile / Tensaw Delta, as of March 20, 2003.

Collection Method	Order	Family	No. of Genera	No. of species
Malaise trap	Blattaria	Blattellidae	1	1
Malaise trap	Coleoptera	Anobiidae	1	1
		Cerambycidae	2	2
		Lampyridae	1	1
		Melandryidae	1	1
		Mordellidae	1	1
Malaise trap	Diptera	Athomyiidae	5	5
		Bibionidae	2	2
		Calliphoridae	1	1

		Ceratopogonidae	11	23
		Chaoboridae	1	1
		Chironomidae	23	45
		Corethrellidae	1	1
		Culicidae	3	3
		Dolichopodidae	16	41
		Drosophilidae	1	1
		Empididae	4	4
		Ephydriidae	5	5
		Heleomyzidae	1	1
		Micropezidae	1	1
		Odiniidae	1	1
		Phoridae	3	3
		Psychodidae	11	20
		Ptilodactylidae	1	1
		Ptychopteridae	1	1
		Rhagionidae	1	1
		Rhinophoridae	1	1
		Sciomyzidae	2	2
		Stratiomyidae	1	2
		Syrphidae	3	3
		Tabanidae	2	2
		Tachinidae	13	15
		Tipulidae	16	29
D-net	Hemiptera	Belostomatidae	1	2
		Naucoridae	1	1
		Nepidae	1	4
Malaise trap	Hymenoptera	Formicidae	7	9
		Mutillidae	2	2
		Sphecidae	1	1
		Vespidae	1	1
Malaise trap	Lepidoptera	Arctiidae	1	1
		Noctuidae	2	2
		Nymphalidae	1	1
Malaise trap	Neuroptera	Hemerobiidae	1	1
D-net	Odonata	Aeshnidae	3	3
		Coenagrionidae	2	12
		Lestidae	1	1
		Libellulidae	6	6
Malaise trap	Trichoptera	Leptoceridae	1	3

3. Significance

Of particular concern in this study was the low diversity of insects found in the part of the delta we examined. Given the high diversity of insects in the southeastern part of the United States, we would have expected a much greater number of species. We propose two possibilities that could account for this low insect diversity:

- i) the lower part of the delta may be naturally low in insect diversity due to factors such as saltwater intrusion into both the aquatic and terrestrial habitats.

ii) the lower part of the delta may be low in insect diversity due to anthropogenic influences such as pollution from upstream industries.

It should also be noted that we have only examined the lower part of the Mobile Tensaw Delta (i.e., south of Interstate 65). The upper part of the delta presents somewhat different habitats, such as drier more upland forested areas, and it might be in this area where biodiversity flourishes. Clearly, further study on both the upper and lower delta are justified, including detailed analysis of water quality for potential indicators of anthropogenic influences.

Publications/Presentations:

- Ihle, D, and McCreadie, J.W. 2003. Spatial distribution of the waterscorpion *Ranatra nigra* Herrich-Scaeffler (Hemiptera: Nepidae) in the Mobile / Tensaw Delta and the Temporal distribution of the associated water mite *Hydrachna magniscutata* Marshall (Acari: Hydrachnidae). *Ann. Entomol. Soc. Am.* (accepted with revisions).
- Ihle, D. 2002. Spatial and temporal distributional ecology of waterscorpions (Hemiptera: Nepidae) in the Mobile /Tensaw Delta. M.S. Thesis. University of South Alabama, Mobile
- McCreadie, J.W., & Adler, P.H. 2002. Total insect bio-inventory project of the Mobile / Tensaw Delta. *Ann. Meeting of the Entomol. Soc. Am.* Fort Lauderdale, FL. Nov. 17-20, 2002.
- Ihle, D., and McCreadie, J.W. 2001. Spatial distribution of Waterscorpions (Nepidae: Hemiptera) and parasitic mites (Hyrachnoidea: Hydrachnidae) in lower Mobile / Tensaw Delta. Graduate Student Symposium, 2001. Dauphin Island Sea Lab, AL.
- Ihle, D., and McCreadie, J.W. 2001. Spatial distribution of Waterscorpions (Nepidae: Hemiptera) in lower Mobile / Tensaw Delta. *Entomology Society of America Annual Meeting*, San Diego, CA.

Future activities

We intend to expand the survey of delta arthropods to include additional taxa such as other insects, millipedes, and opiliones, and to continue to build the reference collection of delta arthropods currently housed at the University of South Alabama. We will compare the arthropod fauna of the delta with that of the Great Smoky Mountains National Park, the only other nearby area where an intensive survey of arthropods has been conducted. This comparison will provide insight into north-south latitudinal trends in arthropod biodiversity and suggest which arthropods might be at the southern limit of their ranges. Additional emphasis will be placed on the new species that have been discovered in the delta, with particular attention to their life histories and the potential that they might be endemic to the delta.

Supplemental Keywords

aquatic, survey, faunistics, insects, lotic

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