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AFATL-TR-76-145

**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

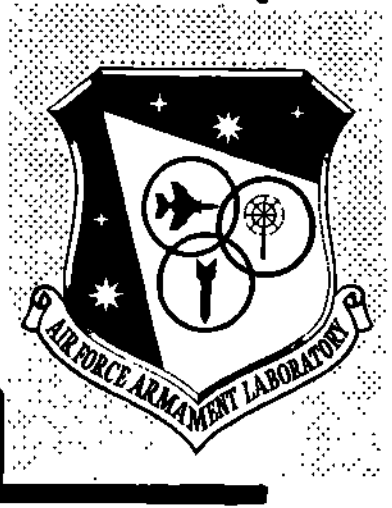
DECEMBER 1976

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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(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.

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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:

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

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 i th species (Reference 4).



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

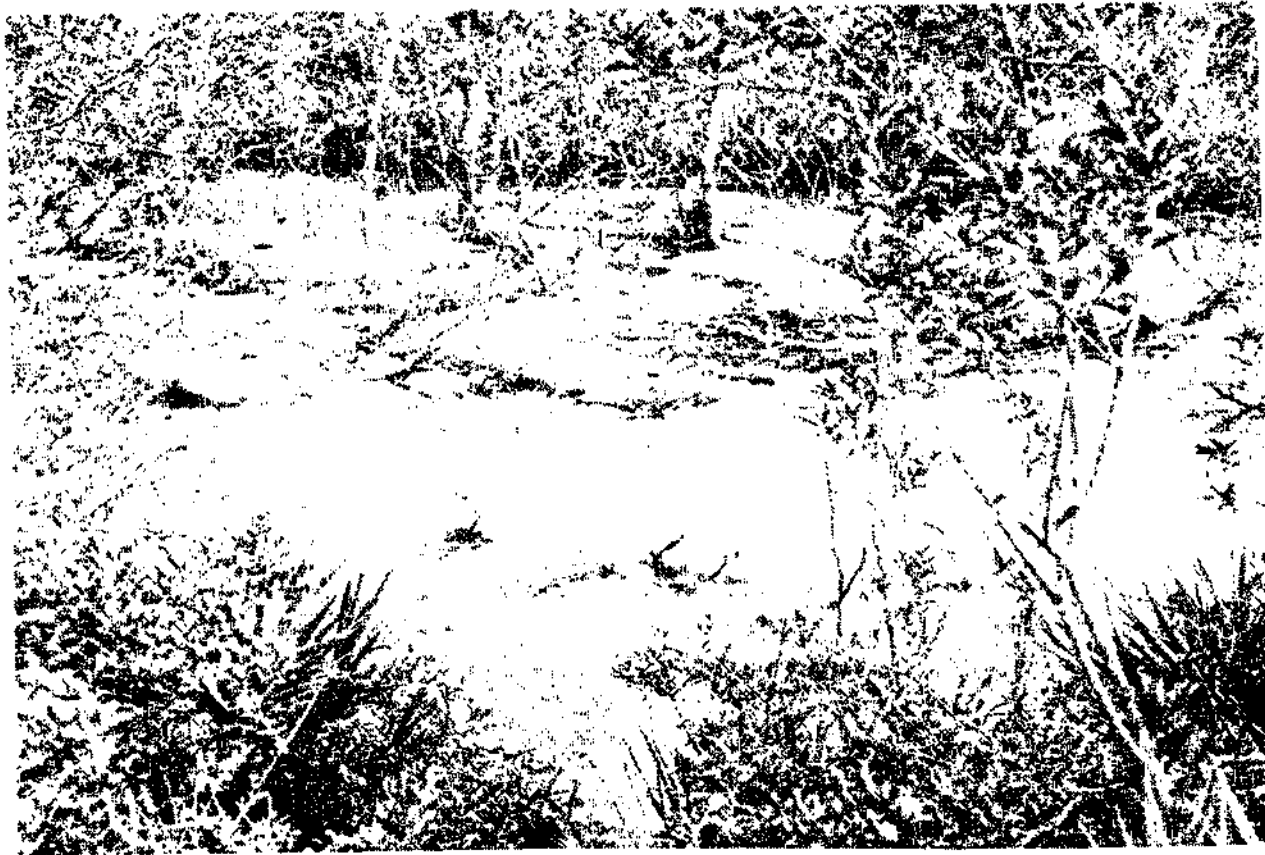


Figure 2. Collection Station SF-2, Unnamed Tributary of Rocky Creek



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

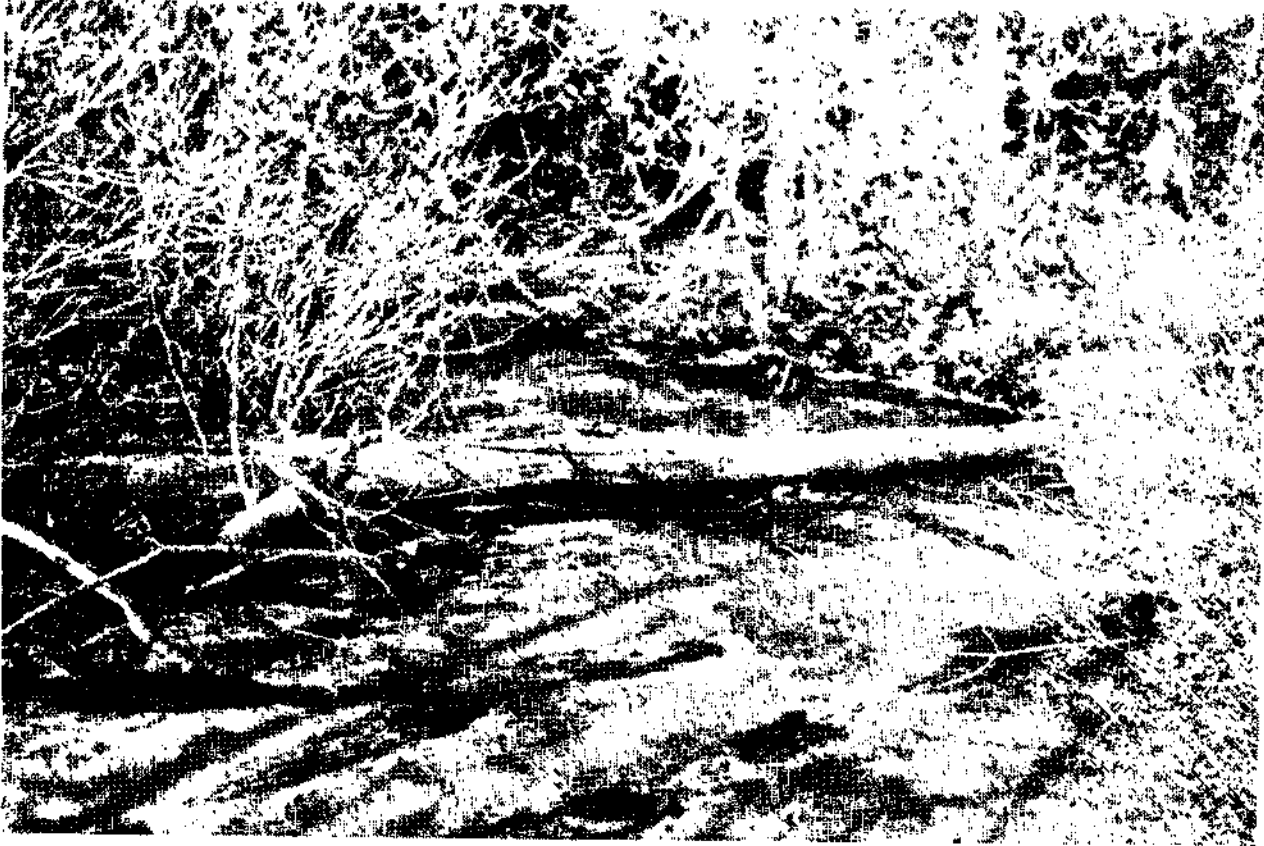


Figure 10. Collection Station SF-9, Mattress Branch



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

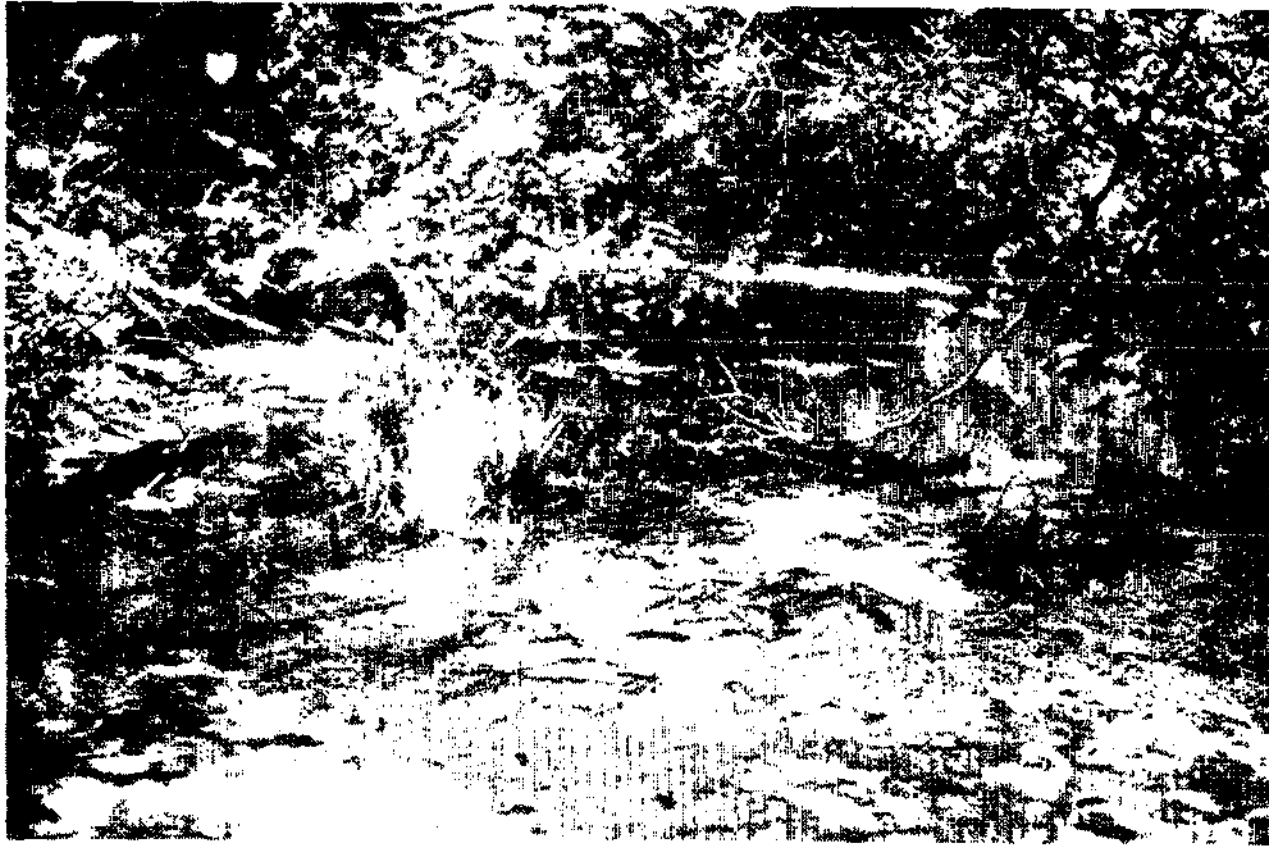


Figure 14. Collection Station SF-13, Trout Creek



Figure 15. Collection Station SF-14, Mullet Creek



Figure 16. Collection Station SF-15, Long Creek



Figure 17. Collection Station SF-16, Hickory Branch



Figure 18. Collection Station SF-17, Schoolhouse Branch



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

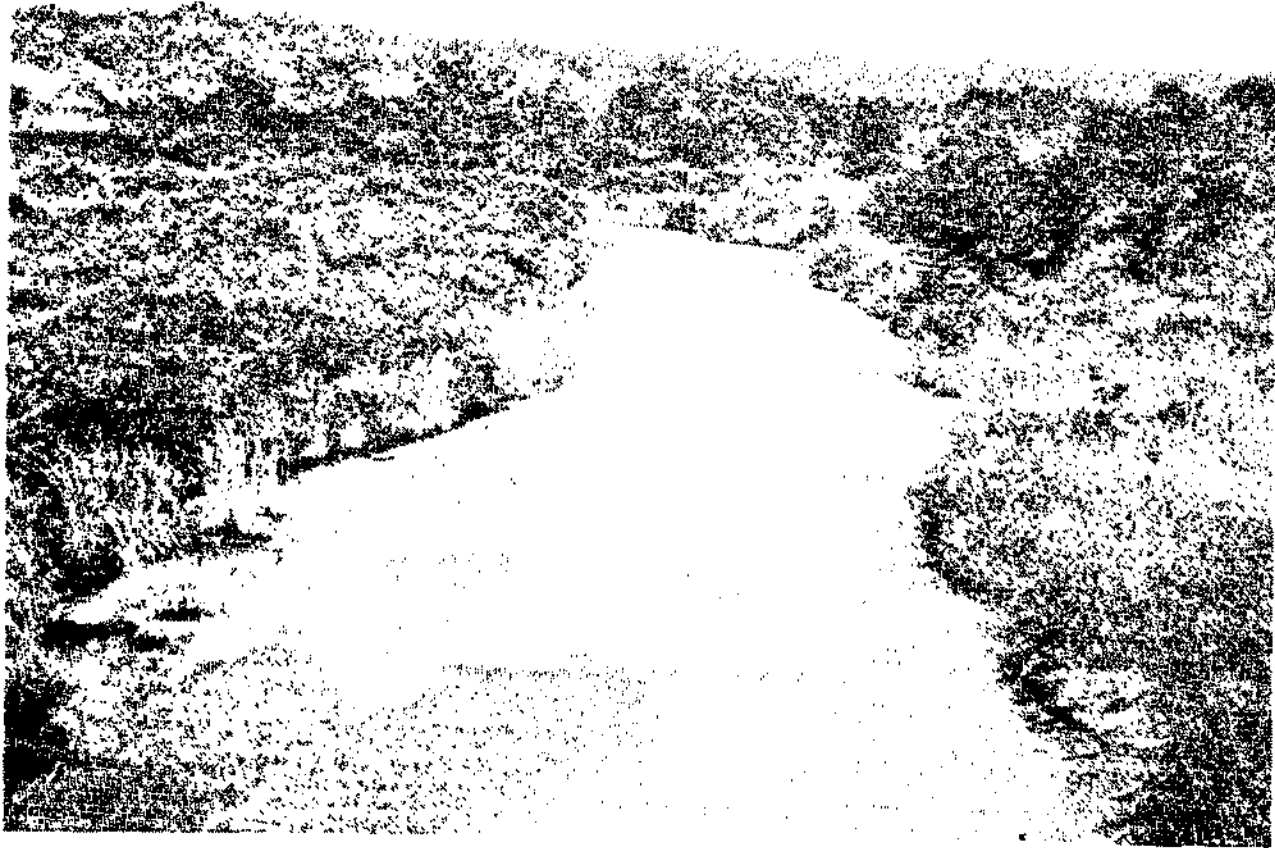


Figure 22. Collection Station SF-21A, Liveoak Creek



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

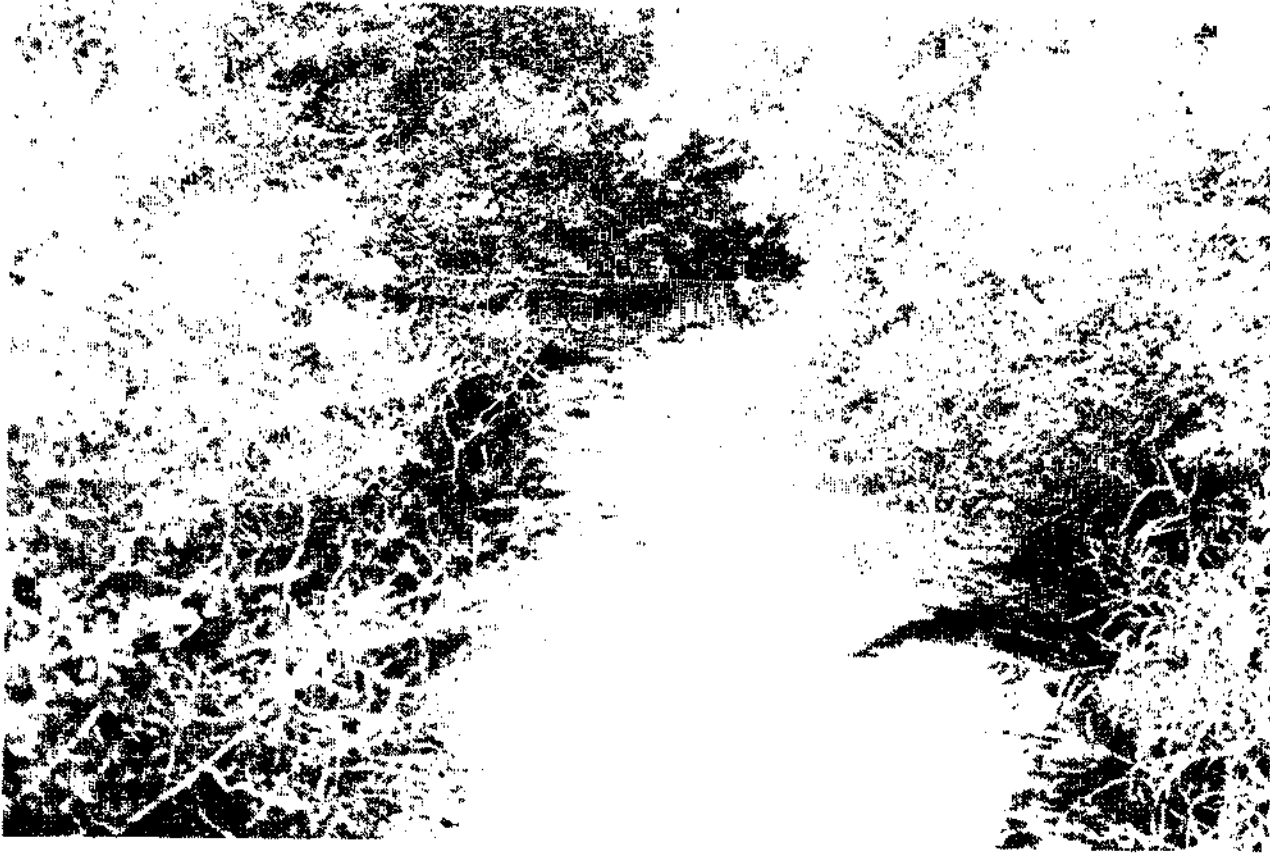


Figure 24. Collection Station SF-22, Bull Creek



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, Liveoak Creek	1.608
SF-21B, Liveoak Creek	2.401
SF-22, Bull Creek	2.839
SF-23, Ramer Creek	0.774

TABLE 2. FISH SPECIES OBSERVED DURING STUDY

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

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

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

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

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

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

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

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

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

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

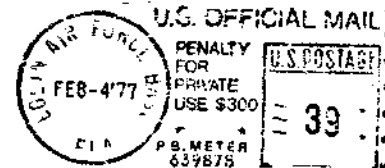
<u>Collection Station</u>	<u>Number Collected</u>	<u>Common Name</u>	<u>Scientific Name</u>
SF-23, Ramer Creek	1	Redfin pickerel	<u>Esox americanus</u>
	2	Brown darter	<u>Etheostoma edwini</u>
	4	Mosquitofish	<u>Gambusia affinis</u>
	2	Southern brook lamprey	<u>Ichthyomyzon gagei</u>
	91	Flagfin shiner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

INITIAL DISTRIBUTION

DDC	12	AMRL/TIT	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/MMMM	2		
AFIS/INTA	1		
Vegetation Control Div (SARE-A-CL-V)	1		
DDRGI/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		
AFDC/DEN	1		
GA (SARE-A-TS-L) Tech Lib	1		
EA (SARE-A-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 (TIE)	1		
AFCEC/EQ	1		
Game and Freshwater Fish Com	1		
Archbold Biological Station	1		

ADTC
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OFFICIAL BUSINESS
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THIRD CLASS

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