ANNOTATED CHECKLIST OF FISHES of the ARCHBOLD BIOLOGICAL STATION, Highlands County, Florida

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Nomenclature revised October 2004 following Nelson et al. 2004.

Introduction

The only permanent aquatic habitats on the Archbold Biological Station are Lake Annie and a small sinkhole pond in Tract 30. Lake Annie, with a surface area of approximately 37 ha and mean and maximum depths of 6 m and 20 m, respectively, is the southernmost of a 322-km chain of sinkhole lakes of common geological origin lying in the intraridge valley of the Lake Wales Ridge (Layne 1979). The shallow outlet of Lake Annie has a relatively strong current when the lake level is high enough to produce a flow. The sinkhole pond, with a diameter of about 27 m, fluctuates with the ground water level from about 1.2 to 3.3 m (mean 2.3 m) in depth. A small depression 1-2 m in diameter, possibly a sinkhole, in a large seasonal pond (Big Pond) in Tract 18 and a man-made water hole in Tract 18 usually contain some water except during extended drought. The remaining aquatic habitats are seasonal ponds and ditches with highly variable hydroperiods. Seasonal ponds, which collectively comprise about 10 percent of the Station area, vary considerably in shape, depth, and vegetation composition (Abrahamson et al. 1984). Some of the deeper seasonal ponds normally contain water during the rainy season and early part of the dry season each year and during wetter years may hold water continuously for a year or more. Others have water only during years of high rainfall, and some have not had water for more than 40 years and probably do not become flooded except with the passage of hurricanes.

This list documents fishes recorded from the main property of the Station since 1967 by staff and visiting investigators. Specimens were collected from all aquatic habitats by dip net, gig, and 10-foot minnow seine and in addition by wire funnel trap, Wegener ring, and gill netting in Lake Annie. Data on species occurrence and relative abundance in Lake Annie were also obtained through abovewater and underwater observations using SCUBA or snorkeling gear. Most records for Lake Annie are from Nester (1976) and Werner et al. (1978), summarized by Layne (1979), and collections by J. L. Wolfe during 1986-1988. Wolfe(1988) included 23 species in a key to fishes of Lake Annie (se also Wolfe and Prophet 1993). Keller (n.d.) reported on growth characteristics of a sample of largemouth bass collected in the lake in July 1984, and Ulanowicz et al.< (1993) also included data on the fish fauna of the lake.

Twenty-seven species in 8 orders and 12 families are presently known from the Station. This number includes 24 native and 3 exotic species. Of the native species, 18 (67%) are primary fresh water species and 6 (33%) in the families Cyprinodontidae, Poeciliidae, and

Atherinidae are secondary fresh water types. Because of the scarcity of permanent aquatic habitats on the property, the fish fauna is relatively depauperate, including only about 56 percent of the native species occurring in southcentral Florida (Lee et al. 1980). All but one (Fundulus cingulatus) of the species recorded from the Station occur in Lake Annie, and 11 species are known only from the lake. The fish populations of ditches and seasonal ponds are ephemeral and usually limited to species such as Gambusia holbrooki, Heterandria formosa, Fundulus cingulatus, and the exotic Clarias batrachus which are capable of dispersing through shallow water and of reproducing rapidly. However, during prolonged periods of high water table, species typically restricted to Lake Annie may disperse to seasonal ponds far from the lake. For example, in January 1975, following a period of extensive flooding in the intraridge valley area of the Station, a dense concentration of several hundred individuals of 11 species, including 6 species (Florida gar, bowfin, lake chubsucker, largemouth bass, bluegill, bluespotted sunfish) otherwise known only from Lake Annie, was observed in a small pool remaining in a rapidly drying seasonal pond nearly 3 miles from the lake. At such times of high water, dispersal of fishes from the lake is presumably through flooded ditches draining into the lake and bordering a nearby railroad right-of-way to adjoining seasonal ponds and then to other ponds through natural drainageways between ponds or shallow interconnecting ditches dug many years ago.

The classification and scientific and common names follow Nelson (2004). Exotic species are denoted with an asterisk. Voucher specimens of all species except Oreochromis aureus are deposited in the Station reference collections.

Species List

Order Lepisosteiformes

Family Lepisosteidae - gars

Lepisosteus platyrhincus. Florida Gar. -- Common in Lake Annie; several in a drying pool of a seasonal pond in Tract 18 in January 1975.

Order Amiiformes

Family Amiidae - bowfin

Amia calva. Bowfin. -- Common in Lake Annie; one adult and numerous juveniles collected in a drying pool of a seasonal pond in Tract 18 in January 1975.

Order Cypriniformes

Family Cyprinidae - carps and minnows

- *Notemigonus crysoleucas*. Golden Shiner. -- Common in Lake Annie. Reported by Werner et al. (1978) to rank fourth among species in the littoral zone in abundance and biomass (7%). This species is widely used as a bait minnow ("Missouri minnow") in Florida and may have been introduced to Lake Annie.
- *Notropis petersoni*. Coastal Shiner. -- Apparently rare in Lake Annie; one collection of three specimens in Lake Annie outlet in 1967. Not included in Wolfe's (1988) key to fishes of Lake Annie.

Family Catastomidae - suckers

- *Erimyzon sucetta*. Lake Chubsucker. -- Abundant in Lake Annie, where individuals can usually be seen from the dock; many in drying pool of a seasonal pond in Tract 18 in January 1975. In the study by Werner et al. (1978), this species ranked third in contribution (9%) to fish biomass in the littoral zone of the lake.

Order Siluriformes

Family Ictaluridae - North American catfishes

- *Ameiurus natalis*. Yellow Bullhead. -- Uncommon in Lake Annie and ditches. Specimens were collected in the water hole in Tract 18 and in a drying pool of seasonal pond in Tract 18 in January 1975.
- *Ameiurus nebulosus*. Brown Bullhead. -- Common in Lake Annie.
- *Noturus gyrinus*. Tadpole Madtom. -- Fairly common in Lake Annie.

Family Clariidae - labyrinth catfishes

- **Clarias batrachus*. Walking Catfish. -- Introduced. The first record from the Station was a specimen collected in the ditch in the Main Grounds area in January 1980. There was a possible sighting at the same site in July 1979. Abundant remains of walking catfish from the feeding of wading birds, raccoons, and otters were observed around drying Burmania Pond (Tract 31, No. 13) in February 1984. A specimen was collected in Lake Annie in June 1986.*

Family Callichthyidae - armored catfishes

- *Hoplosternum littorale*. Brown Hoplo.-- Introduced. The first record from the Station was a specimen collected during September 2004 at the Main Grounds in shallow floodwaters immediately behind Liatris (4) Cottage. A specimen was collected from the adjacent Reserve of Archbold Expeditions in 2003.

Order Esociformes

Family Esocidae - pikes

- *Esox niger*. Chain Pickerel. -- Fairly common in Lake Annie.

Order Atheriniformes

Family Atherinopsidae - silversides

- *Labidesthes sicculus*. Brook Silverside. -- Schools abundant in surface waters of Lake Annie.

Order Cyprinodontiformes

Family Fundulidae - topminnows

- *Fundulus chrysotus*. Golden Topminnow. -- Common in Lake Annie; uncommon in ditches.
- *Fundulus cingulatus*. Banded Topminnow. -- Abundant in railroad ditch, Sinkhole Pond, and seasonal ponds. Next to Gambusia, the most abundant species on Station property, exclusive of Lake Annie.
- *Fundulus lineolatus*. Lined Topminnow. -- Abundant in Lake Annie.

Family Poeciliidae - livebearers

- *Gambusia holbrooki*. Eastern Mosquitofish. -- The most ubiquitous and abundant fish species of the Station, occurring in Lake Annie, ditches, and seasonal ponds.
- *Heterandria formosa*. Least Killifish. -- Common in littoral zone of Lake Annie; uncommon in ditches.

Order Perciformes

Family Centrarchidae - sunfishes

- *Enneacanthus gloriosus*. Bluespotted Sunfish. -- Uncommon in Lake Annie; one collected in drying pool of a seasonal pond in Tract 18 in January 1975.
- *Lepomis gulosus*. Warmouth. -- Common in Lake Annie; uncommon in seasonal ponds.
- *Lepomis machrochirus.* Bluegill. Abundant in Lake Annie, accounting for 46 percent of the biomass of fishes in the littoral zone (Werner et al.1978). Numerous in a drying pool of a seasonal pond in Tract 18 in January 1975.
- Lepomis marginatus. Dollar Sunfish. -- Common in Lake Annie.
- *Lepomis microlophus*. Redear Sunfish. -- Uncommon in Lake Annie.
- *Micropterus salmoides*. Largemouth Bass. Abundant in Lake Annie, representing 35 percent of the fish community biomass in the littoral zone (Werner et al. 1978). Numerous small individuals were present in a drying pool of a seasonal pond in Tract 18 in January 1975. Largemouth bass in Lake Annie have the second highest tissue level of mercury recorded for lakes in Florida (Hand and Friedman 1990) and a higher level (mean,1.33 ug/g and range, 0.92-1.90) than any species analyzed from lakes in Canada, Minnesota, and New Jersey (Watkins 1991). Battoe and Lowe (1991) documented a long-term increase in acidity of Lake Annie which they attributed to atmospheric sources. This finding together with a strong inverse correlation between pH and Hg concentration in bass and the relative scarcity of organic sediments which could be a potential source of mercury strongly point to atmospheric deposition as the source of the mercury in the Lake Annie bass (Watkins 1991). Unfortunately, nothing is known of the pathway(s) by which the bass acquire their high tissue burdens of mercury.
- *Pomoxis nigromaculatus*. Black Crappie. -- Uncommon in Lake Annie.

Family Percidae - perches

- *Etheostoma fusiforme*. Swamp Darter. -- Common in Lake Annie in shallow water around edge.

Family Elassomatidae - pygmy sunfishes

- *Elassoma evergladei*. Everglades Pygmy Sunfish. -- Uncommon in Lake Annie outlet; abundant in Sinkhole Pond in Tract 19 and Water Hole in Tract 18; common in seasonal ponds; and occasional in ditches.

Family Cichlidae - cichlids

- **Oreochromis aureus*. Blue Tilapia. First recorded in Lake Annie in July 1997, when an adult and characteristic bowl-shaped, clean sand nests were observed in the area west of the dock near the outer edge of the emergent plant zone (personal observation). Adults and nests have been observed in the same area on several subsequent occasions. The species may have been introduced directly into the lake or entered through the outlet which connects to Lake Placid and other interconnected ridge lakes to the north.

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