

First Semi-Annual Status Report- December 2002
BICY and BISC Freshwater Fish Inventory and Monitoring
Audubon Tavernier Science Center
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INTRODUCTION

This project is intended to provide data on the freshwater fish community present in the Big Cypress National Preserve (BICY) and Biscayne National Park (BISC). The goal is to provide a list of at least 90 percent of the fish species occurring within the preserve boundaries, as required by the Department of the Interior's Inventory and Monitoring program. This report is organized by detailing our activities in BICY and BISC in separate sections.

I. BIG CYPRESS NATIONAL PRESERVE

In BICY, the field sampling effort conducted in this project will be based upon a stratified random sampling design. Sites will be selected from a set of randomly distributed points in different habitat types within the preserve. Sampling will be conducted in seven broadly defined habitat types: ponds and sloughs, canals and borrow pits, cypress forest, mixed swamp forest, cypress/pine prairie, herbaceous prairie and freshwater marsh, and coastal marshes. Sites will principally be located within a 300 meter buffer of existing roads and authorized ATV trails to facilitate access, although airboat and helicopter transport will be utilized when available to reach more remote sites. Emphasis will be placed on habitats with broad spatial extent within the preserve as well as those which are favorable fish habitat.

Sampling Gear

Sampling will be conducted with the gear which is most appropriate for each site. Whenever possible, gear type will be kept constant within each habitat type to allow comparison between sites. Sampling techniques may include any of the following: electrofishing, throw traps, minnow traps, fyke nets, breder traps, gill nets, cast nets, seines, angling, and rotenone application.

Site Selection

Potential sampling sites were selected using digital vegetation maps of the Big Cypress Preserve and ArcView GIS software. Sample points were generated randomly, separated by habitat type, and clipped to buffers within 300 meters of roads, ORV trails, or airboat trails. Additional sites were added manually for geographically explicit features such as ponds and borrow pits. Sampling sites in each of the major administrative units of Big Cypress are shown in figures 1 through 7. Figure 8 Provides a reference map of the locations of these administrative divisions within the preserve. Sites will be sampled as time allows, and may be supplemented with opportunistic sampling based upon field conditions. It is unlikely that all of the listed potential sites will be sampled during the first year of this project, and it is possible that the locations of some sites will need to be modified upon ground-truthing. Also, no random points were generated for sampling in canals. Rather, these will be sampled based on accessibility. The primary method for sampling in canals will be small boat electrofishing.

Sample Collection & Data Management:

Samples will generally be returned to the lab for analysis, either on ice or preserved in 10% buffered formalin. An exception will be made in cases where a site produces small numbers of easily identified fishes, or if fishes are exceptionally large. Voucher specimens will be taken for each species found in each habitat type. Additionally, separate vouchers will be collected for the northern (north of I-75), central, and southern (south of US 41) regions of the preserve for each species.

Records of all sampling expeditions will be maintained in an MS-Access database. Data collected will include water depth, temp, dissolved oxygen, pH, salinity, habitat type, gear type, and resulting species composition, abundance, and individual overall lengths. ArcView shape files will be generated to show the spatial location of the sampling sites and will be linked to the Access database.

Current Status

Field sampling for the BICY freshwater fish I&M project commenced in November 2002. As of December 31st, sampling has occurred at 39 sites using a combination of

trapping, cast netting, dip netting, and angling. 1347 individuals of 30 species have been captured as of the end of 2002, as shown in Table 1. A review of the literature was used to develop a list of potential species that might be encountered in BICY (Table 2). This list may not be exhaustive and will be updated as more literature is reviewed. Table 2 also lists the likelihood of finding each species based on the original data source. Fish that have already been collected in this study are indicated as well.

The majority of sampling during this period has been performed using minnow traps of several designs and breder traps. As such, there is undoubtedly an under-representation of larger fish, which have difficulty entering such traps. It is likely that there is a bias against extremely small fish as well, since they can escape through the mesh of the minnow traps, which varies between an eighth and a quarter of an inch. Also, it seems likely that relatively sedentary species are likely to be less prone to capture using these techniques owing to fewer incidences of contact with traps. Despite these drawbacks, trapping has been the most practical technique used in this study so far. Traps can be placed in virtually any of the aquatic habitats in the Preserve and provide a simple and consistent measure of effort based on sampling duration which is lacking in angling or netting forays. It is necessary to keep in mind these limitations, however, when evaluating the results presented here.

Native fishes dominate the sampling data to this point. Exotics account for less than a quarter of the species and less than 12% of the total individuals captured to date. Of these, spotted tilapia (*Tilapia mariae*) and Mayan cichlid (*Cichlasoma urophthalmus*) are the most frequently encountered species, both in terms of capture rates as well as anecdotal field observation during sampling expeditions.

II. BISCAYNE NATIONAL PARK

Freshwater habitats within BISC are limited to manmade canals on the mainland and solution holes on Elliot Key. Six canals within or immediately adjacent to mainland BISC were identified for sampling in the cooperative agreement: Mowry, Military, Princeton, Black Creek, L-31 and C-102 canals, however, the Princeton and C-102 are the same canal. This was simply a clerical error. The agreement should have identified North Canal instead of C-102. Also, a reconnaissance of the area indicated that the L-31

would be redundant since all of the other canals have direct connections with the L-31. In conjunction with National Park staff, it was decided that that sampling the Florida City Canal would provide better spatial coverage and the L-31 was removed from the list of sampling sites. To summarize these changes, the canals that will be part of this study are (in order from south to north) Florida City, North, Mowry, Military, Princeton and Black Creek Canals. The agreement also specifies that solution holes on Elliot Key will be sampled however, these collection are not scheduled until later in the study and will not be addressed further in this report.

Sampling Gear

The primary method of collection in the canals is electrofishing, however, these data will be supplemented with minnow trap collections and visual observations.

Site Selection

Electrofishing activities were restricted to the upstream (western) side of the control structures on each of the canals thereby insuring that we were sampling freshwater environs. The state permit restricts sampling to within 1km west of the control structures. Each 1 km section of canal was divided into ten 100m transects. Since only one side of the canal could be sampled at a time this resulted in 20 potential transects for sampling. Five of the 20 transects were selected at random for each canal. Ten minnow traps were placed at appropriate location along the entire 1km length of each canal.

Sample Collection & Data Management:

All fish collected were processed in the field. Most specimens were preserved in 10% formalin however, some were placed on ice for use in tissue analysis and several specimens were kept alive for display purposes. Collections are currently being stored at Audubon's Tavernier Science Center but will be transferred to a permanent site once one is identified by the National Park Service. Physical data (conductivity, temperature and dissolved oxygen) were also collected. Data are available in a Microsoft Excel spreadsheet format.

Current Status

Fish collection were made on November 20 and from December 2 through December 6. Boat access to the canals was physically restricted by the lack of suitable boat ramps, resulting in the use of a small jon-boat equipped with a relatively low powered electroshocking device. Each of the canals had low conductivity (500-700 mO) but this proved sufficient to noticeably reduce the range of the electoshocker. This logistical problem resulted in an unexpectedly low number of species (Table 3). In the near future, we will attempt to sample two of the canals (Princeton and Black Creek canals) with a larger and more powerful electroshocking boat, as these two canals have boat ramps for access. Other canals may also be attempted based on our success with these two. A review similar to that shown in Table 2 for BICY is being developed for BISC and will be presented in the next report.

Table 1: List of Captured Species in Big Cypress National Preserve, Current to 12/31/02

Species Name	Common Name	number	exotic?
<i>Lepomis marginatus</i>	Dollar sunfish	432	no
<i>Gambusia holbrooki</i>	Mosquitofish	423	no
<i>Jordanella floridae</i>	Flagfish	66	no
<i>Tilapia mariae</i>	Spotted tilapia	64	yes
<i>Lepomis punctatus</i>	Spotted sunfish	60	no
<i>Lepomis gulosus</i>	Warmouth	59	no
<i>Cichlasoma urophthalmus</i>	Mayan cichlid	49	yes
<i>Poecilia latipinna</i>	Sailfin molly	45	no
<i>Fundulus confluentus</i>	Marsh killifish	24	no
<i>Belonesox belizanus</i>	Pike killifish	22	yes
<i>Fundulus chrysotus</i>	Golden topminnow	17	no
<i>Lepomis macrochirus</i>	Bluegill	14	no
<i>Heterandria formosa</i>	Least killifish	12	no
<i>Lucania goodei</i>	Bluefin killifish	9	no
<i>Enneacanthus gloriosus</i>	Bluespotted sunfish	9	no
<i>Lophogobius cyprinoides</i>	Crested goby	9	no
<i>Cichlasoma bimaculatum</i>	Black acara	6	yes
<i>Lepisosteus platyrhincus</i>	Florida gar	5	no
<i>Micropterus salmoides</i>	Largemouth bass	4	no
<i>Lepomis microlophus</i>	Redear	3	no
<i>Labidesthes sicculus</i>	Brook silverside	2	no
<i>Notropis petersoni</i>	Coastal shiner	2	no
<i>Notemigonus crysoleucas</i>	Golden shiner	2	no
<i>Lucania parva</i>	Rainwater killifish	2	no
<i>Cyprinodon variegatus</i>	Sheepshead minnow	2	no
<i>Oreochromis aureus</i>	Blue tilapia	1	yes
<i>Astronotus ocellatus</i>	Oscar	1	yes
<i>Clarias batrachus</i>	Walking catfish	1	yes
<i>Menidia beryllina</i>	Inland silverside	1	no
<i>Eugerres plumieri</i>	Striped mojarra	1	no
	total	1347	

Table 2: A list of Freshwater fishes reported from the Big Cypress Area with notes on species already collected during the inventory. Specific notes regarding the likelihood of each species are also presented (FMNH = Specimen(s) in Florida Museum of Natural History). Species are ranked based on the likelihood of their occurrence in the Big Cypress Preserve as follows.

Most Likely 5 = Present: Collected or seen by Ellis & Zokan and/or Loftus & Kushlan in Big Cypress

4 = Likely: Found in nearby areas and likely to be found in Big Cypress

3 = Probable: Present in nearby areas and possibly found in Big Cypress

V2 = Doubtful: Present in south Florida with small possibility of occurrence in Big Cypress

Least Likely 1 = Unlikely: Present in south Florida, but not very likely in Big Cypress

<u>Common Name</u>	<u>Genus species</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>Notes</u>
Longnose Gar	<i>Lepisosteus osseus</i>					X	Present in Lake Okeechobee (FMNH), And Water Conservatio Unlikely due to few records in south Florida and lack of habitat florida and northward.
Florida Gar	<i>Lepisosteus platyrhincus</i>	C					Present in Big Cypress (Ellis & Zokan)
Bowfin	<i>Amia calva</i>	C					Present in Big Cypress (Ellis & Zokan)
Tarpon	<i>Megalops atlanticus</i>	C					Present in Big Cypress (Ellis & Zokan)
American Eel	<i>Anguilla rostrata</i>	X					Present in Big Cypress (Loftus & Kushlan 1987)
Bay Anchovy	<i>Anchoa mitchilli</i>			X			Present in Everglades drainage Collier county (FMNH), Evergl Possible, but primarily marine, may enter Tamiami canal.
Gizzard Shad	<i>Dorosoma cepedianum</i>				X		Present in Lake Okeechobee (FMNH) and Homestead canals Possible, few records from south Florida, and lack of habitat in canal.
Threadfin Shad	<i>Dorosoma petenense</i>		X				Present in Tamiami Canal ENP (Loftus & Kushlan 1987), Lake (
Golden Shiner	<i>Notemigonus crysoleucas</i>	C					Present in Big Cypress (Ellis & Zokan)
Ironcolor Shiner	<i>Notropis chalybaeus</i>					X	Present in Lake Okeechobee (FMNH): Unlikely, no record sou of habitat in BICY.
Taillight Shiner	<i>Notropis maculatus</i>	X					Present in Big Cypress (Loftus & Kushlan 1987)
Coastal Shiner	<i>Notropis petersoni</i>	C					Present in Big Cypress (Ellis & Zokan)

Table 2 (Cont.)

<u>Common Name</u>	<u>Genus species</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>Notes</u>
Pugnose Minnow	<i>Opsopoeodus emiliae</i>				X		Present in Big Marco Pass drainage??, Collier county and Lak Validity of Collier county record unknown, no other records so
Lake Chubsucker	<i>Erimyzon sucetta</i>	C					Present in Big Cypress (Ellis & Zokan)
White Catfish	<i>Ameiurus catus</i>					X	Present in Lake Okeechobee (FMNH) ** Unlikely, no record so lack of habitat in BICY.
Yellow Bullhead	<i>Ameiurus natalis</i>	C					Present in Big Cypress (Ellis & Zokan)
Brown Bullhead	<i>Ameiurus nebulosus</i>	X					Present in Big Cypress (Loftus & Kushlan 1987)
Channel Catfish	<i>Ictalurus punctatus</i>		X				Present in ENP (Loftus & Kushlan 1987)
Tadpole Madtom	<i>Noturus gyrinus</i>	C					Present in Big Cypress (Ellis & Zokan)
Walking Catfish	<i>Clarias batrachus</i>	C					Present in Big Cypress (Ellis & Zokan)
Hardhead Catfish	<i>Arius felis</i>		X				Present in ENP (Loftus & Kushlan) ** Reported in BICY by par undetermined.
Vermiculated Sailfin Catfish	<i>Pterygoplichthys disjunctivus</i>					X	Present in Tampa Bay drainage (FMNH) ** Unlikely, no record
Orinoco Sailfin Catfish	<i>Pterygoplichthys multiradiatus</i>				X		Present In Dade and Broward county (FMNH) ** Possible, rep south.
Brown Hoplo	<i>Hoplosternum littorale</i>	C					Present in Big Cypress (Ellis & Zokan)
Chain Pickerel	<i>Esox niger</i>		X				Present in ENP (Loftus & Kushlan 1987)
Pirate Perch	<i>Aphredoderus sayanus</i>					X	Present in Lake Okeechobee (FMNH) ** Unlikely, no record so primarily in central and north florida.
Striped Mullet	<i>Mugil cephalus</i>	C					Present in Big Cypress (Ellis & Zokan)
Brook Silverside	<i>Labidesthes sicculus</i>	C					Present in Big Cypress (Ellis & Zokan)
Inland Silverside	<i>Menidia beryllina</i>	C					Present in Big Cypress (Ellis & Zokan)
Atlantic Needlefish	<i>Strongylura marina</i>			X			Present in Lake Okeechobee and Collier county coastal water: Tabb 1974)
Redfin Needlefish	<i>Strongylura notata</i>	C					Present in Big Cypress (Ellis & Zokan)
Timucu	<i>Strongylura timucu</i>	X					Present in Big Cypress (Loftus & Kushlan 1987)
Diamond Killifish	<i>Adinia xenica</i>	X					Present in Big Cypress (Loftus & Kushlan 1987)
Golden Topminnow	<i>Fundulus chrysotus</i>	C					Present in Big Cypress (Ellis & Zokan)
Marsh Killifish	<i>Fundulus confluentus</i>	C					Present in Big Cypress (Ellis & Zokan)

Table 2 (Cont.)

Common Name	Genus species	5	4	3	2	1	Notes
Lined Topminnow	<i>Fundulus lineolatus</i>					X	Present in Lake Okeechobee drainage (FMNH) ** Unlikely, no Okeechobee.
Redface Topminnow	<i>Fundulus rubifrons</i>				X		Present in Lake Okeechobee drainage and Lake Trafford (Loft information on this species).
Seminole Killifish	<i>Fundulus seminolis</i>	C					Present in Big Cypress (Ellis & Zokan)
Longnose Killifish	<i>Fundulus similis</i>				X		Present in Everglades drainage, Collier county (FMNH) ** Pos
Bluefin Killifish	<i>Lucania goodei</i>	C					Present in Big Cypress (Ellis & Zokan)
Rainwater Killifish	<i>Lucania parva</i>	C					Present in Big Cypress (Ellis & Zokan)
Mangrove Rivulus	<i>Rivulus marmoratus</i>				X		Present in ENP (Tabb & Manning 1961) ** Possible, but prima
Pike Killifish	<i>Belonesox belizanus</i>	C					Present in Big Cypress (Ellis & Zokan)
Mosquitofish	<i>Gambusia holbrooki</i>	C					Present in Big Cypress (Ellis & Zokan)
Least Killifish	<i>Heterandria formosa</i>	C					Present in Big Cypress (Ellis & Zokan)
Sailfin Molly	<i>Poecilia latipinna</i>	C					Present in Big Cypress (Ellis & Zokan)
Sheepshead Minnow	<i>Cyprinodon variegatus</i>	C					Present in Big Cypress (Ellis & Zokan)
Goldspotted Killifish	<i>Floridichthys carpio</i>			X			Present in Everglades drainage, Collier county (FMNH) ENP (I Possible, but primarily marine.
Flagfish	<i>Jordanella floridae</i>	C					Present in Big Cypress (Ellis & Zokan)
Asian Swamp Eel	<i>Monopterus albus</i>					X	Present in east coast canals ** Unlikely, have not been found c
Common Snook	<i>Centropomus undecimalis</i>	C					Present in Big Cypress (Ellis & Zokan)
Tarpon Snook	<i>Centropomus pectinatus</i>				X		Present in ENP (Tabb 1974) ** Possible, but very few records coast
Bluespotted Sunfish	<i>Enneacanthus gloriosus</i>	C					Present in Big Cypress (Ellis & Zokan)
Warmouth	<i>Lepomis gulosus</i>	C					Present in Big Cypress (Ellis & Zokan)
Bluegill	<i>Lepomis macrochirus</i>	C					Present in Big Cypress (Ellis & Zokan)
Dollar Sunfish	<i>Lepomis marginatus</i>	C					Present in Big Cypress (Ellis & Zokan)
Redear Sunfish	<i>Lepomis microlophus</i>	C					Present in Big Cypress (Ellis & Zokan)
Spotted Sunfish	<i>Lepomis punctatus</i>	C					Present in Big Cypress (Ellis & Zokan)
Largemouth Bass	<i>Micropterus salmoides</i>	C					Present in Big Cypress (Ellis & Zokan)
Black Crappie	<i>Pomoxis nigromaculatus</i>		X				Present in ENP (Loftus & Kushlan 1987)

Table 2 (Cont.)

<u>Common Name</u>	<u>Genus species</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>Notes</u>
Swamp Darter	<i>Etheostoma fusiforme</i>	X					Present in Big Cypress (Loftus & Kushlan 1987)
Crevelle Jack	<i>Caranx hippos</i>			X			Present in ENP (Loftus & Kushlan 1987) ** Possible, may ente
Gray Snapper	<i>Lutjanus griseus</i>			X			Present in ENP (Tabb and Manning 1961; Odum 1971; Tabb 1 Tamiami canal.
Striped Mojarra	<i>Eugerres plumieri</i>	C					Present in Big Cypress (Ellis & Zokan)
Spotfin Mojarra	<i>Eucinostomus argenteus</i>				X		Present in Everglades drainage, Collier county (FMNH) ** Pos: harengulus apparently replaces this species in low salinity wat
Silver Jenny	<i>Eucinostomus gula</i>				X		Present in ENP (Odum 1971; Tabb et al. 1974; Kushlan & Lod primarily marine.
Tidewater Mojarra	<i>Eucinostomus harengulus</i>		X				** No local records, but records of E. argenteus in south Florid species.
Sheepshead	<i>Archosargus probatocephalus</i>	X					Present in Big Cypress (Loftus & Kushlan 1987)
Red Drum	<i>Sciaenops ocellatus</i>			X			Present in ENP (Loftus & Kushlan 1987) ** Reported in BICY b undetermined.
Everg. Pgymy Sunfish	<i>Elassoma evergladei</i>	C					Present in Big Cypress (Ellis & Zokan)
Peacock Cichlid	<i>Cichla ocellaris</i>					X	Present in east coast canals (FMNH) ** Unlikely, has not spread
Oscar	<i>Astronotus ocellatus</i>	C					Present in Big Cypress (Ellis & Zokan)
Black Acara	<i>Cichlasoma bimaculatum</i>	C					Present in Big Cypress (Ellis & Zokan)
Mayan Cichlid	<i>Cichlasoma urophthalmus</i>	C					Present in Big Cypress (Ellis & Zokan)
Jewelfish	<i>Hemichromis bimaculatus</i>				X		Present in east coast canals (Loftus & Kushlan; FMNH) ** Pos may spread south.
Blue Tilapia	<i>Oreochromis aureus</i>	C					Present in Big Cypress (Ellis & Zokan)
Mozambique Tilapia	<i>Oreochromis mossambicus</i>					X	Present in east coast canals (Loftus & Kushlan; FMNH) ** Unli coast canals.
Jaguar Guapote	<i>Parachromis managuense</i>					X	Present in east coast canals (Loftus & Kushlan; FMNH) ** Unli coast canals.
Spotted Tilapia	<i>Tilapia mariae</i>	C					Present in Big Cypress (Ellis & Zokan)

Table 2 (Cont.)

<u>Common Name</u>	<u>Genus species</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>Notes</u>
Fat Sleeper	<i>Dormitator maculatus</i>				X		Present in ENP (Tabb & Manning 1961; Tabb et al. 1967) and (FMNH) ** Possible, validity of Collier county record undetermi Florida.
Bigmouth Sleeper	<i>Gobiomorus dormitor</i>					X	Present in east coast canals (Loftus & Kushlan; FMNH) ** Unli
Crested Goby	<i>Lophogobius cyprinoides</i>	C					Present in Big Cypress (Ellis & Zokan)
Naked Goby	<i>Gobiosoma boscii</i>	X					Present in Big Cypress (Loftus & Kushlan 1987)
Clown Goby	<i>Microgobius gulosus</i>			X			Present in Everglades drainage, Collier county (FMNH) and EI
Lined Sole	<i>Achirus lineatus</i>			X			Present in Everglades drainage, Collier county (FMNH) and EI Odum 1971; Tabb et al. 1974; Kushlan & Lodge 1974)
Hogchoker	<i>Trinectes maculatus</i>		X				Present in Everglades drainage, Collier county (FMNH) and EI
		53	11	12	15	15	

Species presently known (Column 5) = 53 <--- Low range
 Species probably in BICY (Columns 5+4) = 64
 Species possibly in BICY (Columns 5+4+3) = 76
 Max. species possible (Columns 5+4+3+2) = 91 <--- High range

Table 3. Species collected and location of collection in the initial electrofishing effort for Biscayne National Park freshwater fish species inventory.

<u>Common Name</u>	<u>Genus species</u>	<u>BLKCR</u>	<u>C-100</u>	<u>FLCTY</u>	<u>MLTRY</u>	<u>MOWRY</u>	<u>PRINC</u>	<u>TOTAL</u>
American Eel	<i>Anguilla rostrata</i>		1	3	3	3	2	12
Grass Carp	<i>Ctenophryngodon idella</i>		1					1
Orinoco Sailfin Catfish	<i>Pterygoplichthys multiradiatus</i>	1				4		5
Striped Mullet	<i>Mugil cephalus</i>	1			2		2	5
Needlefish species	<i>Strongylura sp</i>			1	2	1	1	5
Bluefin Killifish	<i>Lucania goodei</i>			1	1		1	3
Mosquitofish	<i>Gambusia holbrooki</i>		6	2	6			14
Sailfin Molly	<i>Poecilia latipinna</i>				6	4	4	14
Warmouth	<i>Lepomis gulosus</i>		9					9
Bluegill	<i>Lepomis macrochirus</i>		2		2			4
Redear Sunfish	<i>Lepomis microlophus</i>	1		1	2	1	2	7
Spotted Sunfish	<i>Lepomis punctatus</i>	6	3				1	9
Largemouth Bass	<i>Micropterus salmoides</i>		1	2	3	2		8
Bass Species	<i>Micropterus sp.</i>						1	1
Crevelle Jack	<i>Caranx hippos</i>			1	1		1	3
Gray Snapper	<i>Lutjanus griseus</i>			1	1	1	2	5
Mojarra species	<i>Eucinostomus sp.</i>			1			2	3
Mojarra Species	<i>Gerriodea spp.</i>				7			7
Peacock Cichlid	<i>Cichla ocellaris</i>	11	3	1		1		16
Black Acara	<i>Cichlasoma bimaculatum</i>						5	5
Midas Cichlid	<i>Cichlasoma citrinellum</i>		3					3
Cichlid Species	<i>Cichlasoma</i>		1					1
Mayan Cichlid	<i>Cichlasoma urophthalmus</i>	1		2	4	2	3	12
Jewelfish	<i>Hemichromis bimaculatus</i>		3		3	11	10	27
Tilapia Species	<i>Oreochromis sp.</i>	1						1
Spotted Tilapia	<i>Tilapia mariae</i>		7	1	22	6	1	37
Crested Goby	<i>Lophogobius cyprinoides</i>		1	7	21	8	2	39
TOTAL		24	41	26	86	45	42	264

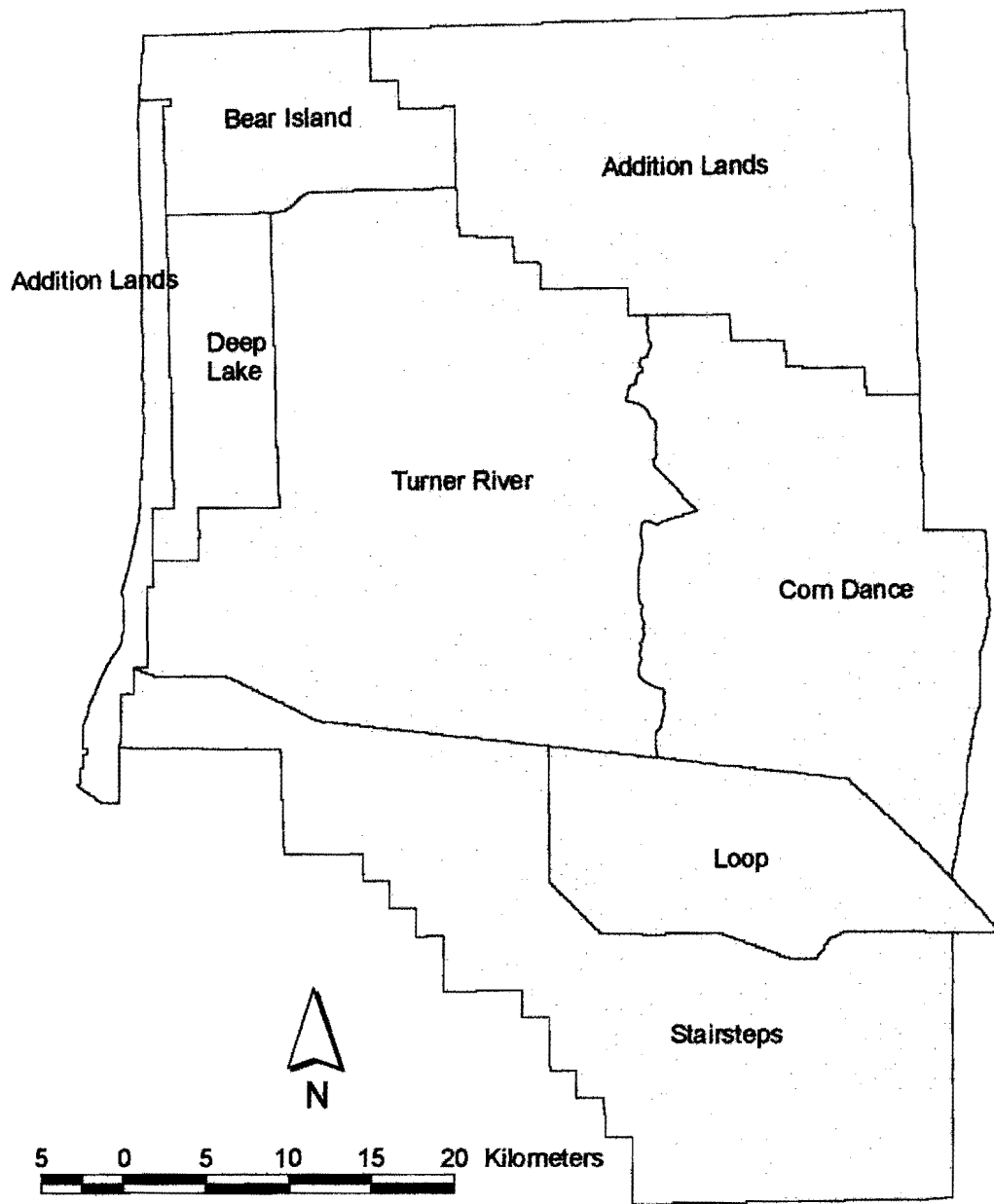


Figure 1: Big Cypress National Preserve Administrative Units

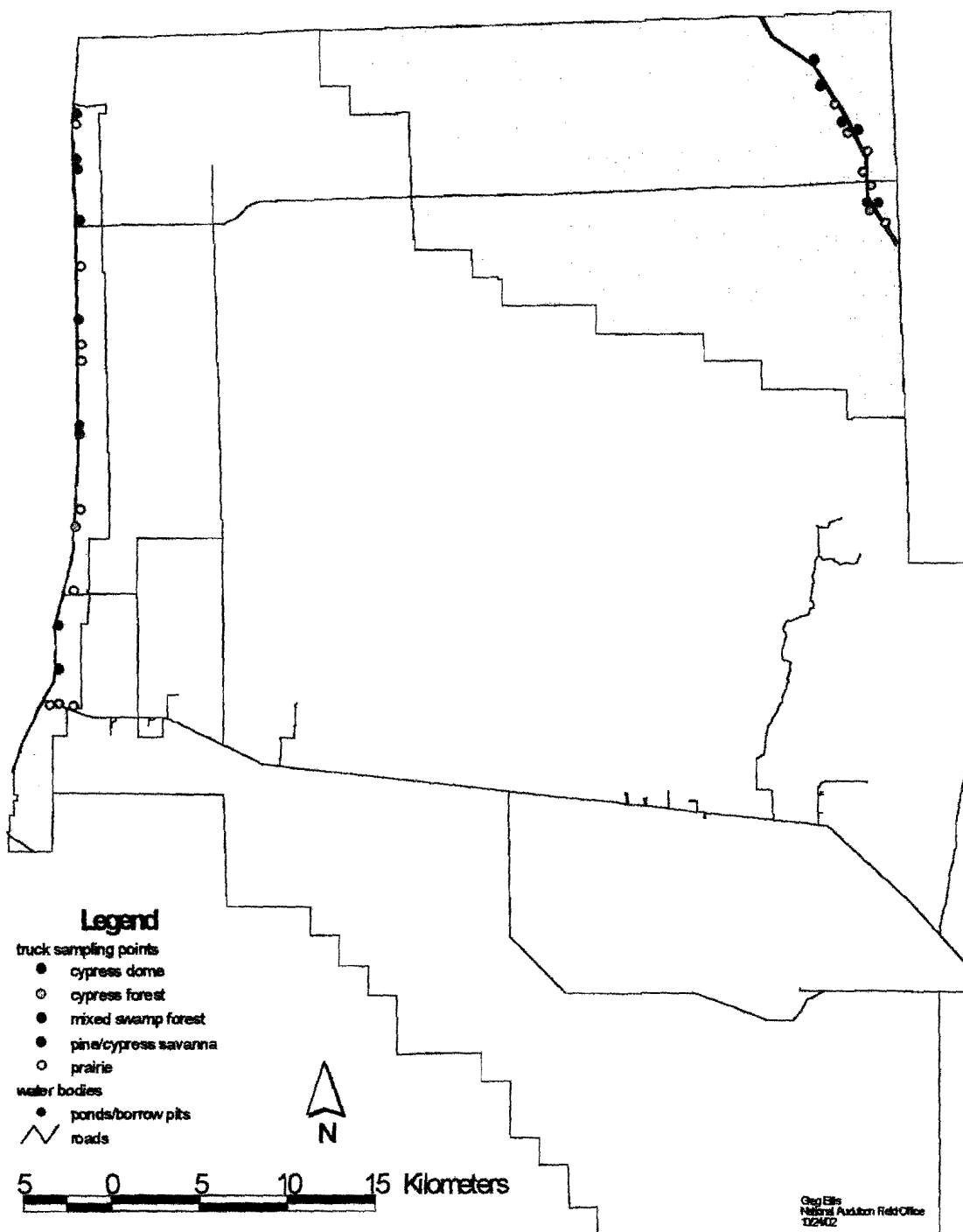


Figure 2: Addition Lands Proposed Freshwater Fish Sampling Locations

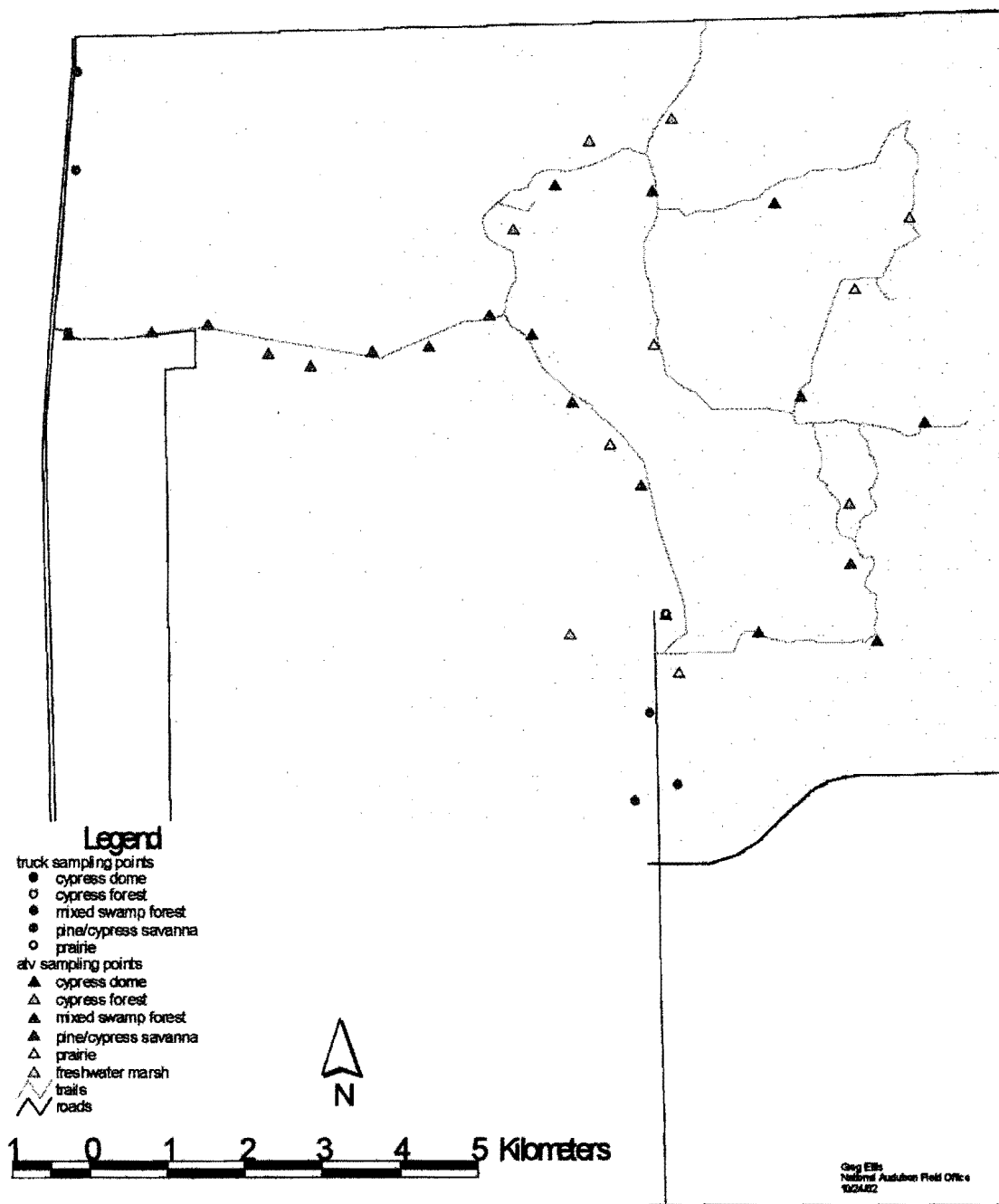


Figure 3: Bear Island Proposed Freshwater Fish Sampling Locations

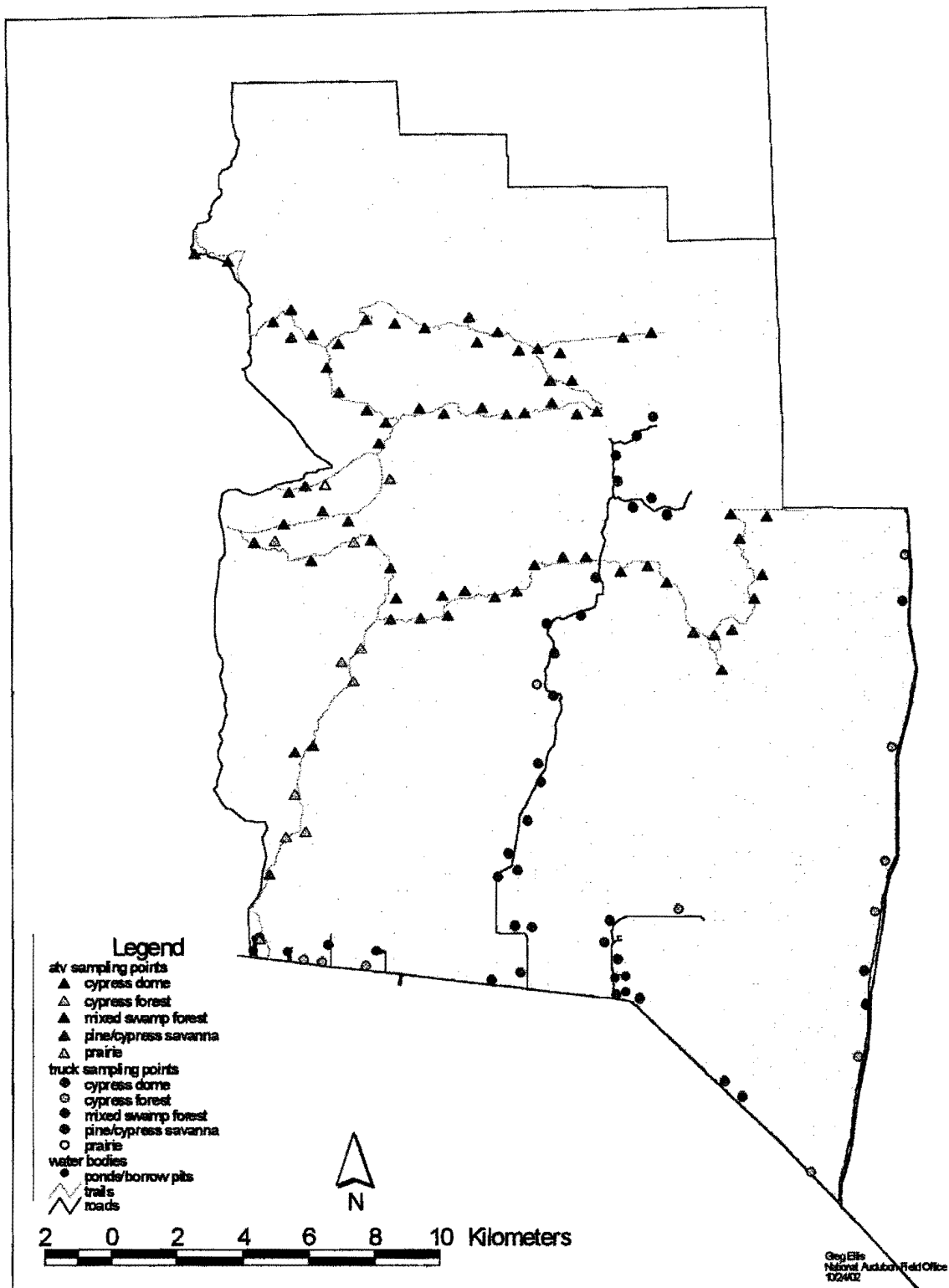


Figure 4: Corn Dance Proposed Freshwater Fish Sampling Locations

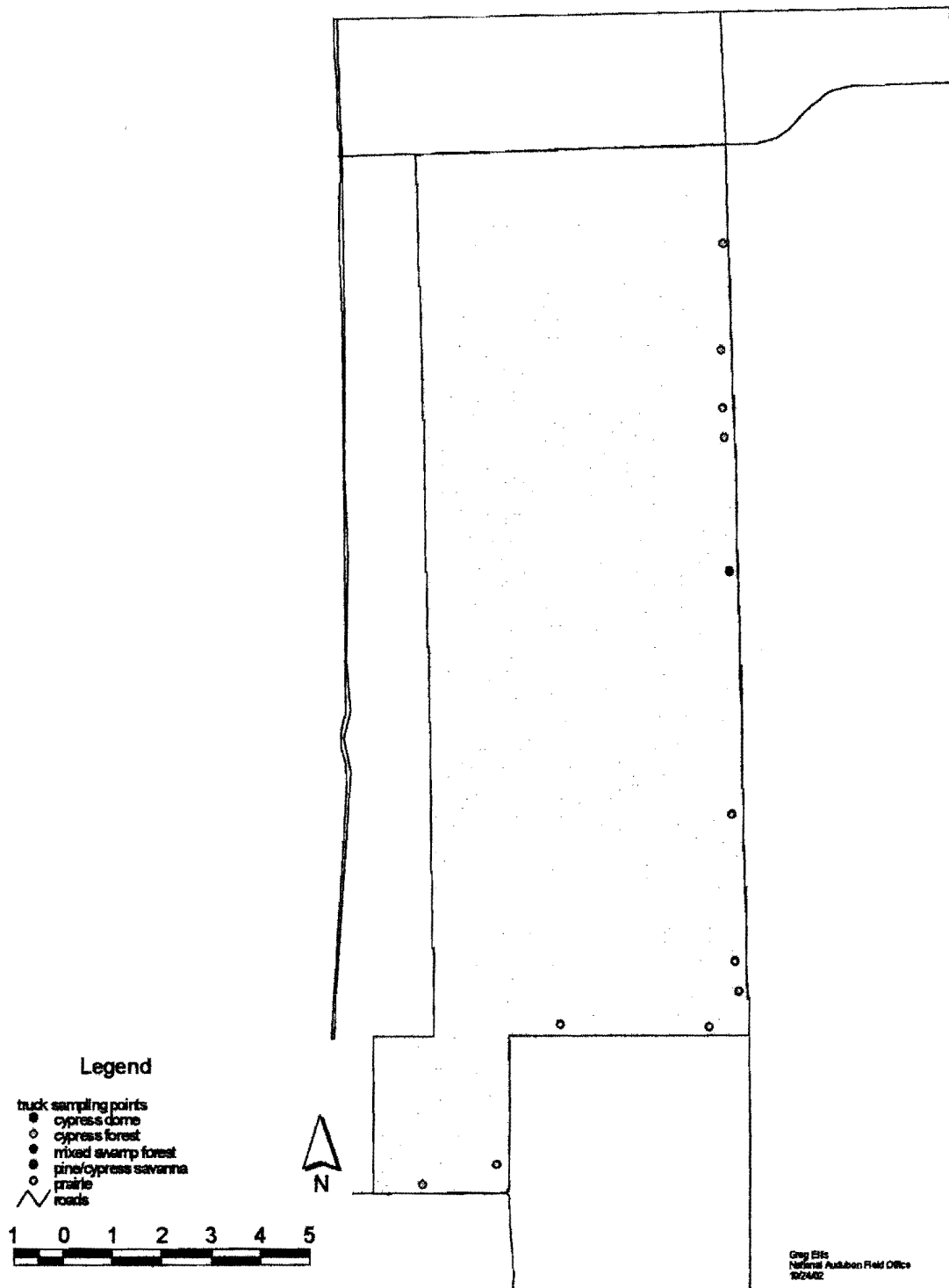


Figure 5: Deep Lake Proposed Freshwater Fish Sampling Locations

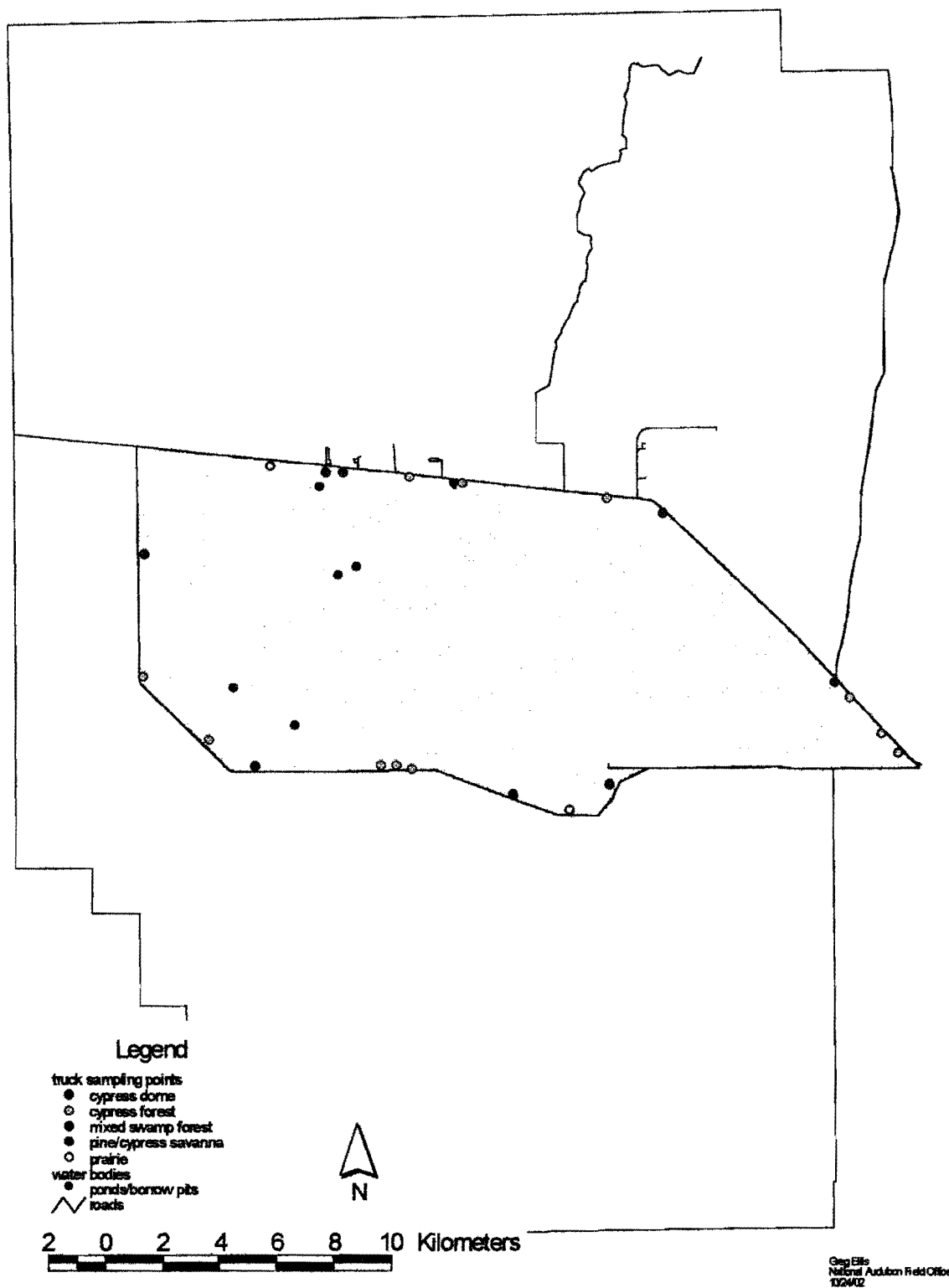


Figure 6: Loop Proposed Freshwater Fish Sampling Locations

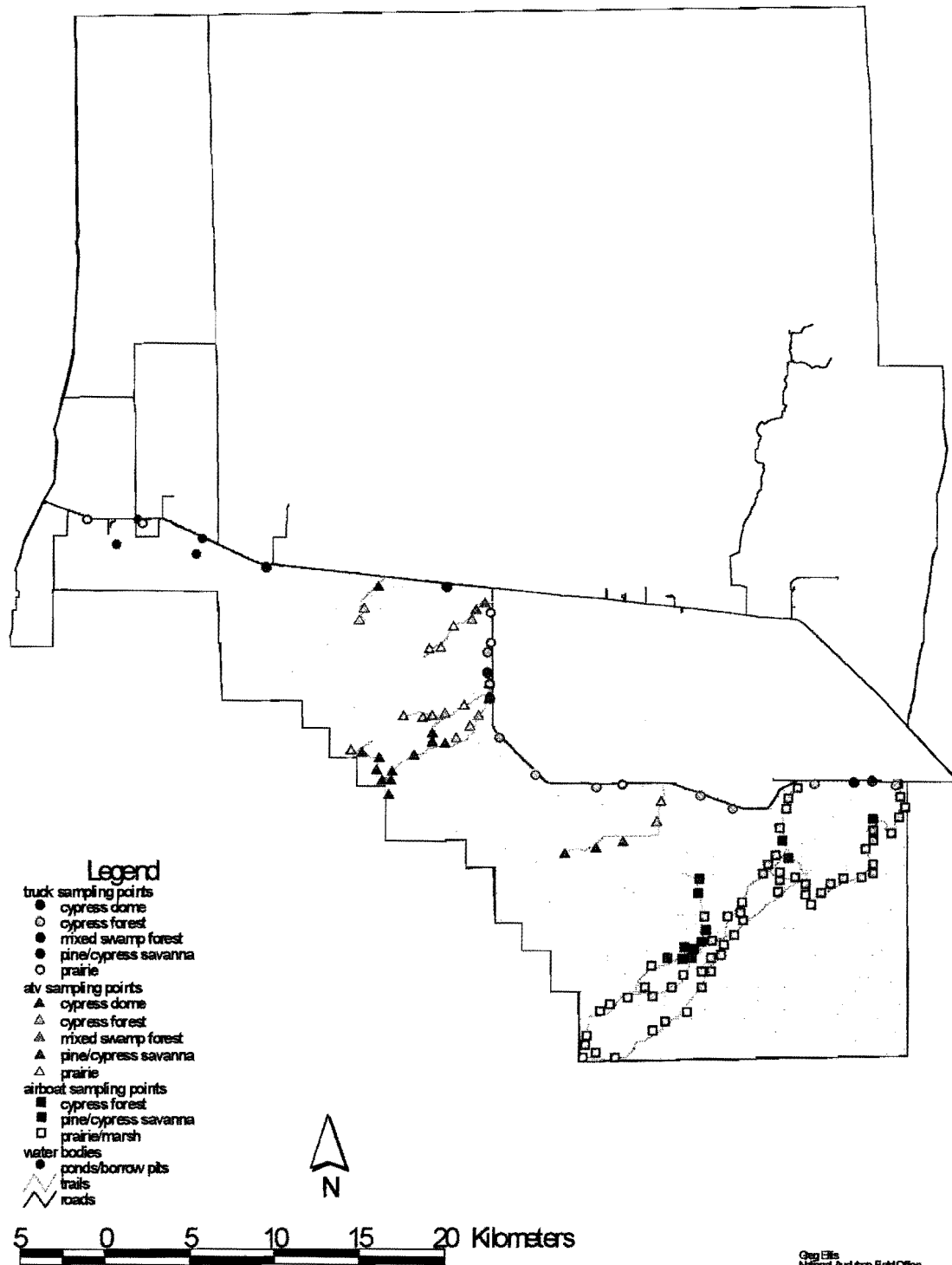


Figure 7: Stairsteps Proposed Freshwater Fish Sampling Locations

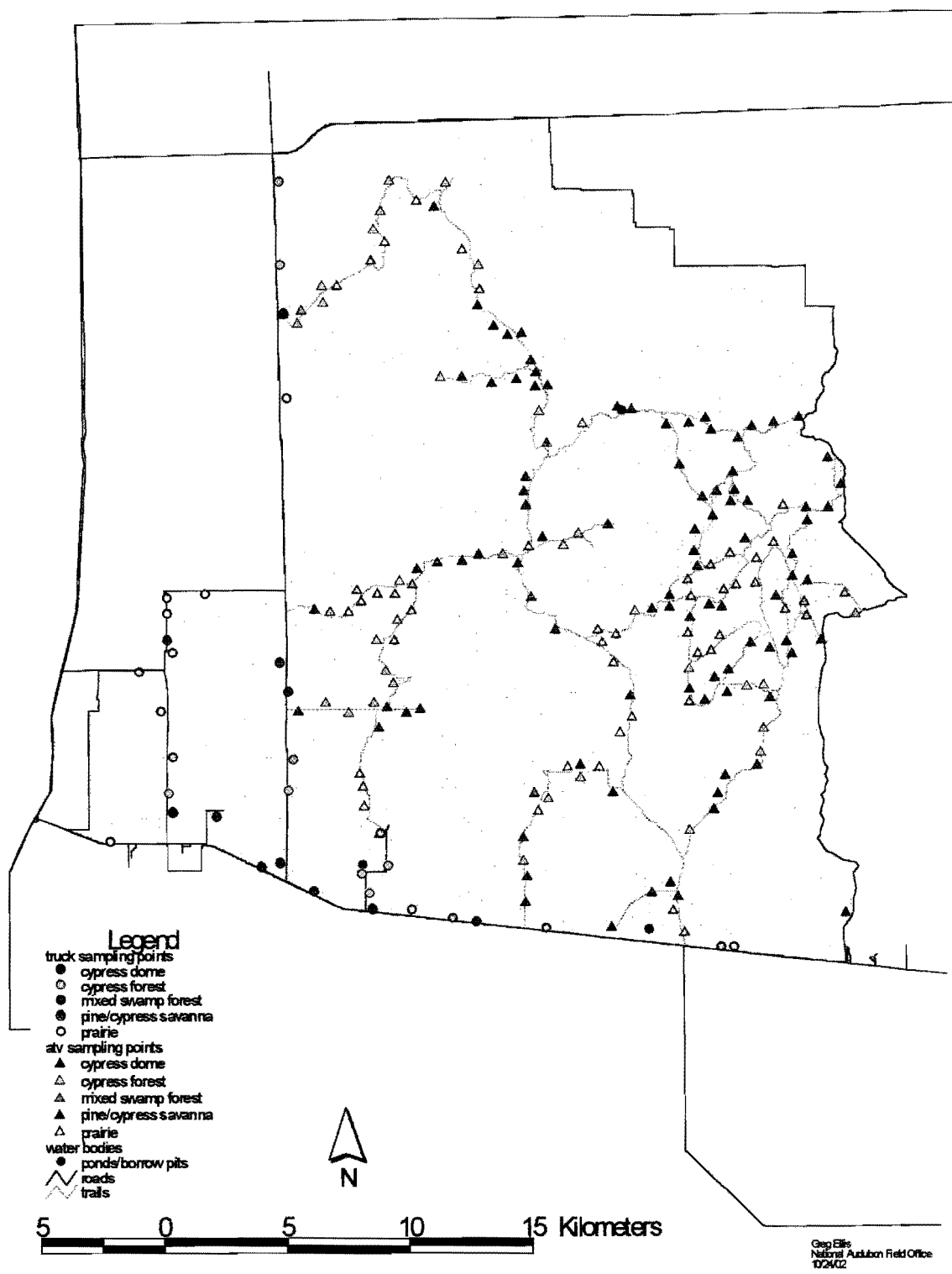


Figure 8: Turner River Proposed Freshwater Fish Sampling Locations