A Faunal and Seasonal Study of the Aquatic Insects in Two Water Ecosystems in South Arkansas: DeGray Reservoir and the Upper Cadda River

Robert T. Allen
University of Arkansas, Fayetteville

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A FAUNAL AND SEASONAL STUDY OF THE AQUATIC INSECTS IN TWO WATER ECOSYSTEMS IN SOUTH ARKANSAS: DeGRAY RESERVOIR AND THE UPPER CADDIO RIVER

by

Robert T. Allen

Arkansas Water Resources Research Center

University of Arkansas
Fayetteville

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FINAL REPORT

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University of Arkansas, Fayetteville, Arkansas

Principal Investigator Degree Discipline

Robert T. Allen Ph.D. Entomology

Student Assistant

John Michael Kopek B.S. Zoology
Abstract

The impounding of the lower Caddo River to create DeGray Reservoir radically changed the water habitats in that portion of the Caddo River. A number of new and different habitats were created by the lake. The objective of this study was to determine what, if any, differences existed between the aquatic insect biotas of DeGray Reservoir and the upper Caddo River.

Four collecting stations along the shore of DeGray Reservoir and four stations along the upper Caddo River were selected as sampling sites. Collections were made at one month (March, April, Oct., Nov.) intervals or at two week intervals (May, June, July, August, Sept.) from March to December of 1979.

The data collected indicates that the upper Caddo River is approximately three times as rich in the diversity of taxa collected and the number of individuals collected as DeGray Reservoir.
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INTRODUCTION

In any ecosystem, aquatic or terrestrial, members of the class Insecta are by far the most numerous in species and often biomass. They are an integral part of any food chain especially those in aquatic environments. They are, however, usually studied only superficially or neglected altogether. This is because many groups are difficult or impossible to identify and the large numbers of individuals are cumbersome to deal with, especially by the general ecologist/biologist. Both of these drawbacks can be largely overcome by careful planning by an entomologist.

Many insect species have rather precise habitat requirements for survival. If a habitat is modified, the insect faunal composition will change. Thus, the insect species present in a habitat are frequently indicators of both levels and kinds of pollution, types of substrate, types of vegetation and stream flow (in aquatic habitats).

The modification of the Caddo River by the formation of DeGray Reservoir created a new habitat. This, no doubt, had an effect on the aquatic fauna. The data collected under the auspices of this study document the differences between the aquatic insect faunas in the Caddo River and in DeGray Reservoir.

OBJECTIVES

The objectives of this project will be the following:

1. A Survey of the aquatic insect fauna in
   (a) The DeGray Reservoir
   (b) The Upper Caddo River

2. To determine the seasonal cycles of activity and abundance of selected taxa at the DeGray Reservoir site.
METHODS

Sampling Sites

With the aid of county highway maps, eight sampling stations were chosen. These stations were selected based on their being longitudinally distributed along the Upper Caddo River - DeGray Reservoir Complex, their accessibility and the likelihood of their being diverse aquatic and semiaquatic insect habitats.

Caddo River Stations

Station 1 - Headwaters area, 7 mi. west of Black Springs, Arkansas at Ark. Hwy. 8 bridge. Montgomery County R27W-T3S.


Station 3 - Glenwood, Ark. Hwy. 70 bridge at Glenwood, Arkansas. Pike County R24W-T5S.

Station 4 - Amity, 3.0 miles N.E. of Amity, Arkansas, at low water bridge 200 yds. upstream of Ark. Hwy. 84 bridge. Clark County R23W-T5S.

DeGray Reservoir

Station 1 - Hwy. 346 Recreation Area, North side of DeGray Reservoir where Ark. Hwy. 346 ends. Hot Springs County R23W-T5S.

Station 2 - Arlie Moore Recreation Area, primitive camping area 1 mi. S.E. of Arlie Moore Ranger Station. Pike County R20W-T5S.

Station 3 - DeGray State Park Lakeside Vista ½ mi. E. of Ark. Hwy. 7 eastern entrance to DeGray State Park. Clark County R20W-T5S.

Station 4 - Spillway Recreation Area, Cove 150 yds. E. of boat launching ramp. Clark County R20W-T6S.
Sampling Methods

At each station on the Caddo River aquatic kick net samples were taken from both riffle and pool habitats and the shoreline vegetation was swept with an insect net.

At each station on DeGray Reservoir the shoreline vegetation was swept with an insect net and stones in the littoral zone were overturned and inspected for aquatic insects.

During each trip a black light sample was taken at one or more stations on both the Caddo River and DeGray Reservoir. Black lighting appears to be the most successful method of collecting a large diversity of adult aquatic and semiaquatic insects on both the Caddo River and DeGray Reservoir. Lighted parking, picnic, and restroom areas on the shoreline of DeGray Reservoir also provided productive sites for hand collecting adult aquatic and semiaquatic insects in the evening.

Insects collected by all methods were immediately placed in labelled vials filled with 70% Ethanol as a preservative. These were then returned to the lab for sorting and identification as time permitted.
CONCLUSIONS

The two objectives set forth in this proposal were accomplished. Tables I-VIII present a detailed record of all the aquatic insect taxa that were collected and the stations at which they were collected. Tables IX-XVI present a detailed record of all the aquatic insect taxa that were collected and the dates on which they were collected.

The data presented in Tables I-VIII are summarized in Table XVII. From summary Table XVII we may see that 85 insect taxa were collected in the Upper Caddo River while only 27 insect taxa were collected in DeGray Reservoir. Of the 27 taxa occurring in DeGray Reservoir all but 7 taxa also occurred in the Upper Caddo River. It appears that the DeGray Reservoir has a depauperate aquatic insect fauna in relation to the Upper Caddo River.

The data presented in Tables IX-XVI relevant to seasonal occurrence are summarized in Table XVIII. From summary Table XVIII it appears that there were no distinct seasonal cycles. There did seem to be a decrease in the number of specimens and taxa collected during December. Unfortunately we were unable to continue the sampling in the succeeding month and are therefore unable to positively identify this apparent decrease in numbers as a definite trend.

From the data collected we may conclude that there is a distinct quantitative and qualitative difference between the aquatic insect fauna of the Upper Caddo River and DeGray Reservoir. We may also note that no distinct seasonal cycles of abundance and non abundance appeared during the sampling period.
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THE NUMBERS OF AQUATIC INSECT TAXA OCCURRING IN EACH OF TWO STUDY AREAS, THE UPPER CADDOR RIVER AND DEGRAY RESERVOIR:
\( E = \) ENDEMIC, NUMBER OF TAXA OCCURRING ONLY IN ONE STUDY AREA

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