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SPECIES DIVERSITY INDICES OF THE FISH POPULATIONS OF STREAMS DRAINING SELECTED TEST AREAS ON EGLIN AIR FORCE BASE RESERVATION, FLORIDA

Crews, R. C.

ENVIRONICS AND HUMAN FACTORS OFFICE

DECEMBER 1976

FINAL REPORT: MAY TO JULY 1976

AIR FORCE ARMAMENT LABORATORY
AIR FORCE SYSTEMS COMMAND • UNITED STATES AIR FORCE
EGLIN AIR FORCE BASE, FLORIDA

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A baseline study of fishes was conducted in streams draining various test ranges currently used for testing and evaluation of conventional munitions. The purpose of the effort was to determine a species diversity index for each of the streams to be used for comparison data in future studies and for use in environmental documentation. Twenty-three species of fishes and one lamprey species were collected or observed. All specimens were preserved (except Etheostoma okaloosae Fowler) and catalogued for placement in the Air Force

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(Item 20 concluded) Armament Laboratory's fish reference collection. Many streams sampled serve as the habitat for an endangered species, the Okaloosa darter (Etheostoma okaloosae Fowler). One hundred and fifteen specimens of the Okaloosa darter were observed and released unharmed.

PREFACE

This technical report discusses a portion of the work performed at the Air Force Armament Laboratory, Armament Development and Test Center, Eglin Air Force Base, Florida, under Exploratory Development Project 50660101 during the period May 1976 to July 1976.

The sources and manufacturers of materials and equipment used in this study are identified for reference only and do not constitute endorsement of the companies or products by the United States Air Force.

This report has been reviewed by the Information Officer (IO) and is releasable to the National Technical Information Service (NTIS). At NTIS it will be available to the general public, including foreign nationals.

This technical report has been reviewed and is approved for publication.

FOR THE COMMANDER:

JOE A. FARMER
Chief, Environics and Human Factors Office

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SECTION I

INTRODUCTION

Since November 1974, Air Force Armament Laboratory (AFATL) personnel have been engaged in an effort to establish the existing site characteristics for the following Eglin AFB Test areas: TA B-70, TA B-71, TA C-64, TA C-64A, TA C-74, TA C-74L, TA C-72, TA C-52N, TA C-52C, and TA C-52A. These test areas are utilized for the testing of conventional munitions. This effort was initiated to meet the Council of Environmental Quality (CEQ) guidelines and Air Force regulation requirements to establish the existing site characteristics of these test areas for environmental documentation.

Many streams originate on, flow through, or otherwise drain these test areas; therefore, an essential component of any site description is aquatic baseline data. For this reason, the study reported here was conducted. Ideally, the aquatic baseline would have encompassed both the aquatic vertebrates and invertebrates, but the lack of qualified personnel limited the study to the ichthyofauna. The aquatic baseline study was to be accomplished on a four-season basis, but the time required to accomplish the overall program and the other scheduled activities of AFATL personnel restricted the study to the winter and summer seasons. The winter study was conducted during November and December 1975, and the data were published in AFATL-TR-76-4 (Reference 1).

The approach to this study was to establish the species diversity indices of streams draining the test areas previously mentioned, for use in comparing the resulting species diversity indices of future studies on the same test areas. For locations and descriptions of these test areas and sampling stations, refer to AFATL-TR-76-4. All identification of species was done by personnel of the Environmental Research Facility. All specimens were preserved (except Etheostoma okaloosae Fowler) and catalogued and will remain at the Environmental Research Facility, Building 574, as a permanent reference collection of these test areas.

SECTION II

MATERIALS AND METHODS

A diversity index study of the fish populations of streams draining various test areas within the Eglin AFB Reservation was conducted from May to July 1976. Sampling stations were the same as those used in an earlier baseline study conducted during November and December 1975 (Reference 1), except for stations 19 and 23 which were changed to alternate sites because of the ease of accessibility of the new sites and the increased fish population. The times scheduled for collection of specimens were dictated by range accessibility due to mission requirements and the other scheduled activities of AFATL personnel.

Fish populations of the streams were sampled with a small mesh seine, and all specimens (except Etheostoma okaloosae Fowler) were fixed in 10 percent formalin immediately after capture, held in tap water for 24 hours, and preserved in 40 percent isopropanol. All specimens were identified to genus and species (References 2 and 3) and catalogued for placement in the AFATL fish reference collection.

Photographs of each sampling station were taken for use in environmental documentation and for use as a basis of comparing stream conditions during future studies (Figures 1 to 25).

During this study, many of the streams sampled were within the territory of the Okaloosa darter (Etheostoma okaloosae Fowler), an endangered species. All Okaloosa darter specimens were identified in the field and returned to the stream. Extreme caution was used to avoid injury to the specimens and to minimize habitat disruption.

The mean species diversity ($\bar{d}$) indices were determined by the formula presented by Lloyd, Zar, and Karr:

$$\bar{d} = \frac{C}{N}\left(N \log_{10} N - \Sigma n_i \log_{10} n_i\right)$$

where C is 3.321928 (converts base 10 log to base 2), N is the total number of individuals, and n_i is the total number of individuals in the ith species (Reference 4).

Figure 1. Collection Station SF-1, Unnamed Tributary of Rocky Creek

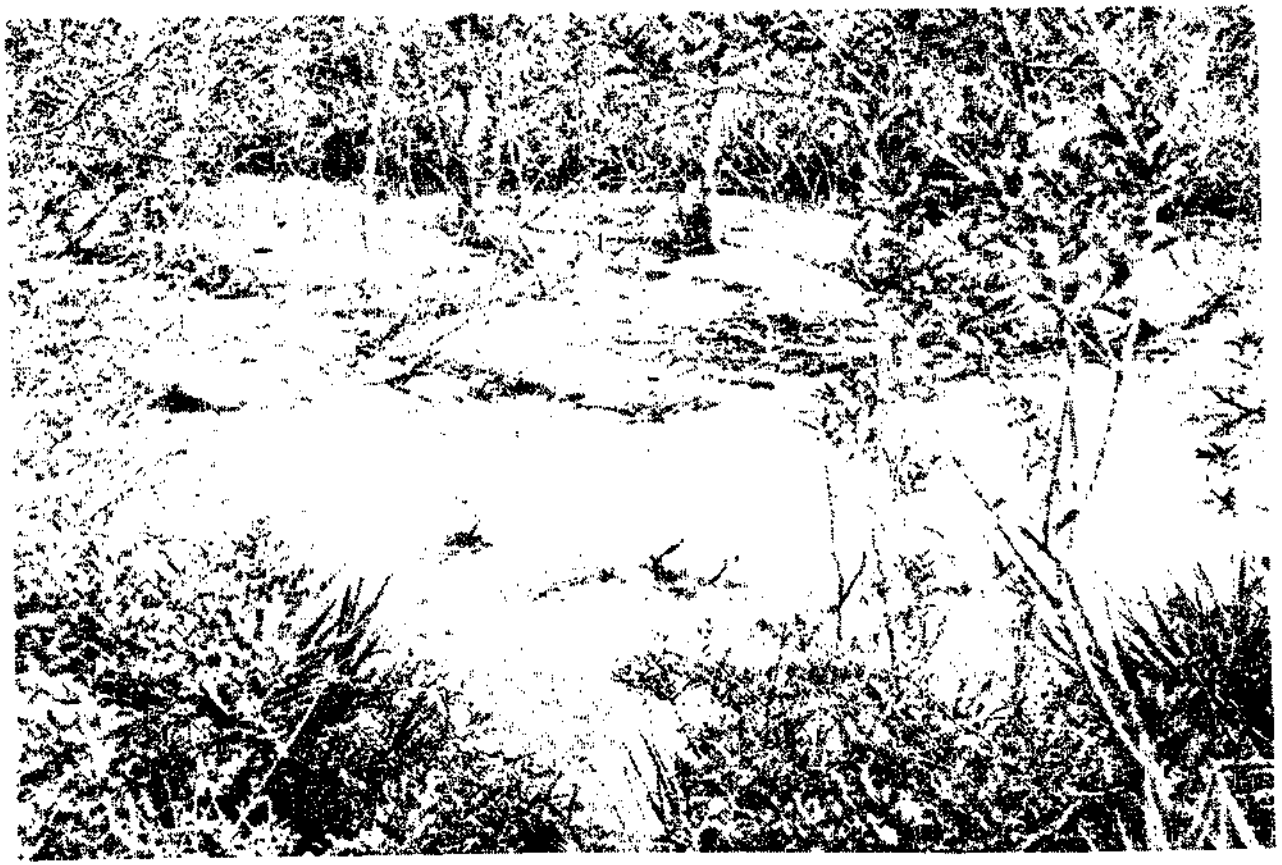

Figure 2. Collection Station SF-2, Unnamed Tributary of Rocky Creek

Figure 3. Collection Station SF-3, Rocky Creek

Figure 4. Collection Station SF-4, Open Branch

Figure 5. Collection Station SF-5A, East Rocky Creek

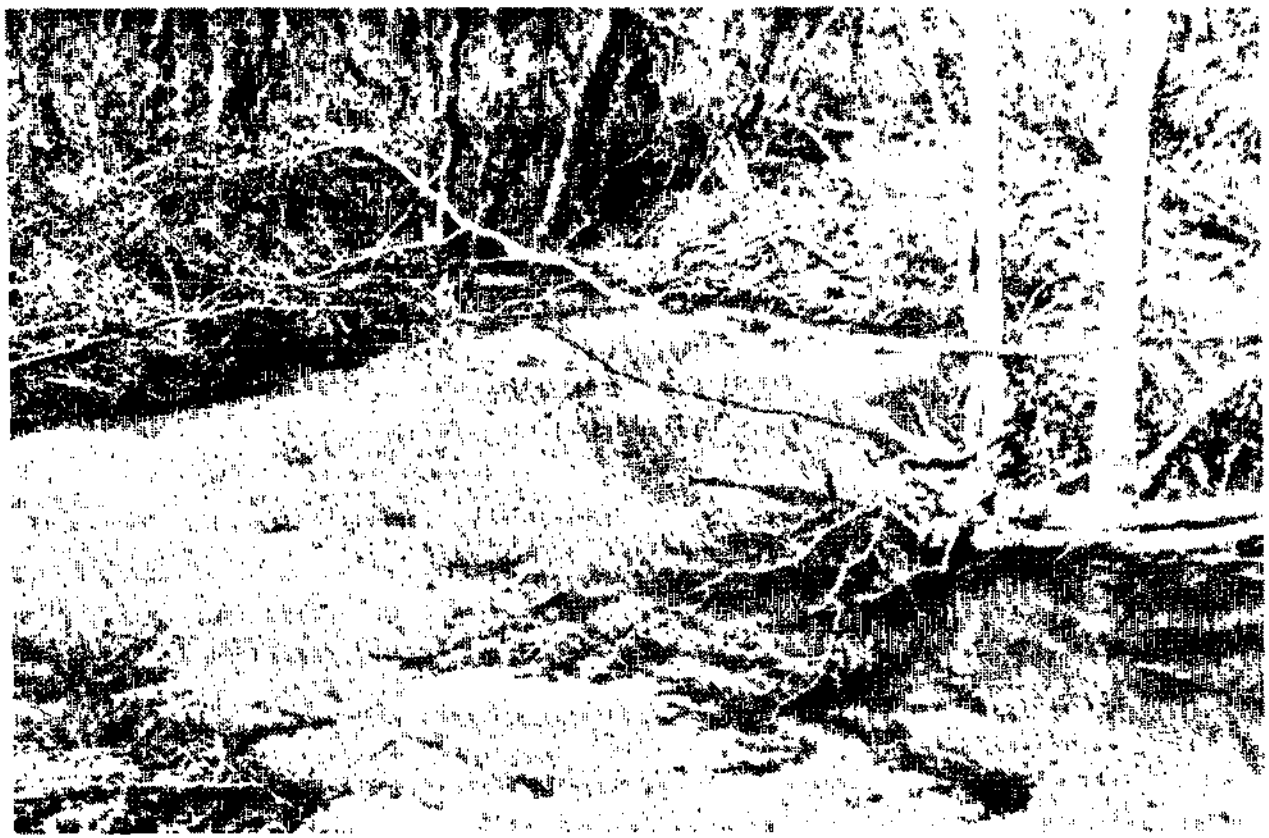

Figure 6. Collection Station SF-5B, East Rocky Creek

Figure 7. Collection Station SF-6, Unnamed Tributary of Little Alaqua Creek

Figure 8. Collection Station SF-7, Unnamed Tributary of Little Alaqua Creek

Figure 9. Collection Station SF-8, Unnamed Tributary of Little Alaqua Creek

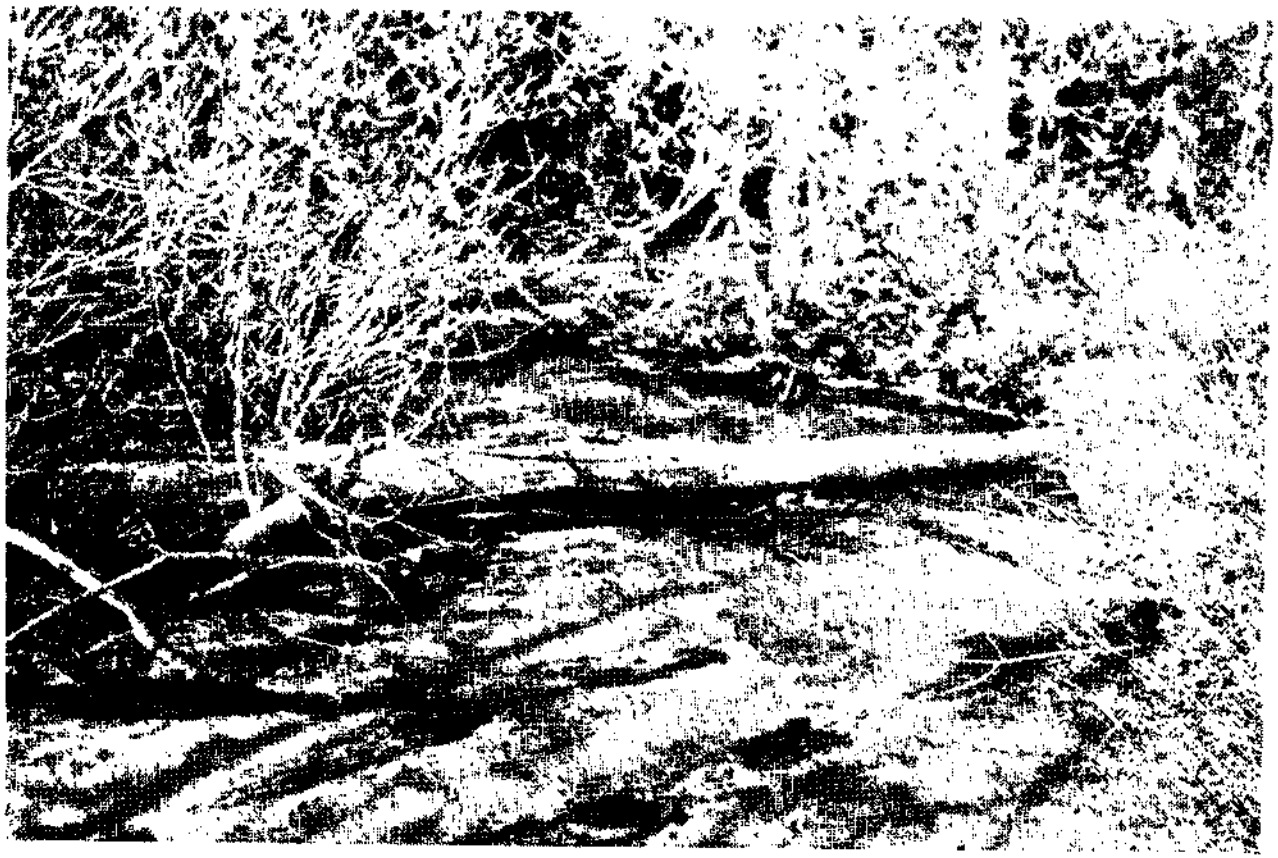

Figure 10. Collection Station SF-9, Mattress Branch

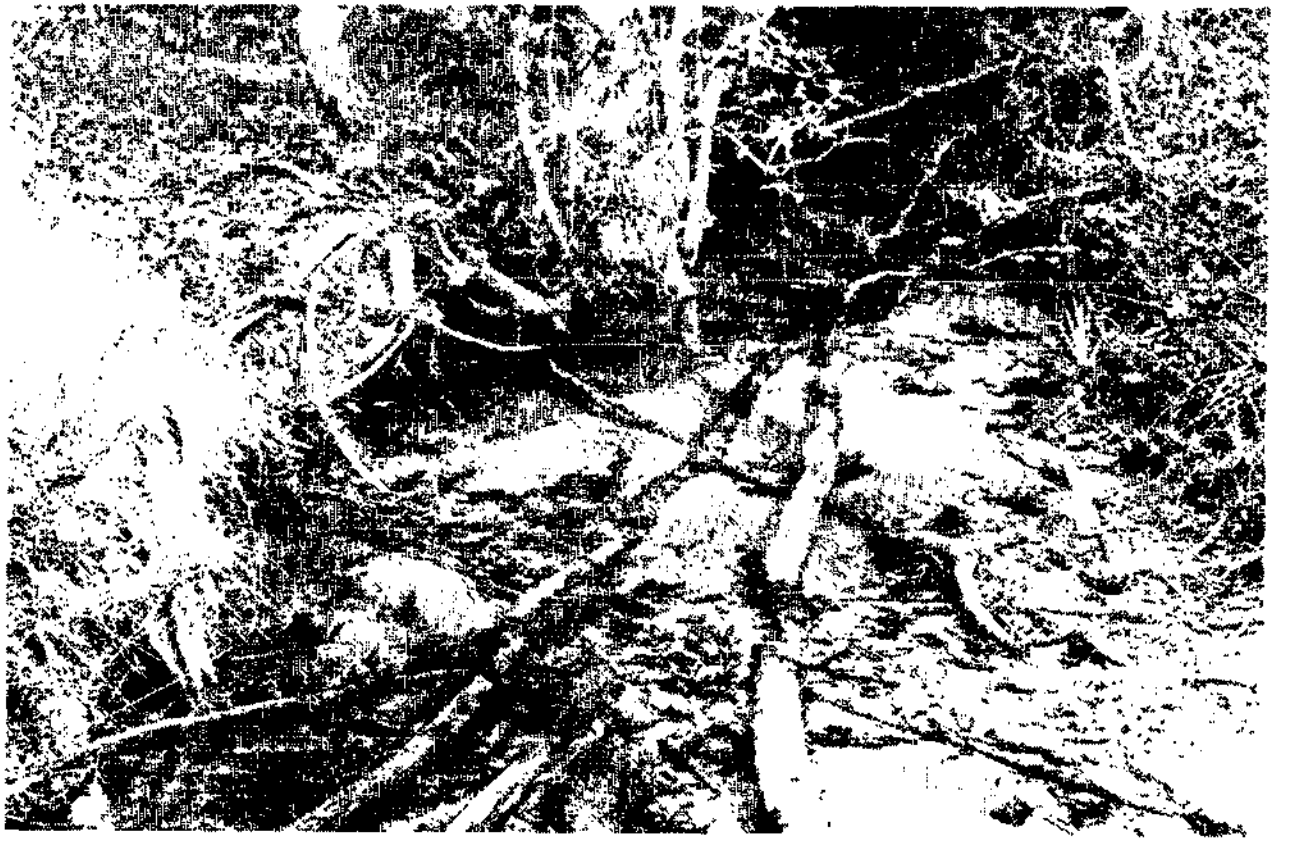

Figure 11. Collection Station SF-10, Unnamed Tributary of East Rocky Creek

Figure 12. Collection Station SF-11, Middle Creek

Figure 13. Collection Station SF-12, Basin Creek

Figure 14. Collection Station SF-13, Trout Creek

Figure 15. Collection Station SF-14, Mullet Creek

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Figure 17. Collection Station SF-16, Hickory Branch

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Figure 19. Collection Station SF-18, Unnamed Tributary of Turtle Creek

Figure 20. Collection Station SF-19, Turtle Creek

Figure 21. Collection Station SF-20, Indigo Creek

Figure 22. Collection Station SF-21A, Liveoak Creek

Figure 23. Collection Station SF-21B, Liveoak Creek

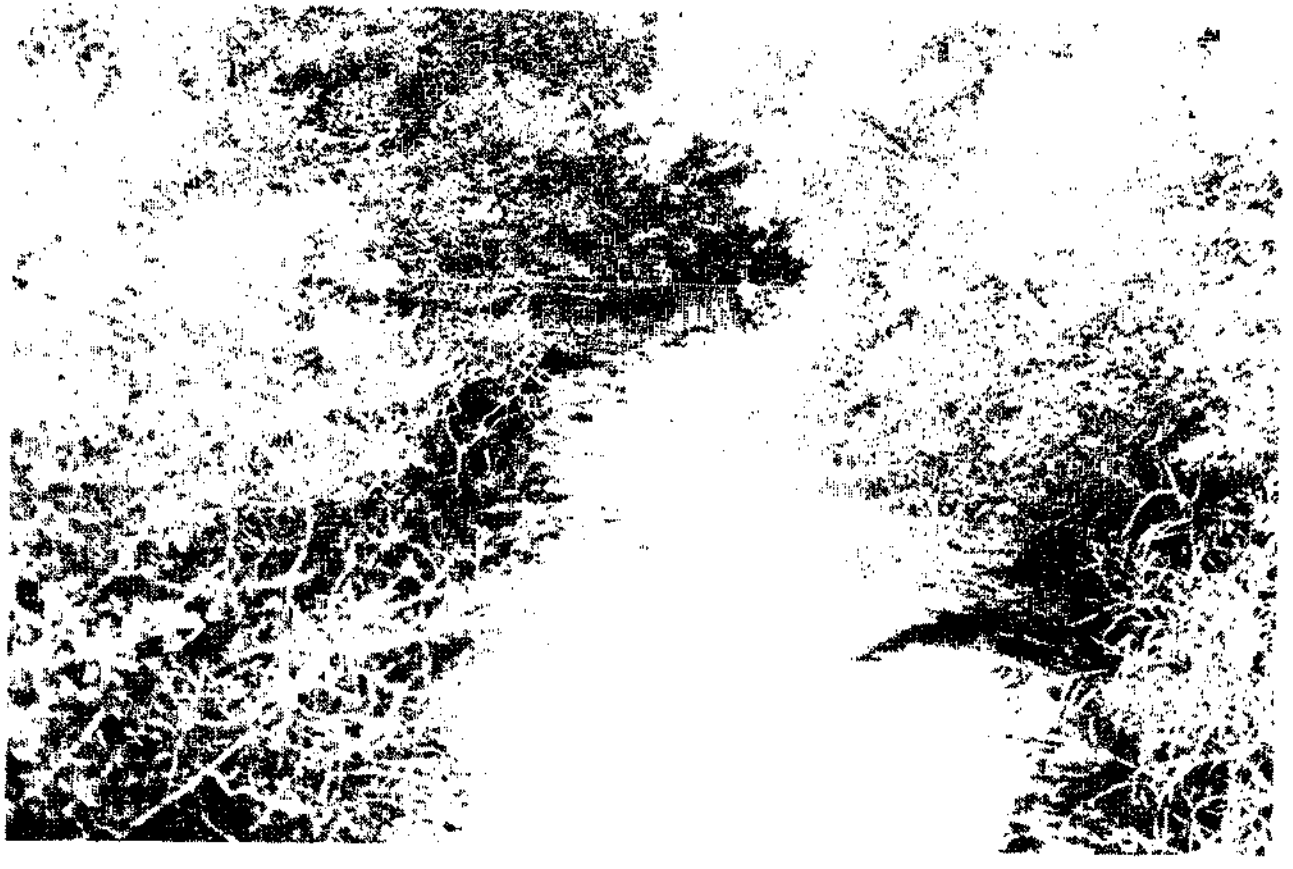

Figure 24. Collection Station SF-22, Bull Creek

Figure 25. Collection Station SF-23, Ramer Creek

SECTION III

RESULTS

The resulting diversity indices for the fish species collected during this study are given in Table 1. No comparisons between the previous winter studies (Reference 1) and these summer studies were made because of the difficulties in interpreting extraneous variables such as the high water conditions of the streams due to heavy rainfall during the winter months of 1975 and the resulting differences in physical and chemical characteristics among the various streams.

Twenty-three species of fishes and one lamprey species were collected or observed during this study (Table 2). One of the fish species, the Okaloosa darter (Etheostoma okaloosae Fowler), is on the endangered list. One hundred and fifteen Okaloosa darters were observed in the field, and all specimens were released unharmed.

The sailfin shiner (Notropis hypselopterus Gunter) was the most abundant species encountered. Also, the mosquitofish (Gambusia affinis Baird and Girard), blackbanded darter (Percina nigrofasciata Agassiz), brown darter (Etheostoma edwini Hubbs and Cannon), speckled madtom (Noturus leptacanthus Jordan), and spotted sunfish (Lepomis punctatus Valenciennes) were abundant in most of the streams studied. A list of species collected from each station is given in Appendix A.

TABLE 1. MEAN SPECIES DIVERSITY INDICES ($\bar{d}$) FOR EACH COLLECTION STATION

COLLECTION STATION	$\bar{d}$
SF-1, Unnamed Tributary of Rocky Creek	2.724
SF-2, Unnamed Tributary of Rocky Creek	1.981
SF-3, Rocky Creek	1.685
SF-4, Open Branch	1.884
SF-5A, East Rocky Creek	2.019
SF-5B, East Rocky Creek	1.423
SF-6, Unnamed Tributary of Little Alaqua Creek	0.530
SF-7, Unnamed Tributary of Little Alaqua Creek	0.875
SF-8, Unnamed Tributary of Little Alaqua Creek	1.544
SF-9, Mattress Branch	1.553
SF-10, Unnamed Tributary of East Rocky Creek	1.969
SF-11, Middle Creek	1.803
SF-12, Basin Creek	1.932
SF-13, Trout Creek	1.884
SF-14, Mullet Creek	0.403
SF-15, Long Creek	1.604
SF-16, Hickory Branch	1.846
SF-17, Schoolhouse Branch	1.910
SF-18, Unnamed Tributary of Turtle Creek	1.174
SF-19, Turtle Creek	1.845
SF-20, Indigo Creek	2.386
SF-21A, Livecak Creek	1.608
SF-21B, Livecak Creek	2.401
SF-22, Bull Creek	2.839
SF-23, Ramer Creek	0.774

TABLE 2. FISH SPECIES OBSERVED DURING STUDY

	Scientific Name	Common Name
1.	Ambloplites rupestris (Rafinesque)	Rock bass
2.	Aphredoderus sayanus (Gilliams)	Pirate perch
3.	Elassoma evergladei (Jordon)	Everglades pygmy sunfish
4.	Elassoma zonatum (Jordon)	Banded pygmy sunfish
5.	Erimyzon succeta (Lacépède)	Creek chubsucker
6.	Erimyzon tenuis (Agassiz)	Sharpfin chubsucker
7.	Esox americanus (Gmelin)	Redfin pickerel
8.	Etheostoma edwini (Hubbs & Cannon)	Brown darter
9.	Etheostoma okaloosae (Fowler)	Okaloosa darter
10.	Etheostoma (Ulocentra) sp.	Orangestripe darter
11.	Fundulus notti (Agassiz)	Starhead topminnow
12.	Gambusia affinis (Baird & Girard)	Mosquitofish
13.	Ichthyomyzon gagei (Hubbs & Trautman)	Southern brook lamprey
14.	Ictalurus natalis (LeSueur)	Yellow bullhead
15.	Lepomis punctatus (Valenciennes)	Spotted sunfish
16.	Micropterus salmoides (Lacépède)	Largemouth bass
17.	Minytrema melanops (Rafinesque)	Spotted sucker
18.	Notropis harperi (Fowler)	Redeye shiner
19.	Notropis hypselopterus (Gunther)	Sailfin shiner
20.	Notropis signipinnis (Bailey & Suttkus)	Flagfin shiner
21.	Notropis texanus (Girard)	Weed shiner
22.	Noturus funebris (Gilbert & Swain)	Black madtom
23.	Noturus leptacanthus (Jordon)	Speckled madtom
24.	Percina nigrofasciata (Agassiz)	Blackbanded darter

SECTION IV

DISCUSSION

During this study the water level of the creeks was low. This was quite different from water conditions during a similar study done in November and December 1975 (Reference 1) when the water level was very high because of heavy rainfall during the last half of that year. The creeks had returned to or were below normal level at the time this survey was initiated which could possibly account for the large increase in the number of species collected.

During this study 115 Okaloosa darters were observed and released. The Okaloosa darter was placed on the list of endangered species in 1973 because of the concern over possible habitat disruption and apparent competition from the brown darter (Etheostoma edwini, Hubbs and Cannon). The Okaloosa darter is endemic to Okaloosa and Walton counties, and its known range is limited to six streams surrounding Valparaiso and Niceville, Florida, which drain into Toms, Boggy, and Rocky Bayous. The majority of the range of the Okaloosa darter is located on the Eglin Reservation except for a small amount of privately owned acreage in the Valparaiso and Niceville areas. Most of the range of the Okaloosa darter at Eglin is undeveloped with the exception of a few cleared test areas (TA C-74, TA C-74L, and TA C-72) and a few bridges scattered over various range roads. Even in the test areas which have been cleared of vegetation, the Okaloosa darter appears to be doing well and has been observed in large numbers. Many range roads crossing Okaloosa darter streams have raised culverts overlaid with clay, and in many instances this produces back water causing small impoundments. These small impounded areas have a reduced water flow, but many Okaloosa darters have been observed from around the culverts of these areas. The most serious problem facing the Okaloosa darter on the Eglin Reservation appears to be competition from its closest relative, the brown darter. In recent years the brown darter has invaded the territory of the Okaloosa darter on Rocky and Swift Creeks. Dr. Mettee (Reference 5) stated that the brown and Okaloosa darters could be ecological equivalents, and the competition and possible hybridization could be detrimental to the Okaloosa darter. Observations during this and other recent field studies indicate that a reduction in the ratio of Okaloosa darters to brown darters may occur when an Okaloosa darter territory is invaded by brown darters. During this study the only brown darter collections in the territory of the Okaloosa darter were on Hickory Branch. Collections on Hickory Branch during November 1975 (Reference 1) produced 5 Okaloosa darters and 3 brown darters while collections during this study produced 9 Okaloosa darters and 23 brown darters. It has been postulated (Reference 6) that, given a situation where only a limited amount of preferred habitat is available to both species, one species might outcompete the other due to shortage of food or space, or a combination of both. This might provide the explanation for the population reversal mentioned above since Hickory Branch provides a very limited area of habitat suitable for either of these species.

During the November study (Reference 1), one brown darter was collected from station SF-2 which is very close to the headwaters of Rocky Creek. Repeated collections in this same area have failed to produce any other specimens of brown darter. This single collection of the brown darter is the only specimen which has been taken above range road 201 on Rocky Creek. The next closest collection of the brown darter was obtained from an area on Rocky Creek between range roads 200 and 201.

On Rocky Creek there are a few road beds with raised culverts, causing small impoundments, which may prevent a further northward invasion of the brown darter on Rocky Creek. Work is currently being done to monitor the streams invaded by the brown darter to evaluate the apparent threat to the continued existence of the Okaloosa darter. Also, study areas have been identified by the Okaloosa Darter Recovery Team for determination of the population densities, critical macro- and microhabitat, life history, and effective land management techniques to insure the continued existence of the Okaloosa darter on the Eglin Reservation.

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APPENDIX A

OBSERVED NUMBER OF FISH BY STATION

Collection Station	Number Collected	Common Name	Scientific Name
SF-1, Rocky Creek	2	Rock bass	Ambloplites rupestris
	4	Pirate perch	Aphredoderus sayanus
	26	Okaloosa darter	Etheostoma okaloosae
	52	Mosquitofish	Gambusia affinis
	11	Southern brook lamprey	Ichthyomyzon gagei
	14	Spotted sunfish	Lepomis punctatus
	3	Largemouth bass	Micropterus salmoides
	51	Sailfin shiner	Notropis hypselopterus
	19	Speckled madtom	Noturus leptacanthus
	7	Blackbanded darter	Percina nigrofasciata
SF-2, Unnamed Tributary of Rocky Creek	19	Okaloosa darter	Etheostoma okaloosae
	7	Mosquitofish	Gambusia affinis
	2	Spotted sunfish	Lepomis punctatus
	2	Largemouth bass	Micropterus salmoides
	15	Sailfin shiner	Notropis hypselopterus
	1	Speckled madtom	Noturus leptacanthus
SF-3, Rocky Creek	1	Rock bass	Ambloplites rupestris
	8	Okaloosa darter	Etheostoma okaloosae
	19	Mosquitofish	Gambusia affinis
	1	Southern brook lamprey	Ichthyomyzon gagei
	3	Spotted sunfish	Lepomis punctatus
	110	Sailfin shiner	Notropis hypselopterus

Collection Station	Number Collected	Common Name	Scientific Name
SF-5 (Concl'd)	3	Speckled madtom	Noturus leptacanthus
	28	Blackbanded darter	Percina nigrofasciata
SF-4, Open Branch	16	Okaloosa darter	Etheostoma okaloosae
	57	Mosquitofish	Gambusia affinis
	1	Southern brook lamprey	Ichthyomyzon gagei
	1	Spotted sunfish	Lepomis punctatus
	10	Sailfin shiner	Notropis hypselopterus
	3	Speckled madtom	Noturus leptacanthus
	9	Blackbanded darter	Percina nigrofasciata
SF-5A, East Rocky Creek	15	Okaloosa darter	Etheostoma okaloosae
	38	Mosquitofish	Gambusia affinis
	2	Spotted sunfish	Lepomis punctatus
	64	Sailfin shiner	Notropis hypselopterus
	1	Black madtom	Noturus funebris
	3	Speckled madtom	Noturus leptacanthus
	20	Blackbanded darter	Percina nigrofasciata

Collection Station	Number Collected	Common Name	Scientific Name
SF-5B, East Rocky Creek	1	Pirate perch	Aphredoderus sayanus
	6	Creek chubsucker	Erimyzon succeta
	1	Okaloosa darter	Etheostoma okaloosae
	9	Mosquitofish	Gambusia affinis
	61	Sailfin shiner	Notropis hypselopterus
	1	Speckled madtom	Noturus leptacanthus
	5	Blackbanded darter	Percina nigrofasciata
SF-6, Unnamed Tributary of Little Alaqua Creek	1	Creek chubsucker	Erimyzon succeta
	20	Mosquitofish	Gambusia affinis
	1	Flagfin shiner	Notropis signipinnis
SF-7, Unnamed Tributary of Little Alaqua Creek	46	Mosquitofish	Gambusia affinis
	9	Flagfin shiner	Notropis signipinnis
	1	Black madtom	Noturus funebris
	1	Blackbanded darter	Percina nigrofasciata
SF-8, Unnamed Tributary of Little Alaqua Creek	2	Brown darter	Etheostoma edwini
	3	Mosquitofish	Gambusia affinis
	2	Southern brook lamprey	Ichthyomyzon gagei
	1	Spotted sunfish	Lepomis punctatus

Collection Station	Number Collected	Common Name	Scientific Name
SF-8 (Concl'd)	21	Sailfin shiner	Notropis hypselopterus
	56	Flagfin shiner	Notropis signipinnis
	1	Speckled madtom	Noturus leptacanthus
	1	Blackbanded darter	Percina nigrofasciata
SF-9, Mattress Branch	1	Redfin pickerel	Esox americanus
	7	Okaloosa darter	Etheostoma okaloosae
	7	Mosquitofish	Gambusia affinis
	1	Yellow bullhead	Ictalurus natalis
	69	Sailfin shiner	Notropis hypselopterus
	2	Black madtom	Noturus funebris
	3	Speckled madtom	Noturus leptacanthus
	6	Blackbanded darter	Percina nigrofasciata
SF-10, Unnamed Tributary of East Rocky Creek	3	Okaloosa darter	Etheostoma okaloosae
	3	Mosquitofish	Gambusia affinis
	1	Spotted sunfish	Lepomis punctatus
	32	Sailfin shiner	Notropis hypselopterus
	6	Flagfin shiner	Notropis signipinnis
	2	Speckled madtom	Noturus leptacanthus
	10	Blackbanded darter	Percina nigrofasciata
SF-11, Middle Creek	13	Mosquitofish	Gambusia affinis
	1	Southern brook lamprey	Ichthyomyzon gagei
	1	Spotted sunfish	Lepomis punctatus
	15	Sailfin shiner	Notropis hypselopterus

Collection Station	Number Collected	Common Name	Scientific Name
SF-11 (Concl'd)	7	Speckled madtom	Noturus leptacanthus
	15	Blackbanded darter	Percina nigrofasciata
SF-12, Basin Creek	1	Pirate perch	Aphredoderus sayanus
	20	Brown darter	Etheostoma edwini
	17	Mosquitofish	Gambusia affinis
	2	Southern brook lamprey	Ichthyomyzon gagei
	13	Spotted sunfish	Lepomis punctatus
	120	Sailfin shiner	Notropis hypselopterus
	3	Weed shiner	Notropis texanus
	3	Speckled madtom	Noturus leptacanthus
	17	Blackbanded darter	Percina nigrofasciata
SF-13, Trout Creek	1	Pirate perch	Aphredoderus sayanus
	1	Everglades pygmy sunfish	Elassoma evergladei
	17	Brown darter	Etheostoma edwini
	44	Mosquitofish	Gambusia affinis
	2	Spotted sunfish	Lepomis punctatus
	81	Sailfin shiner	Notropis hypselopterus
	1	Black madtom	Noturus funebris
	15	Speckled madtom	Noturus leptacanthus

Collection Station	Number Collected	Common Name	Scientific Name
SF-14, Mullet Creek	2	Pirate perch	Aphredoderus sayanus
	1	Brown darter	Etheostoma edwini
	131	Mosquitofish	Gambusia affinis
	1	Spotted sunfish	Lepomis punctatus
	2	Sailfin shiner	Notropis hypselopterus
	1	Speckled madtom	Noturus leptacanthus
SF-15, Long Creek	2	Okaloosa darter	Etheostoma okaloosae
	28	Mosquitofish	Gambusia affinis
	1	Southern brook lamprey	Ichthyomyzon gagei
	44	Sailfin shiner	Notropis hypselopterus
	1	Redeye shiner	Notropis harperi
	2	Speckled madtom	Noturus leptacanthus
	3	Blackbanded darter	Percina nigrofasciata
SF-16, Hickory Branch	1	Pirate perch	Aphredoderus sayanus
	1	Redfin pickerel	Esox americanus
	23	Brown darter	Etheostoma edwini
	9	Okaloosa darter	Etheostoma okaloosae
	37	Mosquitofish	Gambusia affinis
	8	Southern brook lamprey	Ichthyomyzon gagei
	2	Spotted sunfish	Lepomis punctatus
	1	Largemouth bass	Micropterus salmoides
	1	Spotted sucker	Minytrema melanops
	1	Redeye shiner	Notropis harperi
	161	Sailfin shiner	Notropis hypselopterus

Collection Station	Number Collected	Common Name	Scientific Name
SF-16 (Concl'd)	5	Speckled madtom	Noturus leptacanthus
	2	Blackbanded darter	Percina nigrofasciata
SF-17, Schoolhouse Branch	2	Redfin pickerel	Esox americanus
	9	Okaloosa darter	Etheostoma okaloosae
	3	Mosquitofish	Gambusia affinis
	1	Spotted sunfish	Lepomis punctatus
	3	Spotted sucker	Minytrema melanops
	100	Sailfin shiner	Notropis hypselopterus
	14	Flagfin shiner	Notropis signipinnis
	1	Black madtom	Noturus funebris
	4	Speckled madtom	Noturus leptacanthus
	28	Blackbanded darter	Percina nigrofasciata
SF-18, Unnamed Tributary of Turtle Creek	2	Starhead topminnow	Fundulus notti
	26	Mosquitofish	Gambusia affinis
	1	Yellow bullhead	Ictalurus natalis
	7	Spotted sunfish	Lepomis punctatus
SF-19, Turtle Creek	4	Mosquitofish	Gambusia affinis
	1	Southern brook lamprey	Ichthyomyzon gagei
	21	Sailfin shiner	Notropis hypselopterus
	52	Flagfin shiner	Notropis signipinnis
	1	Black madtom	Noturus funebris
	4	Speckled madtom	Noturus leptacanthus

Collection Station	Number Collected	Common Name	Scientific Name
SF-19 (Concl'd)	11	Blackbanded darter	Percina nigrofasciata
SF-20, Indigo Creek	1	Rock bass	Ambloplites rupestris
	2	Pirate perch	Aphredoderus sayanus
	28	Brown darter	Etheostoma edwini
	15	Mosquitofish	Gambusia affinis
	1	Southern brook lamprey	Ichthyomyzon gagei
	2	Spotted sunfish	Lepomis punctatus
	1	Redeye shiner	Notropis harperi
	28	Flagfin shiner	Notropis signipinnis
	1	Weed shiner	Notropis texanus
	2	Black madtom	Noturus funebris
	4	Speckled madtom	Noturus leptacanthus
	59	Blackbanded darter	Percina nigrofasciata
SF-21A, Liveoak Creek	2	Pirate perch	Aphredoderus sayanus
	17	Everglades pygmy sunfish	Elassoma evergladei
	62	Mosquitofish	Gambusia affinis
	6	Black madtom	Noturus funebris
	2	Speckled madtom	Noturus leptacanthus
	7	Blackbanded darter	Percina nigrofasciata

Collection Station	Number Collected	Common Name	Scientific Name
SF-21B, Liveoak Creek	1	Rock bass	Ambloplites rupestris
	1	Pirate perch	Aphredoderus sayanus
	3	Everglades pygmy sunfish	Elassoma evergladei
	3	Sharpfin chubsucker	Erimyzon tenuis
	7	Brown darter	Etheostoma edwini
	6	Mosquitofish	Gambusia affinis
	3	Southern brook lamprey	Ichthyomyzon gagei
	5	Spotted sunfish	Lepomis punctatus
	28	Blackbanded darter	Percina nigrofasciata
SF-22, Bull Creek	2	Pirate perch	Aphredoderus sayanus
	5	Banded pygmy sunfish	Elassoma zonatum
	2	Redfin pickerel	Esox americanus
	12	Brown darter	Etheostoma edwini
	2	Orangestripe darter	Etheostoma (Ulocentra) sp.
	16	Mosquitofish	Gambusia affinis
	2	Southern brook lamprey	Ichthyomyzon gagei
	1	Yellow bullhead	Ictalurus natalis
	2	Spotted sunfish	Lepomis punctatus
	10	Flagfin shiner	Notropis signipinnis
	1	Speckled madtom	Noturus leptacanthus

Collection Station	Number Collected	Common Name	Scientific Name
SF-23, Ramer Creek	1	Redfin pickerel	Esox americanus
	2	Brown darter	Etheostoma edwini
	4	Mosquitofish	Gambusia affinis
	2	Southern brook lamprey	Ichthyomyzon gagei
	91	Flagfin shiner	Notropis signipinnis
	3	Weed shiner	Notropis texanus

INITIAL DISTRIBUTION

DDC	12	AMRL/THT	1
AUL (AUL/LSE-70-239)	1	ADTC/DEN	1
ASD/ENFEA	1	ADTC/SGPE	1
TAWC/TRADOCLO	1		
USAF/SAMI	1		
AFATL/DL	1		
AFATL/DLOSL	9		
Ogden ALC/MMWM	2		
AFIS/INTA	1		
Vegetation Control Div (SAREA-CL-V)	1		
DDR&E/Tech Lib	1		
USAFA/DFCBS	1		
AFLC (DS)	1		
Deseret Test Cen/Tech Lib	1		
AFLC/MMNO	1		
SAAMA/SFQT	1		
Naval Weapons Cen/Tech Lib	1		
Naval Weapons Lab/Tech Lib	1		
US Dept of Agriculture/Pesticide Coord	1		
Agricultural Environ Qual Inst/ARS	1		
AFSC/SDW	1		
AF/RDP	1		
DDR&E(Env & Life Sciences)	1		
SAMUEA-SA	1		
AFSC/DEV	1		
AEDC/DEN	1		
EA (SAREA-TS-L) Tech Lib	1		
EA (SAREA-CL-V)	1		
CINCPAC (J3A1)	1		
USAF (Environ Health Lab)	1		
NASA Mississippi Test Facility	1		
Univ of West Florida	1		
Tall Timbers Research Station	1		
US Dept of Agriculture, Forest Service/Eastern Region	1		
ADTC/CSV	1		
ADTC/DLV	10		
NWC Env Eng	1		
AMD/RD	1		
USA Natick Lab	1		
Gulf Breeze EPA	1		
AMRL (THE)	1		
AFCEC/EQ	1		
Game and Freshwater Fish Com	1		
Archbold Biological Station	1		

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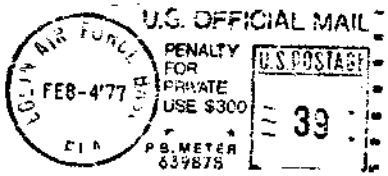
ADTC
EGLIN AFB, FLA. 32542

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300



THIRD CLASS

USAFA/DFCBS (Capt Young)
USAF Academy CO 80840