SPATIOTEMPORAL PATTERNS IN THE DISTRIBUTION AND ABUNDANCE OF THE INTRODUCED REDBREAST SUNFISH (*LEPOMIS AURITUS*) AND NATIVE LONGEAR SUNFISH (*L. MEGALOTIS;* CENTRARCHIDAE) IN RESERVOIRS OF THE TENNESSEE RIVER DRAINAGE

By

Lacey Michelle Genard

Mark Schorr
Professor of Biology
(Chair)

Jose Barbosa
Associate Professor of Biology
(Committee Member)

Andy Carroll
GIS Manager
(Committee Member)

Sean Richards
Professor of Biology
(Committee Member)

SPATIOTEMPORAL PATTERNS IN THE DISTRIBUTION AND ABUNDANCE OF THE INTRODUCED REDBREAST SUNFISH (*LEPOMIS AURITUS*) AND NATIVE LONGEAR SUNFISH (*L. MEGALOTIS;* CENTRARCHIDAE) IN RESERVOIRS OF THE TENNESSEE RIVER DRAINAGE

By

Lacey Michelle Genard

A Thesis Submitted to the Faculty of the
University of Tennessee at Chattanooga
in Partial Fulfillment of the Requirements of the
Degree of Master of Science: Environmental Science

The University of Tennessee at Chattanooga
Chattanooga, Tennessee

May 2014

ABSTRACT

The Redbreast Sunfish (*Lepomis auritus*) was introduced in the Tennessee River drainage (TRD) in the 1940s, and contemporary anecdotal evidence suggests that *L. auritus* is possibly displacing the native Longear Sunfish (*Lepomis megalotis*). This study aimed to characterize temporal patterns in regional abundances of *L. auritus* and *L. megalotis* populations in the TRD based on a multiyear analysis of historical and contemporary fish assemblage datasets (percent abundance, density, biomass). Results indicate that *L. megalotis* abundance declined in reservoirs where *L. auritus* was found in high or increasing abundances. Also, *L. auritus* surpassed *L. megalotis* in mean percent abundance in Nickajack-Chickamauga River section and has consequently shifted *Lepomis* species composition. Although it is difficult to isolate causal variables, the interaction of both biotic (i.e., *L. auritus* competition) and abiotic (i.e., geographic variables, land use, and water quality) factors likely explain the changes in *L. megalotis* abundance and variability within river sections.

DEDICATION

This thesis is dedicated to my mother, Carla Moore Pugh. She has been an outstanding role model and has taught me the value of hard work and perseverance. I greatly appreciate her constant support throughout this process.

ACKNOWLEDGMENTS

First, I would like to express my gratitude to Dr. Mark S. Schorr for working as my thesis advisor and for giving me this opportunity. His continuous guidance and assistance throughout my time at the University of Tennessee at Chattanooga is greatly appreciated, and his mentorship has enhanced my growth as a researcher and biologist. I would also like to express gratitude to Andy Carroll for his guidance with GIS and development of range maps. Further, I wish to thank the remainder of my thesis committee, Dr. Jose Barbosa, Dr. Sean Richards, and Charles Saylor for their helpful comments and guidance. To the Biological and Environmental Science Department at the University of Tennessee at Chattanooga, thank you for making this project possible through research and teaching assistantships. To the Tennessee Valley Authority, thank you for providing fish assemblage data for analysis. Lastly, I would like to thank my family and friends for their constant support and encouragement throughout this process.

TABLE OF CONTENTS

APPENDIX

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ANOVA, Analysis of Variance
DO, Dissolved Oxygen
EPA, Environmental Protection Agency
TRD, Tennessee River drainage
TVA, Tennessee Valley Authority
USGS, United States Geological Survey
WRT, Water Residency Time
YOY, Young-of-year

CHAPTER 1

INTRODUCTION

Impacts of Nonnative Fishes

Nonnative fishes are the most documented invaders of aquatic ecosystems, and occurrences of introductions are continuing to increase (Gozlan *et al.* 2010). Consequently, nonnative fishes is one of the primary causes of endangerment to riverine fish species (Dudgeon *et al.* 2006, Gozlan *et al*. 2010); they have altered aquatic communities and contributed to the worldwide decline of native fishes by lowering biodiversity, impacting ecosystem function, and causing extinction of some native species (Deacon *et al*. 1964, Adams *et al*. 2001, Byers *et al.* 2002, Marchetti *et al.* 2004, Pimentel *et. al.* 2005, Moyle and Marchetti 2006, Sanderson *et al*. 2009). In North America, nonnative fishes are a contributing factor in 67.5 % of the continental fish extinctions (27 of 40 species in the last 100 years; Sanderson *et al*. 2009). Moreover, in the United States, nonnative fishes are a contributing factor in the listing of 70% the native fishes that are registered as threatened or endangered by the United States Fish and Wildlife Service (U.S. Endangered Species Act 1973; Rahel 2000, Clavero and Garcia-Berthou 2006).

Impacts of nonnative fishes on native ichthyofaunas may occur at the population, community, and ecosystem levels. Population-level effects may include competition for food or habitat, predation, disease, and hybridization (Flecker and Townsend 1994, Gozlan *et al.* 2010, Seegert 2010, Cucherousset and Olden 2011, Idelberger *et al.* 2011). For instance, Marsh and Douglas (1997) found that predation by introduced fishes can affect native fish species by

decreasing population numbers and reducing recruitment. At the community level, nonnative species can impact native communities by biotic homogenization, which typically involves the disappearance of many native and endemic species and the spread of nonnative species (Marsh-Matthews and Matthews 2000, Clavero and Garcia-Berthou 2006). Additionally, a review by Ross (1991) concluded that 77% of the 31 studies examined found a decline in native fish species after the introduction of nonnative fishes. Ecosystem-level effects may include habitat degradation (e.g., decreasing aquatic vegetation) and trophic-level alterations (e.g., niche shifts and cascade effects) as well as drastic ecosystem property alterations such as changes in nutrients (Flecker and Townsend 1994, Gozlan *et al.* 2010, Cucherousset and Olden 2011).

Anthropogenic mechanisms of the introduction of nonnative species include intentional introductions such as food aquaculture, aquarium releases, biological control, and fisheries stockings as well as unintentional introductions such as ballast water transfers, interbasin water transfers, and escape from aquaculture installations (Bunn and Arthington 2002, Marchetti *et al.* 2004, Gozlan *et al.* 2010). In the United States, the main method of introduction of nonnative fishes is intentional stocking followed by bait/aquarium release and aquaculture (USGS 2014). Although it is difficult to isolate causal variables, expansion of nonnative species in freshwater ecosystems has been linked to urbanization, agriculture, and other landscape and hydrologic alterations such as impoundments (Wilcove *et al*. 1998, Gido and Brown 1999, Rahel 2000, Bunn and Arthington 2002, Gido *et al.* 2004, Gozlan *et al.* 2010). Prevalence and success of nonnative fish introductions is often correlated with low native species diversity (Gido and Brown 1999, Tsunoda and Mitsuo 2012) and large rivers with dense fish populations (Gido *et al.* 2004, Smith *et al.* 2004).

Species Distributions

Mechanisms determining the distribution of fishes are complex and often not understood (Tonn *et al.* 1990). They occur on local and regional scales, with biotic (e.g., competition and predation) and abiotic (e.g., habitat use, morphological features, and water quality) influences (Jackson *et al.* 2001, Pombo *et al.* 2005). Water quality parameters such as dissolved oxygen, temperature, salinity, and pH in addition to other abiotic factors such as precipitation, groundwater inflow, and morphological features (e.g., disturbance, vegetative cover, and depth) are strongly related to fish community composition (Matthews *et al.* 1992, Jackson *et al.* 2001). Anthropogenic influences such as historical and current land use (e.g., urbanization, residential development, and agriculture) as well as altered flow (e.g., impoundments) are contributing factors in the occurrence, distribution, and composition of fishes (Marchetti and Moyle 2001, Bunn and Arthington 2002, Wenger *et al.* 2008). Species co-occurrence is also driven by abiotic factors (Tonn *et al.* 1990, Peres-Neto 2004) as well as biotic factors (e.g., interspecific competition and predation; Matthews *et al.* 1992, Winston 1995, Persson 1996, Jackson *et al.* 2001). Gatz (1979) found that percentage of overlap in coexisting species is half as much in nature compared to the amount of overlap possible; this pattern could be due to competition between species, forcing them into separate ecological niches.

Tennessee River Fishes

The Tennessee River drainage (TRD; total watershed area = 105,000 km^2), which encompasses portions of Virginia, North Carolina, Georgia, Tennessee, Alabama, Mississippi, and Kentucky, supports 28 families encompassing an estimated total of 282 fish species (247 natives; Etnier and Starnes 1993, TVA unpublished data). Presently, in the TRD, there are 35

nonnative fish species representing 11 families: Clupeidae (2 species), Cyprinidae (12), Ictaluridae (4), Poeciliidae (1), Esocidae (2), Salmonidae (4), Gasterosteidae (1), Belonidae (1), Moronidae (3), Centrarchidae (4), and Percidae (1; Etnier and Starnes 1993, TVA unpublished data).

The Sunfishes (Centrarchidae)

The family Centrarchidae (sunfishes; 31 species), endemic to North America, includes several popular sports fishes such as the rockbasses (*Ambloplites* spp.), black basses (*Micropterus* spp.), crappies (*Pomoxis* spp.), and others collectively known as bream (*Lepomis* spp.). Centrarchids have been widely introduced around the world, often in lakes and rivers where they become invasive (Cucherousset and Olden 2011). In North America, many sunfish species have been released or stocked outside their natural ranges and have negatively impacted other species, even their congeners (Huckins *et al.* 2000). However, relatively few studies have measured their impacts on native fishes, particularly on native congeneric sunfishes (Etnier and Starnes 1993).

In the TRD, there are five genera and 19 species of centrarchids (15 natives and 4 nonnatives; Etnier and Starnes 1993). Nonnative centrarchids in the TRD include Redbreast Sunfish (*Lepomis auritus*), Pumpkinseed (*L. gibbosus*), Redeye Bass (*Micropterus coosae*), and Alabama Spotted Bass (*Micropterus henshalli*). Of these, the Redbreast Sunfish (*Lepomis auritus*) is one of the most abundant and widespread nonnative species in streams and reservoirs of the TRD (TVA unpublished data).

Redbreast Sunfish (Lepomis auritus)

Lepomis auritus is native to the Atlantic Slope (New Brunswick to central Florida) and Gulf slope drainages, and west to Apalachicola and Choctawhatchee drainages (parts of Alabama, Florida, and Georgia); populations outside of this area are considered introduced (Etnier and Starnes 1993, Boschung and Mayden 2004, Page and Burr 2011). The mechanism of introduction into the TRD is most likely due to intentional stocking for sport fishing (USGS 2014). The first recorded occurrences of *L. auritus* in the Tennessee River drainage date back to the early 1940s in tributary streams of Watts Bar and Fort Loudoun reservoirs in eastern Tennessee (TVA unpublished data). *L. auritus* is now well established in the upper Tennessee River drainage downstream to the Chattanooga area; expanding populations of *L. auritus* appear to correspond with decreasing numbers of the native Longear Sunfish (*Lepomis megalotis*), an ecologically similar species (Etnier and Starnes 1993, Boschung and Mayden 2004).

L. auritus is highly adaptable to a variety of habitats such as lakes, reservoirs, swamps, and backwaters; however, it prefers rocky or sandy pools of streams and rivers (Aho *et al.* 1986, Etnier and Starnes 1993, Boschung and Mayden 2004, Page and Burr 2011). Primarily an insectivore, *L. auritus* feeds on aquatic invertebrates (e.g., amphipods), nymphal stages of aquatic insects (e.g., trichopterans), and terrestrial insects (Davis 1972, Bass and Hitt 1974, Sandow *et al.* 1974, Etnier and Starnes 1993, Boschung and Mayden 2004, Gautreau and Curry 2012); it is also known to consume crayfish and small fishes (Etnier and Starnes 1993). Juveniles up to 100 mm feed heavily on ostracods, chironomids, and dipteran larvae (Etnier and Starnes 1993, Boschung and Mayden 2004). However, diet is variable and is determined by prey availability and size (Aho *et al.* 1986). A tolerant species, *L. auritus* can withstand moderate

turbidity (< 100 JTU's) and high water temperatures (33-39 °C), but often move to more suitable habitat if it is accessible (Aho *et al.* 1986, Sandow *et al.* 1974, Jenkins and Burkhead 1994).

The spawning season of *L. auritus* occurs April through August, and activity is greatest during June; nest building begins in springtime when waters reach 16-21°C (Etnier and Starnes 1993, Boschung and Mayden 2004, Gautreau and Curry 2012). Spawning occurs at water temperatures ranging from 16.8-25.6 °C (Davis 1972, Bass and Hitt 1975). Nests are usually solitary and are constructed in sandy substrate or sometimes over a vegetative mat. They are located within shallow portions (< 1.5 m) of streams that have low, stable velocities (<0.10 m/s), near the shoreline and some form of protective covering such as vegetation, submerged logs, stumps, or overhanging banks (Etnier and Starnes 1993, Lukas and Orth 1993, Boschung and Mayden 2004, Gautreau and Curry 2012). However, some nests have been found in open water or in areas with little covering (Gautreau and Curry 2012). Nests of *L. auritus* are typically 30-94 cm in diameter and can often be distinguished from other *Lepomis* species by the uniform shape of stones in the nests (≤12mm; Davis 1972, Boschung and Mayden 2004). Most other species of *Lepomis* typically make sounds during courtship and spawning; *L. auritus* is usually silent which can also serve as a type of species recognition (Gerald 1971, Etnier and Starnes 1993, Boschung and Mayden 2004). In females, fecundity increases greatly with size and averages approximately 3,300 eggs per female with a range of 322-9,206 eggs (Sandow *et al.* 1975, Etnier and Starnes 1993). Males guard nests of fertilized eggs until they are hatched, usually 7-10 days following fertilization (Gautreau and Curry 2012).

Longear Sunfish (*Lepomis megalotis*)

Lepomis megalotis is native to the southern portion of the Hudson Bay drainage, Mississippi River basin, tributaries to three of the Laurentian Great Lakes (Huron, Michigan, and Erie), Gulf Slope drainages (Apalachicola River through the Rio Grande drainage in Mexico), and the Tennessee River drainage (Etnier and Starnes 1993). It is widely distributed throughout the Tennessee River and its tributaries except in the highest portions of the Blue Ridge ecoregion; however, *L. megalotis* is much less common in the upper portion of the TRD where it is broadly sympatric with the ecologically similar redbreast sunfish (Etnier and Starnes 1993). There are several subspecies of *L. megalotis* within its native range, such as the Northern Longear Sunfish (*Lepomis megalotis peltastes*) and the Central Longear Sunfish (*Lepomis megalotis megalotis*; Jennings and Phillip 1992). *L. m. megalotis* is present throughout the Tennessee River drainage (Bauer, University of Tennessee unpublished data).

Preferred habitat of *L. megalotis* is rocky or sandy-bottomed pools of moderately flowing headwater and medium-sized streams (Etnier and Starnes 1993, Boschung and Mayden 2004). It is also associated with margins near vegetative cover, undercut banks, logs, or brush. *L. megalotis* is adapted well to pools and reservoirs of major rivers as well as brackish waters of coastal streams (Etnier and Starnes 1993, Boschung and Mayden 2004). Although *L. megalotis* typically stays within a very small home range, it has very strong homing capabilities by way of olfaction (Etnier and Starnes 1993, Boschung and Mayden 2004). Mainly insectivorous, adults feed on aquatic and terrestrial insects, fish eggs, and aquatic invertebrates (e.g., bryozoans); larger adults particularly feed on terrestrial insects and often feed on the surface of the water. Juveniles feed mainly on microcrustaceans and aquatic insects (Etnier and Starnes 1993,

Boschung and Mayden 2004). Although considered secure throughout its range (Boschung and Mayden 2004), *L. megalotis* is categorized as intolerant and can be susceptible to environmental stressors such as water quality degradation (Jennings 2013, TVA unpublished data).

Spawning mainly occurs May through August once nest-building activity is triggered by warmer water (≥25 °C) and a longer photoperiod (16 hours; Boschung and Mayden 2004). Nests are constructed close together in colonies along shorelines over gravel substrate; solitary nests are occasionally found near colonies of nests (Etnier and Starnes 1993, Boschung and Mayden 2004). Males diligently guard nests while females are able to spawn in the nests of several males (Etnier and Starnes 1993, Boschung and Mayden 2004). Although *L. megalotis* does not exhibit female mimicry like some other *Lepomis* species, smaller males sometimes dart into nests and attempt to fertilize the eggs while a nuptial pair is beginning to spawn (Boschung and Mayden 2004). Sound production by way of grunting may also play a role in spawning (Gerald 1971, Boschung and Mayden 2004). Females spawn in the nests of several males, with egg production as much as 4,000 eggs per female (Etnier and Starnes 1993). After spawning, males fan fertilized eggs immediately, then alternate sweeping and fanning. The sweeping drives the eggs deeper into the protective gravel substrate, and the fanning keeps silt and other debris from settling on the developing eggs (Etnier and Starnes 1993, Boschung and Mayden 2004). Males guard and maintain nests until eggs are hatched (Etnier and Starnes 1993).

Anecdotal evidence suggests that *L. auritus* is possibly displacing native Longear Sunfish (*Lepomis megalotis*; Etnier and Starnes 1993). Cooner and Bayne (1982) reported significant overlap in the diets of *L. megalotis* and *L. auritus*, suggesting that diet may play a role in competitive interactions between sympatric populations of the two species; with the exception of

this study, there is no scientific literature on ecological relationships between *L. megalotis* and *L. auritus.*

Justification for Research

Interspecific competition may play an important role in the organization of local fish communities (Jackson *et al.* 2001). Quantifying the distribution and abundance of an introduced fish species and native congeneric species in an aquatic system is an important first step to understanding and studying its possible interactions and effects of introduced species on native species. Understanding impacts and interactions of these species will be vital in protecting native species and preserving biodiversity in the TRD. Furthermore, scientific documentation is lacking on the introduction of *L. auritus* to the Tennessee River drainage (e.g., year, location); spatiotemporal patterns in the distribution and abundance of *L. auritus* and *L. megalotis* have not been investigated.

Research Questions

1) When and where was the Redbreast Sunfish (*Lepomis auritus*) introduced in the Tennessee River drainage (TRD)?
2) How has the distribution and abundance of *L. auritus* changed within the TRD?
3) Has *L. auritus* had an effect on the distribution and abundance of the native Longear Sunfish (*L. megalotis*) within the TRD?
4) Do electrofishing catch rates provide reliable indices of *Lepomis* sunfish density?

Research Objectives

1) Estimate the time(s) and geographic point(s) of introduction and establishment for *L. auritus* in reservoirs of the TRD.

2) Characterize temporal patterns in regional abundances of *L. auritus* and *L. megalotis* populations in the TRD based on a multiyear analysis of historical and contemporary datasets (rotenone, 1947-1997, and electrofishing/gill-netting, 1993-2012, respectively).

3) Determine whether electrofishing data provide reliable indices of population density (based on rotenone data) for *Lepomis* species in TRD reservoirs.

CHAPTER 2

METHODS

Study Area

The Tennessee River drainage (TRD; total watershed area = 105,000 km^2) encompasses portions of Virginia, North Carolina, Georgia, Tennessee, Alabama, Mississippi, and Kentucky (Etnier and Starnes 1993). Five major Level III ecoregions traverse the TRD: Southeastern Plains, Interior Plateau, Southwestern Appalachians, Ridge and Valley, and Blue Ridge (Figure 1).

Ecoregions of the Tennessee River Drainage

The Southeastern Plains ecoregion is part of the Coastal Plains physiographic province and covers the westernmost portion of the TRD. It extends as far north as Maryland and as far south as the Gulf of Mexico. The Southeastern Plains is characterized by irregular, flat plains including agricultural lands, forests, and some wetland areas (Sohl 2012_a); natural vegetation is predominantly oak-hickory-pine, but much of that has been replaced by heavily managed timberlands (EPA 2010). Elevation is generally lower than the Interior Plateau to the east and higher than the Mississippi Alluvial Plain to the west (Sohl 2012_a). The terrain consists of sands, silts, and clays (EPA 2010).

Farther east, the Interior Plateau ecoregion encompasses much of central Tennessee and northern Alabama, while extending north into parts of Indiana and Ohio. It is characterized by

rolling plains, grassland plateaus and forested uplands; natural vegetation is primarily oak-hickory forest, and it also contains fertile lowlands (EPA 2010). Elevations range from 105-410m, and it is generally lower in elevation than the Southwestern Appalachians and Blue Ridge ecoregions to the east (EPA 2010, Drummond 2012). Limestone, chert, sandstone, siltstone and shale are dominant rock types, with karst terrain being prevalent (EPA 2010). Agriculture and urbanization has impacted this area, and water quality is of concern in watersheds with significant coal mining and agriculture (Drummond 2012).

The Southwestern Appalachians ecoregion occurs in Kentucky, Tennessee, Georgia, and Alabama and borders the Interior Plateau ecoregion to the east (EPA 2010). The Southwestern Appalachians ecoregion is characterized by open low mountains with upland forests and some agricultural lands on valley floors (Sohl 2012_b). Approximately 75% of the ecoregion is covered by forest, primarily oak-pine communities; however, limestone, coal, and iron deposits have resulted in significant historical mining activity (Sohl 2012_b). Furthermore, the Cumberland Plateau is a significant part of the Southwestern Appalachians; this region contains conglomerate, sandstone, siltstone, and shale is covered by mostly well-drained, acidic soils of low fertility.

The Ridge and Valley ecoregion borders the Southwestern Appalachians ecoregion to the east, extends as far north as New York, and as far south as Alabama. It is characterized by roughly parallel ridges and lowland valleys with forests and some agricultural lands (Friesen and Stier 2012). Although elevations can reach up to 1500m on some ridges, it is generally lower in elevation and has less forest cover than the Blue Ridge ecoregion to the east (Friesen and Stier 2012). Forests and managed lands are the dominant land-use type, while agricultural and urban areas comprise a smaller portion of the ecoregion (30%, 9% respectively; Friesen and Stier

2012). Due to faulting and folding, it also has a variety of geologic materials: limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble (EPA 2010).

The Blue Ridge ecoregion covers the easternmost part of the TRD and is located within the Southern Appalachian Mountains, extending from southern Pennsylvania to northern Georgia (EPA 2010, Taylor and Kurtz 2012). It predominantly contains Appalachian oak forests, but a variety of oak, hemlock, and pine communities occur within this forest type (EPA 2010). The terrain is characterized by narrow ridges and hilly plateaus, with elevations generally ranging from 300-1500m (EPA 2010). The ecoregion is mostly forested, with approximately 33% of publicly owned lands; however, agriculture and developed lands make up a small portion of the ecoregion (Taylor and Kurtz 2012). Metamorphic bedrock (i.e. gneiss, schist, and quartzite) is the dominant rock type, but some areas of igneous and sedimentary geology also occur.

Reservoirs of the Tennessee River Drainage

The Tennessee River is formed by the confluence of the French Broad and Holston rivers east of Knoxville, Tennessee and eventually joins the Ohio River at Paducah, Kentucky (totaling 1,426 km in length; Figure 1). The mainstem (main channel) of the Tennessee River contains a series of multipurpose impoundments that were mostly constructed in the 1930s-1960s by the Tennessee Valley Authority (TVA; Table 1). There are nine mainstem reservoirs in the Tennessee River drainage: Kentucky Reservoir, Pickwick Reservoir, Wilson Reservoir, Wheeler Reservoir, Guntersville Reservoir, Nickajack Reservoir, Chickamauga Reservoir, Watts Bar Reservoir, and Fort Loudoun Reservoir (listed in sequence from the mouth of the Tennessee River; Table 1). Although these mainstem impoundments created large reservoirs of water, they

are considered “flow through” impoundments in which the downstream flow is generally maintained (Etnier and Starnes 1993).

Kentucky Reservoir is the largest reservoir (64,922 ha) and is located near the mouth of the Tennessee River (Tennessee River km 36-333) within the Interior Plateau and Southeastern Plains ecoregions. Data were collected from eight tributary reservoirs: Redbud Reservoir (impounds Dry Creek), Sycamore Reservoir (Dry Branch Creek), Cedar Reservoir (Haley Creek), Pine Reservoir (Piney Creek), Pin Oak Reservoir (Browns Creek), Dogwood Reservoir (Big Creek), Beech Reservoir (Beech Creek), and Normandy Reservoir (Duck River).

Farther upstream, Pickwick Reservoir (TR km 333-418) is located within the Southeastern Plains ecoregion. Data were collected from four of its tributary reservoirs, which are all located within the Interior Plateau ecoregion: Little Bear Creek Reservoir (impounds Little Bear Creek), Cedar Creek Reservoir (Cedar Creek), Bear Creek Reservoir (Bear Creek), and Upper Bear Creek Reservoir (Bear Creek). Wilson (TR km 418-442) and Wheeler (TR km 442-562) reservoirs are located completely within the Interior Plateau ecoregion. Data were collected from one tributary reservoir of Wheeler Reservoir (Tims Ford Reservoir; impounds Elk River).

Guntersville Reservoir (TR km 562-684) is located within the Southwestern Appalachians ecoregion and contains no tributary reservoirs. Nickajack Reservoir (TR km 684-758) is located within the Southwestern Appalachians and Ridge and Valley Ecoregions and includes remnants of Hales Bar Reservoir. Hales Bar Dam was dismantled in1967 and was replaced by Nickajack Dam10.3 km downstream; therefore, data from both reservoirs were combined.

Chickamauga Reservoir (TN River km 758-853) is located within the Ridge and Valley ecoregion although most of its tributaries are within the Blue Ridge ecoregion. Data were collected from six tributary reservoirs: Parksville Reservoir (impounds Ocoee River), Nottely Reservoir (Nottely River), Blue Ridge Reservoir (Toccoa River), Appalachia Reservoir (Hiwassee River), Hiwassee Reservoir (Hiwassee River), and Chatuge Reservoir (Hiwassee River). Watts Bar (TR km 853-969) and Fort Loudoun (TR km 969) reservoirs are located in the upper portion of the TRD and are also within the Ridge and Valley ecoregion. Portions of these reservoirs are also in the Blue Ridge ecoregion and the Cumberland Plateau portion of the Southwestern Appalachians ecoregion. Data were collected from eight tributary reservoirs within Watts Bar mainstem reservoir: Santeetlah Reservoir (impounds Cheoah River), Thorpe Reservoir (West Fork Tuckasegee River), Nantahala Reservoir (Nantahala River), Melton Hill and Norris reservoirs (Clinch River), and Tellico, Cheoah, and Fontana reservoirs (Little Tennessee River). Data were collected from seven tributary reservoirs within Fort Loudoun mainstem reservoir: Douglas Reservoir (impounds French Broad River), Watauga Reservoir (Watauga River), Fort Patrick Henry, Boone, and South Holston reservoirs (South Fork Holston River), and Cherokee and John Sevier reservoirs (Holston River).

Data Acquisition

Reservoir fish assemblage data from two multiyear surveys – rotenone sampling and electrofishing/gill-net sampling – were acquired from the Tennessee Valley Authority (TVA). This study focuses on fish data collections within the Tennessee River drainage (41 reservoirs).

Rotenone Data

Cove rotenone sampling was employed by TVA (1947-1997) to collect data on fish assemblages (species composition, diversity, density, and biomass) in 41 reservoirs in the Tennessee River drainage (TRD; 9 mainstem, 32 tributaries; Table 1). One to 40 years of sample data were collected from each reservoir.

Rotenone is a natural toxicant made from the extract of *Derris* roots, which causes fish to die from asphyxiation (Baldwin *et al.* 1996). Rotenone is useful in sampling fishes along shorelines and coves in reservoirs in order to estimate population parameters. Sampling areas cannot be completely random because coves must be of suitable size and depths to hold block nets that prevent movement of fish into or out of the sampling area. Furthermore, some suitable sampling areas could not be utilized due to adjacency to houseboats, boat docks, recreational facilities, streams, or other sensitive habitat. However, sites were selected in various parts of the reservoir and were determined to be representative samples each reservoir (TVA unpublished data).

In each TVA reservoir, an enclosed area within a cove or shoreline (1-20 samples per reservoir, depending on reservoir/year; range of sampling areas = 0.18-1.68 ha) was sampled by applying rotenone to the water using standard methods (Davies and Shelton 1983). Standard sampling methods were as follows: A nylon block net, 300 feet by 25 feet by ½ -inch-bar mesh was set across the open end of the sample cove the evening before or the morning prior to the rotenone treatment. Scuba divers ensured that the block net was properly placed so that it effectively blocked all fish movements. The net served as the outer boundary of the sampling area. Surface area, water volume, and maximum and average depths were calculated before treatment. Five percent emulsifiable rotenone was used at a concentration of 0.6 ppm for

samples from 1960-69 and 1.0 ppm for samples from 1970-1997; concentrations are unknown for data prior to 1960. Rotenone was first applied to the area adjacent to the block net to form a barrier against movement of small fish through the net. It was then applied to deep water by a centrifugal pump and weighted hose, and shallow surface areas were sprayed. Fishes were picked up in the sample area over a two-day period. Fishes were then sorted into species and then into 25mm size groups. Numbers and weights of each size group of each species were recorded the first day; numbers were only recorded the second day. Numbers from the first and second day were summed before density (number of fish per hectare) was calculated. Because fish picked up on day two had deteriorated slightly, calculated biomass would have been inaccurate. Therefore, total biomass was calculated by averaging weights of fishes for each size class from the first day of sampling. That information was applied to fishes from the second day (by multiplying weights of same size classes from first day by number of fishes from second day).

TVA cove rotenone sampling methodology varied between years and locations. Before 1958, the sampling area was not accurately determined using consistent methods. Also, prior to 1960, samples were taken without the use of a block net. Therefore, data collected during this time period was not suitable for calculating density and/or related parameters that require a specified sampling area. However, data collection was standardized in the southeastern United States by 1960, and most data collected during this time period is suitable for all quantitative uses.

Sunfish (*Lepomis* spp.) population parameters (presence/absence, percent abundance, density, biomass) were estimated for all reservoirs in the rotenone survey. Species presence/absence and percent abundance [(number of fish / total number of all fishes) x 100]

were determined from all years of data. However, because data quality varied among reservoirs/years, density (number of fish per hectare) and biomass (kilograms of fish per hectare) were calculated from data collected during/after 1960.

Electrofishing/Gillnetting Data

Electrofishing and gillnetting data were collected by TVA (1993-2012) as part of the Vital Signs survey to collect data on fish assemblages in 29 TRD reservoirs (9 mainstem, 20 tributaries; Table 1). Nine to nineteen years of data were collected from each reservoir. These data were used to assess reservoir health using the Reservoir Fish Assemblage Index (Hickman and Brown 2002); this multimetric ecoregion-specific index was developed by TVA in the early 1990s as a part of a monitoring program to assess reservoir health based on measurements of fish community attributes.

TVA fish sampling methods included boat electrofishing and gill netting (Hubert 1996, Reynolds 1996). Electrofishing is the use of electrical currents to capture fish in which electrical current flows between the electrodes of opposite polarity (anode and cathode), creating a three-dimensional electrical field (Reynolds 1996). In boat electrofishing, the metal hull of the boat serves as the cathode, while metal cylindrical poles extending from front of boat are used as the anode. When exposed to the electrical field, fishes exhibit behavioral responses that facilitate capture: oscillotaxis (thrashing movement), electrotaxis (forced swimming), or immobilization (Reynolds 1996). TVA fish sampling consisted of electrofishing boat runs along various types of shoreline. Fifteen sampling runs were conducted at each site (1-7 sites per reservoir, depending on reservoir/year). Each run was 30.5 meters long with duration of approximately 10-30 minutes.

Gill nets are vertical panels of netting with varying mesh sizes held vertically in water by weights and floats. Fishes are captured by the netting becoming held around the body, held behind the gills (opercula), or tangled in teeth, spines, or other protrusions (Hubert 1996). Fishes collected from both sampling techniques were identified, counted, and examined for anomalies (Baker 2011). After examining summary data, most *Lepomis* species were not captured using gill nets. Therefore, only electrofishing data were used in the analysis. Relative density of each species captured during sampling was determined by calculating the catch rate per unit effort (CPUE).

Data Analysis

Rotenone and electrofishing datasets were analyzed separately to assess spatiotemporal patterns in the distributions and abundance of introduced Redbreast Sunfish (*Lepomis auritus*), native Longear Sunfish (*L. megalotis*), and two other native congeneric sunfishes [Bluegill Sunfish (*L. macrochirus*) and Redear Sunfish (*L. microlophus*)], which served as reference species. Reference species were chosen based on their expansive distribution and moderate to high abundances throughout the TRD. Other native congeneric sunfishes that were present in most of the TRD were summarized (Appendix B.4, B.5) but not included in most of the analyses.

Young-of-year (YOY) were excluded from data summaries and analyses for both rotenone and electrofishing datasets due to high mortality rates and unstable populations of YOY; therefore data only included intermediate and adult age classes. In most reservoirs, YOY age classes were less than 75 mm in total body length (TVA unpublished data).

Various population parameters (presence/absence, percent abundance, density/CPUE, and biomass) were examined in the analysis. It is important to note that percent abundance of a

species is mathematically related to the abundances of other species. For instance, if a species maintained abundance over a period of time, and another species increased in abundance over that same period, the former would experience a decline in percent abundance due to the increase in abundance of the latter. In contrast, density/CPUE and biomass are mathematically independent of other species.

Objective 1

The first objective was to estimate the times and geographic points of introduction and establishment for *L. auritus* in reservoirs of the TRD. The United States Geological Survey (USGS) considers a nonnative species to be established if that species is reproducing and overwintering (USGS 2014). The time period during which *L. auritus* was introduced and became established in TRD reservoirs was determined by examining rotenone (1947-1997) and electrofishing (1993-2012) datasets. Year-specific data on *L. auritus* presence/absence was examined in each mainstem and tributary reservoir. Years *L. auritus* was found and first/last years detected were recorded for each reservoir; percentages of years present compared to total sampling years were also calculated for each mainstem reservoir.

Objective 2

The second objective was to characterize temporal trends in regional abundances of *L. auritus* and *L. megalotis* populations in the TRD. Mainstem reservoirs were combined into five river sections based on ecoregion, proximity, and first year of *L. auritus* appearance: Kentucky-Pickwick, Wilson-Wheeler, Guntersville, Nickajack-Chickamauga, and Watts Bar-Fort Loudoun (Figure 2). Temporal trends were analyzed for populations/assemblages of native congeneric

sunfishes (*Lepomis* spp.) in river sections with established populations of *L. auritus* (treatment) and in those without *L. auritus* (control). Historical and contemporary trends were examined using rotenone and electrofishing data, respectively. For both datasets, data were transformed to improve normality and homogeneity of variances (HOV). Percent abundance was arcsin-transformed [arcsin square root of species proportion (p_i), where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes]. Density and biomass data were log-transformed [$\log_{10}(x + 1)$].

Longitudinal mixed-effects regression methods with polynomials were performed for both datasets to quantify long-term changes in *Lepomis* sunfishes in five river sections within the TRD. The mixed-effects model contained both fixed (years) and random (subjects) effects; this model more properly tests for a relationship in repeated measures designs because it accounts for residual variation as well as variation within subjects (Zar 2010). Polynomial regressions are a type of multiple linear regression that can fit nonlinear relationships and are useful for fluctuating data; they are fitted successively starting with a linear (first order) regression and increase in order (quadratic, cubic, quartic). The order with the best fit (lowest P value) is used in addition to all lower order terms (e.g. $\hat{y} = a_0 + a_1x - a_2x^2 + a_3x^3$; Zar 2010). Because sampling sites within reservoirs were considered to be spatially independent of one another (within coves/along shorelines), the sampling sites were the replications in the study (Maceina *et al.* 1994). Repeated-measures ANOVA and Dunnett's tests were also performed for both datasets to examine changes in *Lepomis* species composition in each river section.

Historical Trends

Rotenone samples (1947-1997) were analyzed using longitudinal mixed-effects regression methods in order to assess temporal trends (species vs. year) for percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes), density [Log_{10} (fish/ha + 1)] and biomass [Log_{10} (kg/ha + 1)] of *L. auritus* and selected native congeneric sunfishes (*L. megalotis, L. macrochirus, L. microlophus*). Species-specific trends were analyzed in reservoirs with and without *L. auritus*. Data collected during or prior to 1960 was not suitable for analysis density and/or related parameters; therefore, only percent abundance was calculated using all sampling years (1947-1997). For percent abundance, sampling years were separated into two time periods: late 40s-60s and 70s-90s. Due to low data quality prior to 1960 and very few sampling years in the 1960s, density and biomass were calculated using sampling years from 1970-1997. For Kentucky-Pickwick River section, 1988 was omitted due to only one sample from that year and five years excluding it from other sampling years.

Contemporary Trends

Electrofishing samples (1993-2012) were used to calculate reservoir-year-specific estimates of percent abundance and relative density (catch per unit effort, CPUE) of *L. auritus* and selected native congeneric sunfishes (*L. megalotis, L. macrochirus, L. microlophus*). Longitudinal mixed-effects regression methods were used to assess temporal trends (species vs. year) for percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes) and relative density [Log_{10} (CPUE + 1)] of the aforementioned species. Species-specific trends were

analyzed in reservoirs with and without *L. auritus*. Data from 2012 were omitted in Nickajack-Chickamauga River section because there was only one sample from that year.

Species Composition

Repeated-measures ANOVA and Dunnett's test ($\alpha \leq 0.05$) were used to compare mean ($\arcsin\sqrt{p_i}$) percent abundance of *L. megalotis* with other congeneric sunfishes. Dunett's test is a type of multiple comparison in which one sample (*L. megalotis*) is compared to all other samples (other congeneric sunfishes) to determine if their means are statistically different (Zar 2010). *L. macrochirus* is consistently the most abundant species in the TRD, so it was removed from the analysis with the exception of Kentucky-Pickwick Reservoir (1993-2011; when it was the second most abundant species).

Objective 3

The third objective was to determine whether electrofishing and/or gill-netting catch data provided reliable indices of population density (based on rotenone data) for *Lepomis* species in TRD reservoirs. Pearson's linear correlation analysis was used to test the relationship between historical cove-rotenone density and electrofishing CPUE to determine if electrofishing data provide an accurate index of *Lepomis* sunfish density. Rotenone sampling obtains an accurate sample of the area because rotenone reaches all depths and affects all age/size classes; on the other hand, electrofishing may not effectively capture some fish age/size classes and certain habitats. For each reservoir (mainstem and tributary) where sampling years overlapped in both datasets, samples were averaged for each reservoir and each sampling year for six *Lepomis* species – four species previously described and two additional congeneric sunfishes (Green

Sunfish, *Lepomis cyanellus;* Warmouth Sunfish, *Lepomis gulosus*). These species typically comprise a complete assemblage of *Lepomis* species within a given reservoir in the TRD.

Statistical Significance

Statistical significance was declared at an alpha (α) level of 0.05. To reduce the risk of making a type-I error, the sequential Bonferroni procedure (Rice 1989) was applied when performing multiple related statistical tests. For each type of population-level analysis within a river section (e.g., regression of species abundance vs. year), the overall alpha level was adjusted for the number of *Lepomis* species tested. For example, to test historical population trends of four *Lepomis* species within a river section, species-specific regression relationships (e.g., y = percent abundance, x = year) were initially tested at a Bonferrroni-adjusted alpha level of 0.0125 (0.05/4); if the species trend with the lowest P-value was significant, then the species trend with second-lowest P-value was tested at .0167 (0.05/3), then the species trend with third-lowest P-value was tested at 0.025 (0.05/2), and so on; if a species trend was not significant, then trends with larger P-values are declared not significant (even if $P < 0.05$).

Statistical Analysis System

The Statistical Analysis System (SAS) is a software program developed by the SAS Institute that is used for data management and analysis. SAS programs are written in codes known as SAS language. The DATA step typically generates a SAS data set, while the PROC step analyzes the data (SAS Institute 2014). For this data analysis, data were summarized and analyzed using SAS 9.3. PROC MIXED was used to perform longitudinal regressions and repeated-measures ANOVAs.

CHAPTER 3

RESULTS

Introduction of Redbreast Sunfish (*Lepomis auritus*) into the TRD

First records of *L. auritus* in mainstem reservoirs of the Tennessee River drainage occurred in 1950 in the middle reaches of the Tennessee River (Wilson, Wheeler, and Guntersville). *L. auritus* was also detected in the upper reaches in the 1950s (Watts Bar, 1957; Fort Loudoun, 1953). *L. auritus* was not detected until the 1970s in the middle-upper reaches (Nickajack, 1972; Chickamauga, 1976). *L. auritus* was not detected in the lower reaches until the early 2000s (Kentucky, 2003; Pickwick, 2001; Figure 2).

Historical Patterns

Historical rotenone samples (1947-1997) indicated that *L. auritus* was not found in much of the western TRD (Interior Plateau and Southeastern Plains ecoregions; Table 1). It was not present in Kentucky Reservoir (sampled 22 years; 1949-1982) and only in one of eight tributary reservoirs (Piney Creek, found 1 of 2 years sampled; 1980-1984). *L. auritus* was also not detected in Pickwick Reservoir (sampled 23 years; 1949-1987) or in any of its four tributary reservoirs. *L. auritus* was first detected in 1950 in three sequentially-located mainstem reservoirs – Wilson, Wheeler, and Guntersville. Although it was detected in 1950 in Wilson Reservoir, it

was not found any other year (sampled 15 years; 1949-1983). In Wheeler Reservoir, *L. auritus* was first found in 1950 and later found in 1984 and 1995 (sampled 42 years; 1949-1997); however, it was not detected in Tims Ford Reservoir (tributary impoundment sampled 3 years; 1974-1984).

In the middle-upper TRD (Southwestern Appalachians, Ridge and Valley, and Blue Ridge ecoregions), *L. auritus* was found numerous years. Although *L. auritus* was first detected in 1950 in Guntersville Reservoir, it was not found consistently until 1986 (found 6 of 31 years; 1947-1993). *L. auritus* was never detected in Hales Bar Reservoir (sampled 7 years; 1949-1964 and dismantled in 1967), but it was found all years sampled in Nickajack Reservoir, which replaced Hales Bar Reservoir (sampled 5 years; 1972-1981). *L. auritus* was not found in Chickamauga Reservoir until 1976, but was found consistently thereafter (17 of 36 years sampled; 1947-1997). Conversely, it was first detected in two tributary reservoirs of Chickamauga in the 1950s (Nottely Reservoir, 1958; Chatuge Reservoir, 1953) and was later found in all tributary reservoirs of Chickamauga, with the exception of Parksville Reservoir. *L. auritus* was found in Watts Bar Reservoir starting in 1957 (11 of 17 years sampled; 1949-1986) and was also detected in five of the eight tributary reservoirs. The first detection of *L. auritus* in Fort Loudoun Reservoir was in 1953, and it was found consistently thereafter (10 of 13 years sampled; 1949-1993). *L. auritus* was detected in all six tributary reservoirs of Fort Loudoun.

Contemporary Patterns

Electrofishing samples (1993-2012) indicated that *L. auritus* was later detected in parts of the western TRD (Interior Plateau and Southeastern Plains ecoregions). It was found in Kentucky starting in 2003 (found 4 of 12 years sampled; 1993-2011); however, it was detected earlier

(1993) in Normandy Reservoir (1 of 11 years sampled; 1993-2011). *L. auritus* was first detected in Pickwick Reservoir in 2001 (8 of 16 years sampled; 1993-2011); however, it was found earlier in Little Bear Creek (1993) and Bear Creek (1999) tributary reservoirs. After not being detected in Wilson Reservoir since 1950, *L. auritus* resurfaced in 1996 (3 of 10 years sampled; 1993-2010). On the other hand, *L. auritus* was continually found in Wheeler Reservoir (13 of 17 years sampled; 1993-2011) and was first detected in 1993 in Tims Ford Reservoir (1 of 11 years sampled; 1993-2010). Its presence also continued in Guntersville Reservoir (14 of 15 years sampled; 1993-2011), Nickajack Reservoir (11 of 11 years sampled; 1993-2011), Chickamauga Reservoir (19 of 19 years sampled; 1993-2012), Watts Bar Reservoir (18 of 18 years sampled; 1993-2012), and Fort Loudoun Reservoir (8 of 11 years sampled; 1993-2011).

Overall Presence/Absence Patterns

After combining presence/absence data for all rotenone and electrofishing sampling years (1947-2012), *L. auritus* was found in 11.8% of all sampling years in Kentucky, 25.8% in Pickwick, 16% in Wilson, 27.1% in Wheeler, 43.5% in Guntersville, 69.6% in Nickajack, 65.5% in Chickamauga, 82.8% in Watts Bar, and 75% in Fort Loudoun mainstem reservoirs (Figure 2).

Sunfish Population Trends

Kentucky-Pickwick

Historical Patterns

Rotenone samples (1949-1982) indicated that *L. auritus* was not found in the Kentucky-Pickwick River section; therefore regression methods were not applied to *L. auritus.* During 1949-1963, percent abundance ($\arcsin\sqrt{p_i}$) of *L. megalotis* exhibited an increasing linear trend (P =

0.0031), while in 1971-1982 *L. megalotis* exhibited an increasing quadratic trend (P = 0.0215; Table 2, Figure 3). Density [Log_{10} (fish/ha + 1)] and biomass [Log_{10} (kg/ha + 1)] of *L. megalotis* (1971-1982) also exhibited increasing quadratic trends (P = 0.0127, P = 0.0036, respectively; Table 2, Figure 3).

For percent abundance, *L. macrochirus* exhibited a U-shaped quadratic pattern in 1949-1963 (P = 0.0126) and then a decreasing linear trend in 1971-1982 (P <0.0001). *L. macrochirus* demonstrated a fluctuating cubic pattern for density (P = 0.0311) and a quartic pattern for biomass (P = 0.0036; Table 2). *L. microlophus* percent abundance showed a cubic trend in 1949-1963 (P = 0.0142) and an increasing linear trend in 1971-1982 (P = 0.0020). *L. microlophus* also showed an increasing linear trend for both density and biomass (P <0.0001, P <0.0001 respectively; Table 2).

For *Lepomis* species composition during the four historical time periods (1950-1987), *L. megalotis* was consistently the second most abundant *Lepomis* species in Kentucky-Pickwick section, ranging from 25-35% in mean percent abundance (behind *L. macrochirus*; 49-63%; Figure 5).

Contemporary Trends

Electrofishing samples (1993-2011) indicated that *L. auritus* was present by 2001 in the Kentucky-Pickwick section; however, a significant population trend was not detected (percent abundance, CPUE; Table 3, Figure 4). For percent abundance, *L. megalotis* exhibited a dome-shaped quadratic trend (highest percent abundance occurred in the early 2000s; P = 0.0119); however, *L. megalotis* CPUE exhibited an increasing linear trend (P = 0.0011; Table 3, Figure 4).

L. macrochirus exhibited a dome-shaped quadratic pattern for percent abundance (P = 0.0028) and a fluctuating quartic pattern for CPUE (P = 0.0003; Table 3). *L. microlophus* showed a cubic trend for percent abundance (P = 0.0607) and an increasing linear trend for CPUE (P <0.0001; Table 3).

For *Lepomis* species composition during the two contemporary time periods (1993-2001, 2002-2011), *L. megalotis* was the most abundant species (mean percent abundance 49 % for both periods; Figure 5). *L. auritus* was not detected in Kentucky-Pickwick until 2001, and its mean percent abundance was 0.02% during 1993-2001 and 0.41% during 2002-2011.

Wilson-Wheeler

Historical Trends

Rotenone samples (1949-1997) indicated that *L. auritus* was present only three years (1950, 1984, and 1995) in Wilson-Wheeler River section; therefore regression methods were not applied to *L. auritus. L. megalotis* percent abundance exhibited a fluctuating cubic pattern with a generally increasing trend in 1949-1962 (P = 0.0259) and a decreasing linear trend in 1970-1997 (P <0.0001; Table 4, Figure 6). For density and biomass (1970-1997), *L. megalotis* exhibited a decreasing quadratic pattern (P <0.0001, P <0.0001 respectively; Table 4, Figure 6).

L. macrochirus did not exhibit a significant trend for percent abundance in 1949-1963, but showed an increasing linear trend in 1971-1982 (P <0.0001). Also, *L. macrochirus* exhibited a U-shaped quadratic trend for density (P = 0.0004) and biomass (P = 0.0302; Table 4). For percent abundance, *L. microlophus* showed an increasing linear trend for both time periods (P <0.0001, P = 0.0314 respectively), a fluctuating cubic trend for density (P = 0.0010), and an increasing quadratic trend for biomass (P = 0.0006; Table 4).

For *Lepomis* species composition during the five historical time periods (1950-1997), there was no statistical difference in the mean percent abundance of *L. megalotis* with other *Lepomis* species in 1950-59. However, *L. megalotis* was the second most abundant species (mean percent abundance 19-33%) during all other time periods (1960-1969, 1970-1979, 1980-1989, and 1990-1997) with the exception of *L. microlophus* in 1990-1997 (Figure 8). *L. auritus* mean percent abundance remained <1% for all time periods.

Contemporary Trends

Electrofishing samples (1993-2011) indicated that *L. auritus* was found consistently in Wilson-Wheeler River section; however, a significant population trend was not detected (percent abundance, CPUE; Table 5, Figure 7). For *L. megalotis,* both percent abundance and CPUE showed a fluctuating cubic pattern ($P = 0.0015$, $P < 0.0001$ respectively; Table 5, Figure 7).

L. macrochirus exhibited a decreasing linear trend for percent abundance ($P = 0.0020$) and a quadratic trend with an increasing parabolic curve for CPUE ($P < 0.0001$; Table 5). *L. microlophus* showed a quadratic trend for percent abundance ($P = 0.0286$) and fluctuating cubic pattern for CPUE ($P = 0.0017$; Table 5).

During the two contemporary time periods (1993-2001, 2002-2011), *L. megalotis* was the second most abundant taxa (mean percent abundance ranged from 28-35%) and was statistically different from all other *Lepomi*s species (with the exception of *L. microlophus* during 1993-2001). *L. auritus* mean percent abundance remained <1% for all time periods (Figure 8).

Guntersville

Historical Trends

Rotenone samples (1949-1993) indicated that *L. auritus* was not consistently found until the early 1990s in Guntersville River section; therefore regression methods were not applied to *L. auritus.* Although there was no significant pattern in percent abundance for *L. megalotis* in 1949-1961, there was a decreasing linear pattern in 1971-1993 (P = 0.005; Table 6, Figure 9). It is also important to note that percent abundance of *L. megalotis* was more variable in 1949-1961 with relatively few zero data across sites/years, which contrasted with large amounts of zero data across sites/years in 1971-1993. *L. megalotis* exhibited a fluctuating cubic pattern with a generally decreasing trend for both density (P = 0.0030) and biomass (P = 0.0004) in 1971-1993 (Table 6, Figure 9). Furthermore, once *L. auritus* became established in the 1990s, density and biomass of *L. auritus* and *L. megalotis* appeared to be fairly similar.

Percent abundance of *L. macrochirus* demonstrated a cubic pattern in 1949-1961 (P = 0.0437) and then an increasing linear trend in 1971-1993 (P = 0.0738). For density and biomass, *L. macrochirus* demonstrated a fluctuating quartic trend (P = 0.0022, P = 0.0030 respectively; Table 6). For *L. microlophus*, there were no significant trends for percent abundance during either time period, while it showed a fluctuating quartic pattern for density and biomass (P = 0.0205, P = 0.0076 respectively; Table 6).

Lepomis species composition during the four historical time periods (1950-1993) indicated that *L. megalotis* was the second most abundant species from1950-1961 (mean percent abundance was 12%) and statistically different from all other *Lepomis* species. However, beginning in the 1971-1979 time period, *L. microlophus* became more abundant than *L. megalotis* (*L. megalotis* was statistically different from *L. microlophus* only). This trend

continued in the 1980-88 and 1990-93 time periods (*L. megalotis* mean percent abundance ranged from 0.02-3% from 1971-1993; Figure 10). *L. auritus* mean percent abundance remained <2% during all time periods (1950-1993), but began increasing in abundance in the 1990s.

Contemporary Trends

Electrofishing samples (1993-2011) indicated that *L. auritus* was found consistently throughout sampling years in Guntersville River section, however; a significant population trend was not detected for percent abundance (Table 7, Figure 11). On the other hand, *L. auritus* density exhibited a fluctuating cubic pattern with a generally decreasing trend ($P = 0.0011$; Table 7, Figure 10). *L. megalotis* percent abundance showed a generally decreasing quartic trend ($P = 0.0123$) while its density showed a quartic pattern with a generally increasing trend ($P = 0.026$; Table 7, Figure 10). For both *L. macrochirus* and *L. microlophus,* there were no significant patterns for percent abundance, but density of both showed a generally increasing cubic trend ($P = 0.0002$, $P = 0.0003$ respectively; Table 7).

Lepomis species composition was generally similar during the two contemporary time periods (1993-2001, 2002-2011). For both time periods, *L. megalotis* mean percent abundance (12%, 8% respectively) was not statistically different from *L. auritus* (15%, 11%), more abundant than *L. cyanellus* (1%) and *L. gulosus* (8%, 4%), and less abundant than *L. macrochirus* (51%, 55%). *L. megalotis* was not statistically different from *L. microlophus* in 1993-2001 but became was less abundant than *L. microlophus* (21%) in 2002-2011.

Nickajack-Chickamauga

Historical Trends

Rotenone samples (1947-1997) revealed that *L. auritus* was not detected in Nickajack-Chickamauga River section until the 1970s, therefore regression methods were not applied to the 1947-1964 time period for *L. auritus* percent abundance. In 1970-1997, *L. auritus* exhibited an increasing linear trend for percent abundance ($P = 0.0006$), density ($P < 0.0001$), and biomass ($P < 0.0001$; Table 8, Figure 12). In contrast, *L. megalotis* demonstrated a decreasing linear trend for percent abundance ($P = 0.0001$), density ($P = 0.0017$), and biomass ($P = 0.0001$) in 1970-1997 (Table 8, Figure 12). There was no significant pattern for *L. megalotis* percent abundance in 1947-1964. It is also important to note that percent abundance of *L. megalotis* was more variable in 1947-1964 with relatively few zero data across sites/years, which contrasted with large amounts of zero data across sites/years in 1970-1997. Furthermore, once *L. auritus* became established in the late 1970s, density and biomass of *L. auritus* and *L. megalotis* appeared to be fairly similar.

For percent abundance, *L. macrochirus* demonstrated a decreasing linear trend in 1947-1964 ($P = 0.0098$) and a quadratic trend from 1970-1997 ($P = 0.0761$). However, *L. macrochirus* density and biomass (1970-1997) exhibited an increasing linear trend ($P < 0.0001$, $P = 0.0009$ respectively; Table 8). *L. microlophus* percent abundance exhibited an increasing linear trend for both time periods ($P = 0.0023$, $P < 0.0001$ respectively), and density and biomass also exhibited increasing linear trends ($P < 0.0001$, $P < 0.0001$; Table 8).

During the four historical time periods (1950-1997), there was a shift in species composition of *L. auritus*, *L. megalotis*, and *L. microlophus* (Figure 14). In 1950-1964 and 1970-1979, mean percent abundance of *L. megalotis* (8-14%) was greater than *L. auritus* (0-1%) and

L. cyanellus (<1%) and was equal to *L. microlophus* (10-16%). In 1980-1989 and 1990-1997, mean abundance of *L. megalotis* (1-3%) was equal to *L. auritus* (~3%) and less than *L. microlophus* (16-18%). Mean percent abundance of *L. megalotis* was consistently less than that of *L. macrochirus* (52-73%), which appeared to be the dominant species. Although *L. megalotis* (along with *L. microlophus*) appeared to be the second or third most abundant *Lepomi*s species in 1950-1970s, few significant differences were detected between *L. megalotis* and other native species.

Contemporary Trends

Electrofishing samples (1993-2011) showed that both *L. auritus* and *L. megalotis* both showed a quadratic pattern with a generally increasing parabolic curve for percent abundance ($P < 0.0001$, $P = 0.0029$ respectively) and an increasing linear trend for density ($P < 0.0001$, $P < 0.0001$ respectively; Table 9, Figure 13). *L. macrochirus* percent abundance and density showed a quadratic trend with a generally increasing parabolic curve ($P = < 0.0001$, $P < 0.0001$ respectively). *L. microlophus* percent abundance showed a fluctuating cubic pattern ($P < 0.0001$), and density exhibited an increasing linear trend ($P < 0.0001$; Table 9).

During the two contemporary time periods (1993-2001, 2002-2012), mean percent abundance of *L. megalotis* (6%, 9% respectively) was lower than that of *L. auritus* (16%, 26%) and *L. macrochirus* (49%, 42%), lower than or similar to that of *L. microlophus* (21%, 13%), and greater than or similar to that of *L. cyanellus* (3%, 5%) and *L. gulosus* (5%, 5%; Figure 14).

Watts Bar-Fort Loudoun

Historical Trends

Rotenone data indicate that *L. auritus* exhibited no significant change in percent abundance in 1949-1964 and showed a fluctuating cubic trend (P = 0.0045) in 1972-1988. For density and biomass (1972-1988), *L. auritus* exhibited a fluctuating cubic trend (P = 0.0038, P = 0.0467, respectively; Table 10, Figure 15). *L. megalotis* percent abundance showed a decreasing linear trend in 1949-1964 (P = 0.022) while exhibiting a dome-shaped quadratic trend in 1972-1988 (P = 0.0274). For density, *L. megalotis* showed a dome-shaped quadratic pattern (P = 0.0310; Table 10, Figure 15), but no significant trend was detected for biomass.

In comparison, *L. macrochirus* percent abundance showed a cubic pattern from 1949-1964 (P = 0.0842), and then a quadratic pattern in 1972-1988 (P = 0.0034); density and biomass demonstrated increasing quadratic trends (P = 0.0011, P = 0.0013, respectively; Table 10). *L. microlophus* percent abundance exhibited no significant pattern from 1949-1964 and showed an increasing linear trend in 1972-1988 (P = 0.0576); density and biomass also exhibited increasing linear trends (P = 0.0061, P = 0.0129, respectively; Table 10).

For *Lepomis* species composition during three historical time periods (1950-1964, 1972-1979, 1980-1988), mean abundance of LES (1-2 %) was less than or similar to that of RBS (3-8 %), less than that of BLG (84-86%), and similar to that of other Lepomis species (Figure 17).

Contemporary Trends

Electrofishing samples (1993-2011) from Watts Bar-Fort Loudoun indicated that both *L. auritus* and *L. megalotis* exhibited increasing linear trends for percent abundance (P = 0.0031, P = 0.0014, respectively) and density (P <0.0001, P <0.0001, respectively; Table 11, Figure 16). *L.*

macrochirus exhibited a decreasing linear trend for percent abundance ($P < 0.0001$) and an increasing quartic trend for CPUE ($P = 0.0155$), whereas *L. microlophus* showed a fluctuating quartic trend for percent abundance ($P = 0.0247$) and an increasing linear trend for CPUE ($P < 0.0001$; Table 11).

Lepomis species composition was generally similar during two contemporary time periods (1993-2001, 2002-2012; Figure 17). Mean percent abundance of *L. megalotis* was statistically similar to that of *L. auritus* and *L. gulosus* and less than that of *L. macrochirus*, *L. cyanellus*, and *L. microlophus*. During 1993-2001, *L. auritus* and *L. megalotis* mean percent abundances were 6% and 1%, respectively, and were 8% and 7%, respectively, during 2002-2012.

Correlations Between Gear-Specific Estimates of Abundance

Linear relationships between estimates of electrofishing CPUE (catch [number of fish] per unit effort) and rotenone density (number of fish per ha) were detected for three of the four *Lepomis* species tested ($P \leq 0.05$ with a sequential Bonferroni adjustment; $n = 7$ reservoirs; reservoir-specific means were used in the analysis, 1993-1997). Electrofishing CPUE was directly related to rotenone density for *L. auritus* ($r = 0.805$, $P = 0.0290$), *L. megalotis* ($r = 0.806$, $P = 0.0287$), and *L. microlophus* ($r = 0.895$, $P = 0.007$), but not for *L. macrochirus* ($r = 0.142$, $P = 0.761$).

CHAPTER 4

DISCUSSION

Introduction of Redbreast Sunfish (*Lepomis auritus*) in the TRD

Historical rotenone data (1947-1997) suggest two major points of *L. auritus* entry into the TRD in the 1950s: 1) Fort Loudoun (1953)-Watts Bar (1957) in upper reaches 2) Wilson-Wheeler-Guntersville (1950 in each) in middle reaches. First records of *L. auritus* in the TRD (collected by TVA) dated back to the early 1940s in tributary streams of the upper TRD (TVA unpublished data). It appeared in 1940 in Clear Creek (Cocke County) and 1941 in Black Oak Branch just above the mouth of the Holston River (Jefferson County) as well as several additional streams in 1941 (Roane, Rhea, Grainger, Hamblen, and Loudoun counties; TVA unpublished data). Its first occurrence in the Tennessee River mainstem was approximately eight miles east-southeast of Fort Loudoun Dam in 1942 (TVA unpublished data). These data are generally consistent with sample data from Jenkins and Burkhead (1994), which states that first records of *L. auritus* in the South Fork of Holston River, a major tributary to the Tennessee River, occurred in 1956 in Boone Reservoir. Also, heavy stocking of *L. auritus* (approximately 19,000 fishes) occurred in the Clinch River in 1969 following a fish kill two years earlier (Jenkins and Burkhead 1994). In contrast, there are no known records of *L. auritus* stocking/collection in Wilson-Wheeler-Guntersville during or before the 1950s. First appearance of *L. auritus* in rotenone samples in mid-river sections occurred in the 1970s (Nickajack, 1972;

Chickamauga, 1976) and in the early 2000s in lower-western reaches (Pickwick, 2001; Kentucky, 2003). These occurrences may be related to additional sunfish stocking and/or dispersal from previous introductions.

Establishment of a species requires successful reproduction and overwintering in order to maintain a population (Moyle and Marchetti 2006, USGS 2013). Once a species is established in a particular location, spread of a population often indicates long-term persistence (Moyle and Marchetti 2006). Contemporary electrofishing (1993-2011) data indicate that *L. auritus* spread throughout most of the TRD by the early 2000s and was found consistently throughout the mainstem reservoirs thereafter; however, its abundance appears to vary along a longitudinal gradient.

Longitudinal Zonation in Geomorphology/Hydrology of the TRD

According to the River Continuum Concept, there is a natural and continuous physical gradient, or longitudinal zonation, along a river from its headwaters to the mouth (e.g., width, depth, velocity, temperature, cover, substrate and entropy gain; Vannote *et al.* 1980, Jenkins and Burkhead 1994). Headwater portions are characterized by high gradients and fast current velocities and may receive significant input of allochthonous detritus from riparian zones. Lower reaches closer to the mouth of a river are characterized by low gradient, meandering rivers that receive large amounts autochthonous materials such as fine particulate organic matter from decomposition upstream (Vannote *et al.* 1980). Headwater portions have generally harsher, less stable environmental conditions and typically support a low diversity of cool water fishes; in contrast, lower reaches tend to have more stable environmental conditions and support a more diverse collection of warm water fishes (Vannote *et al.* 1980).

Hydrological/morphological alterations such as impoundments and urbanization can often reset the continuum and create uncharacteristic conditions, depending on location and type of disturbance (Vannote *et al.* 1980, Ellis and Jones 2006). Based on the Serial Discontinuity Concept, impoundments alter geomorphology, water quality, temperature, and flow of river systems; consequently, these alterations have an impact on habitat and resource availability of lower trophic levels (e.g., macroinvertebrate and fish communities; Ellis and Jones 2006). However, when looking at such a broad scale as the TRD, there is still residual longitudinal zonation for some physical characteristics such as flow.

TVA mainstem impoundments are "flow-through" impoundments in which the downstream flow is generally maintained (Etnier and Starnes 1993). Therefore, even with presence of impoundments in the TRD, mean annual flow exhibits longitudinal zonation. In the upper reaches of the TRD, mean annual flow is generally lower (Fort Loudoun, 463 m^3/s; Watts Bar, 778 m^3/s) and tends to increase downstream. It ranges from 962 m^3/s in Chickamauga, 998 m^3/s in Nickajack, 1,172 m^3/s in Guntersville, 1,432 m^3/s in Wheeler, and 1,489 m^3/s in Wilson. In the lower reaches of the TRD, mean annual flow is generally highest (Pickwick, 1,573 m^3/s; Kentucky, 1,754 m^3/s; TVA 2004). Drainage area also shows evidence of longitudinal zonation, forming a gradient from the upper portions to lower portions of the TRD (24,730 mi^2, Fort Loudoun; 104,120 mi^2, Kentucky; TVA 2004). Furthermore, physiography progresses in a similar manner in terms of elevation. The upper reaches of the TRD are mostly within the Blue Ridge/Ridge and Valley ecoregions, which are characterized by higher elevations ($\leq$1500m) with varying peaks and valleys. The lower reaches of the TRD are within the Interior Plateau/Southeastern Plains, which are characterized by rolling plains and have lower elevations ($\leq$410m; EPA 2010).

Sunfish population parameters are interpreted within the context of the geomorphology, hydrology, and water chemistry that characterize three broad sections of the TRD (mainstem reservoirs in parentheses): lower-middle river (Kentucky-Pickwick-Wilson-Wheeler), middle-upper river (Guntersville-Nickajack-Chickamauga), and upper river (Watts Bar-Fort Loudoun).

Lower-Middle TRD

The lower-middle TRD (Kentucky-Pickwick-Wilson-Wheeler) is characterized by a more sinuous main channel and two large tributaries (Duck, Elk); most of the watershed drains the Southeastern Plains and Interior Plateau ecoregions (Figure 1).

In the Kentucky-Pickwick River section, data collections over a 62-year period (1949-2011) revealed that *L. megalotis* consistently was one of the two most abundant sunfish species (along with *L. macrochirus*). During different time periods before (1949-63; 1971-82) and during/after (1993-2011) the appearance of *L. auritus*, *L. megalotis* population parameters increased, increased and plateaued, or remained relatively stable. Following the first appearance of *L. auritus* in electrofishing samples in 2001, the species remained at very low levels for the next 10 years. Although *L. auritus* appeared in 1980 and 1984 rotenone samples from nearby Piney Creek (Pine Reservoir), the species was not found in rotenone samples collected in 1949-1987 in Kentucky Reservoir.

In the Wilson-Wheeler River section, data collections over a 62-year period (1949-2011) also revealed that *L. megalotis* consistently was one of the two most abundant sunfish species (along with *L. macrochirus*). *L. megalotis* generally decreased while other native congeners (*L. macrochirus* and *L. microlophus*) generally increased or exhibited no net change. Although *L. auritus* was first detected in Wilson-Wheeler in 1950, it was not found consistently until the

1990s and remained in fairly low abundances thereafter (1993-2011).

Watersheds of these reservoirs occupy portions of the Southeastern Plains and Interior Plateau ecoregions. Southeastern Plains streams/rivers typically have relatively low gradients and substrates of sand and silt/clay (Griffith *et al.* 1997). Interior Plateau streams (depending on sub-ecoregion) may have low to moderate gradients with sand-gravel substrates and areas of bedrock; collectively, this ecoregion supports the highest fish diversity in Tennessee (Etnier and Starnes 1993; Griffith *et al.* 1997).

Limnological conditions that characterize much of the lower TRD (low-moderate gradients, extensive littoral habitat) appear favorable for supporting *L. megalotis* populations, which may explain the dominance of this species in Kentucky-Pickwick River section. These favorable characteristics appear to decrease upstream, which may explain why *L. megalotis* is still abundant but does not thrive as well in Wilson-Wheeler section. *L. megalotis* populations have been reported do best in warm water habitats such as sluggish rivers with backwaters, pools, and other lentic habitats (Jenkins and Burkhead 1994), while *L. auritus* appear to prefer lotic conditions with higher flow (Sammons and Maceina 2009). Robust *L. megalotis* populations coupled with more suitable habitat and higher species diversity in these sections may give *L. megalotis* competitive edge over *L. auritus.*

Middle-Upper TRD

The middle-upper TRD (Guntersville-Nickajack-Chickamauga) is characterized by a more linear main channel; the river proper and most of the watershed drain portions the Southwestern Appalachians and Ridge and Valley ecoregions, with some influence from the Blue Ridge ecoregion (Figure 1).

In the Guntersville River section, data collections over a 62-year period (1949-2011) revealed that *L. megalotis* decreased from being one of the two most abundant species (along with *L. macrochirus*) in the 1950s, to being surpassed by a native congener (*L. microlophus*) by the 1990s. This trend appears to coincide with the presence of *L. auritus.* Throughout the 62-year period, *L. megalotis* abundance generally decreased while other native congeners (*L. macrochirus* and *L. microlophus*) generally increased or exhibited no net change. Although *L. auritus* was first detected in 1950, it was not detected again until the 1990s.

In the Nickajack-Chickamauga River section, data collections over a 65-year period (1947-2011) revealed that *L. auritus* was not detected in Nickajack-Chickamauga River section until the 1970s but significantly increased thereafter. Historical data (1947-1997) show that *L. auritus* had a linear increase in abundance, while *L. megalotis* exhibited a linear decrease. *L. megalotis* was the only native congeneric species that demonstrated a decreasing abundance in areas where *L. auritus* exhibited an increasing abundance from 1947-1997. Furthermore, *L. megalotis* abundance was surpassed by *L. auritus* in the 1990s and remained below *L. auritus* thereafter. *L. microlophus* exhibited a notable increase and was more abundant than *L. megalotis* in the 1980s-1990s, which coincided with increases in *L auritus* abundance. In 1993-2011, all native *Lepomis* species and nonnative *L. auritus* generally increased. Overall, *Lepomis* species composition has shifted from 1947-2011.

Watersheds of these reservoirs mainly occupy portions of the Southwestern Appalachians and the Ridge and Valley ecoregions, with tributaries of Chickamauga draining the Blue Ridge ecoregion. The Southwestern Appalachians and Ridge and Valley ecoregions have similar topographical characteristics and contain streams of moderate to low gradient (Griffith *et al.* 1997). The Southwestern Appalachians contain low mountains, forests, and some pasture (EPA

2010). However, limestone, coal, and iron deposits have resulted in significant historical mining activity in this ecoregion (Sohl 2012_b). The Ridge and Valley contains low-lying valleys with parallel ridges, forests, and pastures (Friesen and Stier 2012). Extreme faulting and folding events within the Ridge and Valley resulted in complex geological regions composed of limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble (EPA 2010). Underlying geology can have a significant impact on the water chemistry of water bodies (Wooten *et al.* 1999). Many rivers within these sections have cut down into limestone strata of the Ridge and Valley, thus river water chemistry is more typical of Ridge and Valley. Limestone/dolomite dominated formations permit basic conditions (higher pH) and higher alkalinity (acid neutralizing capacity; Mosher *et al.* 2010).

Limnological conditions of Guntersville and Nickajack-Chickamauga River sections are characterized by a more linear channel morphology, moderate to low gradients with moderate flow (962-1,172 m^3/s). Nickajack-Chickamauga also have lower water residency times (WRT; 3-8 days), which creates a more riverine environment. High abundance and fast population growth of *L. auritus* in this Nickajack-Chickamauga River section may be related in part to reported preference of *L. auritus* for lower gradients, increased flows, and more lotic conditions (Aho *et al.* 1986, Jenkins and Burkhead 1994, Sammons and Maceina 2009). Conversely, this may not be optimal habitat for *L. megalotis*, giving *L. auritus* competitive edge in the middle-upper section of the TRD.

Upper TRD

The upper TRD (Watts Bar-Fort Loudoun) is characterized by a more dendritic main channel with four major tributaries (Clinch, Holston, French Broad, Little Tennessee rivers);

most the watershed drains Ridge and Valley and Blue Ridge ecoregions, with some influence from the Southwestern Appalachians ecoregion (mostly Cumberland Plateau portions; Figure 1).

Data collected from a 63-year period (1949-2012) in Watts Bar-Fort Loudoun River section revealed that *L. auritus* and *L. megalotis* were sympatric for most sampling years, and both species remained in relatively low abundances (< 10% of total *Lepomis* abundance); also, *L. auritus* was first detected in the 1950s and was consistently found in Watts Bar-Fort Loudoun River section thereafter, but it never significantly increased. Aside from a decreasing linear trend in percent abundance 1949-1964, *L. megalotis* showed no significant increases or decreases in all other population parameters 1949-1993. *L. auritus* abundance fluctuated and exhibited no net change. Both species generally increased 1993-2011 along with other native congeners (*L. macrochirus* and *L. microlophus*). Even in the years before *L. auritus* was present, *L. megalotis* exhibited low/sporadic abundance patterns.

Watersheds of these reservoirs mainly occupy portions of the Ridge and Valley and Blue Ridge ecoregions, containing smaller headwater streams with higher gradients (Griffith *et al.* 1997). The terrain of the Blue Ridge is characterized by narrow ridges and hilly plateaus, with elevations generally ranging from 300-1500m (EPA 2010). This part of TRD is mainly influenced by naturally soft, slightly acidic tributaries of Blue Ridge and the Cumberland Plateau portion of the Southwestern Appalachians ecoregions; these areas have low acid neutralizing capacity and thus have more pronounced impacts from acid pollution (low pH; Jenkins and Burkhead 1994).

Limnologicial conditions of Watts Bar-Fort Loudoun River section appear to be less suitable for both *L. auritus* and *L. megalotis.* Higher gradients in upper TRD are considered low quality sunfish habitat. For instance, *L. auritus* is more abundant in low gradient (<2m/km)

streams/rivers (Aho *et al.* 1986), and *L. megalotis* tends to avoid the higher gradient streams in the Blue Ridge and Ridge and Valley ecoregions of the upper TRD (Jenkins and Burkhead 1994). Also, fish diversity is naturally inversely correlated with stream gradient and tends to be lower in headwaters where harsher environmental conditions tend to prevail (Vannote *et al.* 1980). In addition to steep gradients, *L auritus* appears to be an acid intolerant species, which may explain its low abundances in naturally acidic areas of the Blue Ridge (Jenkins and Burkhead 1994, Schorr and Baker 2006). Flow may also play a role in the difference between the two river sections. *L. auritus* experiences greater growth in rivers of higher flow/more rainfall (Sammons and Maceina 2009). However, Watts Bar-Fort Loudoun River section has lower mean annual flow (463-778 m^3/s) and a higher WRT (10-17 days).

Water pollution has been a longstanding issue within Watts Bar and Fort Loudoun river systems, which may further explain low abundances for both species. The upper Holston and lower Watauga river systems have experienced extensive pollution, mainly due to paper-mill effluents; the Clinch and Powell river systems have received heavy siltation from strip mines near headwaters in the coal regions of Virginia (Etnier and Starnes 1993).

Factors Influencing Nonnative Impacts

The abundance of a particular species typically operates in a fluctuating cyclic pattern with no significant net change over an extended period of time (Maes *et. al* 2005, Saito *et al.* 2012). In the present study, *L. megalotis* was the only native congeneric species (of the three native species examined) that demonstrated a decreasing abundance in areas where *L. auritus* exhibited an increasing abundance over time: Nickajack-Chickamauga River section (with the exception of electrofishing samples, 1993-2011).

One explanation is that *L. auritus* and *L. megalotis* have similar ecological preferences, which increase competitive interactions between sympatric populations (Cooner and Bayne 1982, Etnier and Starnes 1993). A study by Cooner and Bayne (1982) in the Tallapoosa River drainage in Alabama found that both species are insectivores, and using the Schoener Index, found that their diets significantly overlapped and appeared similar enough to possibly influence the distribution of *L. auritus* and *L. megalotis.* Nonnative species of similar trophic levels enhance interspecific competition, and native species are often displaced as a result (Gozlan *et al.* 2010). A study by Vander Zanden *et al.* (1999) found that Lake Trout (*Salvelinus namaycush*) relied primarily on littoral prey fishes in lakes without introduced Smallmouth Bass (*Micropterus dolomeiu*) and depended on zooplankton where they are sympatric with *M. dolomeiu*, which shows that *M. dolomeiu* has caused lake trout to shift to a less suitable trophic niche. However, it is important to note that *L. auritus* and *L. megalotis* both consume a wide variety of organisms based on prey availability (Cooner and Bayne 1982), and other *Lepomis* species have been shown to exhibit shifts in feeding behavior and prey items when competition is present (VanderKooy *et al.* 2000).

Habitat preference may play a role as there is evidence of native species shifting habitat use in the presence of a nonnative fish species (Cucherousset and Olden 2011). Although *L. auritus* exploits a variety of ecological conditions, both species prefer rocky/sandy pool habitat in shallow littoral areas (Aho *et al.* 1986). In a similar study by Marchetti (1999), the Sacramento Perch (*Archoplites interruptus*) altered its habitat use in the presence of the introduced and aggressively dominant Bluegill Sunfish (*Lepomis macrochirus*), which was also associated with a decrease in its growth rate due to interspecific competition (Marchetti 1999).

L. auritus and *L. megalotis* also have very similar spawning habitat along shorelines in gravel/sandy substrate near cover; spawning temperatures also overlap (Dupuis and Keenleyside 1988, Etnier and Starnes 1993, Boschung and Mayden 2004). At study by Ayala *et al.* (2007) in Utah found that populations of the native Least Chub (*Lotichthys phelgethontis*) declined following the introduction of the Western Mosquitofish (*Gambusia affinis*) due to habitat degradation and overlapping spawning habitat.

L. megalotis is listed as an intolerant species and is susceptible to water quality degradation (Jennings 2013, TVA unpublished data), which may further explain why it is more impacted by *L. auritus* than other congeners. Furthermore, *L. megalotis* is known to have a very small home range, thus may be more easily impacted by local conditions (e.g., water quality, interspecific competition; Gerking 1953, Etnier and Starnes, 1993). Johnston and Smithson (2000) found that *L. megalotis* remained in home pools, whereas *L. auritus* often moved approximately 16 km from its release site (Hudson and Hester 1976). *L. auritus* tends to grow faster and to larger sizes than *L.* megalotis, which may allow *L. auritus* to outcompete *L. megalotis* for ideal habitat and foraging opportunities (Etnier and Starnes 1993). A study by Winston (1995) found that interspecific competition resulted in a significantly low degree of co-occurrence of morphologically similar cyprinid species within in the central United States. Overall, significant overlap of ecological preferences and differences in tolerances are probable explanations to declines of *L. megalotis* where *L. auritus* is increasing/maintains high abundance.

Factors Influencing Species Abundance/Distribution

Fish distribution is significantly related to an assemblage of water quality conditions and geographic variables that operate in a multivariate manner (Matthews and Robison 1988,

Matthews *et al.* 1992). Furthermore, local fish assemblages are usually immediate products of contemporary and local processes, but regional and historical impacts can also be significant (Tonn *et al.* 1990). Water quality parameters that impact fish distribution and community composition include salinity, pH, temperature, and dissolved oxygen, hardness, alkalinity, total dissolved solids, chloride, and ammonia; geological variables include elevation, precipitation, groundwater inflow, and morphological features (e.g., vegetative cover, substrate types, and depth) as well as anthropogenic influences (e.g. historical and current land use, altered flow/impoundments; Matthews and Robison 1988, Matthews *et al.* 1992, Persson 1996, Jackson *et al.* 2001, Marchetti and Moyle 2001, Bunn and Arthington 2002, Wenger *et al.* 2008).

L. megalotis is considered intolerant of water quality degradation and has been used as an indicator of good stream health (Jennings 2013). Water pollution issues in tributaries of/within Watts Bar-Fort Loudoun River section have impacted its water quality (Etnier and Starnes 1993), and consequently has consistently received low (poor-fair) ecological health ratings (1994-2011). Wilson-Wheeler River section also has consistently low (poor-fair) ecological health ratings, whereas Kentucky-Pickwick received fair-good ecological health ratings (1993-2011). This likely contributed to high fish diversity and strong *L. megalotis* populations in Kentucky-Pickwick River section.

Land use via human disturbance (e.g., urbanization, agriculture, impoundments), which is linked to the expansion of nonnative fishes, may play a role in differences between river sections (Marchetti and Moyle 2001, Bunn and Arthington 2002, Wenger *et al.* 2008). Human disturbance creates new laucustrine habitats and a high degree of disruption of natural characteristics (e.g., reservoirs, altered flow regimes), which favor alien species (Moyle and Marchetti 2006). Another study by Wenger *et al.* (2008) examined stream fish occurrence in the

Etowah River basin in Georgia and found that current effective impervious cover and historic land use were predictor variables for four of five species examined.

Biotic factors such as interspecific competition and predation also have the capacity to play an important role in the organization of local fish communities (Matthews and Robison 1988, Winston 1995, Jackson *et al.* 2001). A similar study conducted by Persson (1996) found that biotic factors such as interspecific competition and predation were the main factors impacting perch populations, whereas abiotic factors such as conductivity and pH played a lesser role. Moreover, Gatz (1979) found that percentage of overlap in coexisting species is half as much in nature compared to the amount of overlap possible; this pattern could be due to competition between species, forcing them into separate ecological niches. *L. auritus* and *L. megalotis* are closely related and have similar ecological preferences (i.e., diet overlap, habitat preference, and spawning conditions), which increase competitive interactions between sympatric populations (Cooner and Bayne 1982, Etnier and Starnes 1993).

Prevalence and success of nonnative fish introductions is also often correlated with low native species diversity (Gido and Brown 1999, Tsunoda and Mitsuo 2012), whereas nonnative fish impacts are minimized by higher native species diversity (Carey and Wahl 2010). Carey and Wahl (2010) found that although the introduced Common Carp (*Cyprinus carpio*) reduced resources for native species, higher native diversity (species richness) mitigated the impacts of *C. carpio.* The highest fish species diversity in Tennessee occurs in the Interior Plateau ecoregion, which contains portions of Kentucky-Pickwick River section and its watersheds where *L. auritus* remains in low abundance. Alternatively, upper portions of the TRD are naturally low in fish species diversity. Also, river sections may differ in degrees of saturation of fish species, which may be a contributing factor in the ability of *L. auritus* to proliferate in certain areas. For

instance, nonnative species are more likely to become established in a local community if the community is unsaturated (Smith *et al.* 2004).

Relationship Between Estimates of Rotenone and Electrofishing Abundance

Pearson's linear correlation analysis examined density correlations between overlapping years of historical rotenone (1947-1997) and contemporary electrofishing (1993-2011) samples in order to determine if electrofishing CPUE was an accurate index of *Lepomis* density. The results indicated a significant positive correlation between two datasets in three of the four *Lepomis* species examined. This suggests that sampling procedures (rotenone vs. electrofishing) yielded similar results in determining density.

A similar study by Tate *et al.* (2003) found that electrofishing resulted in capture of larger sizes of Largemouth Bass (*Micropterus salmoides*) than rotenone sampling. Overall, Tate *et al.* (2003) determined that electrofishing was a precise and cost-effective method for estimating *M. salmoides* abundance. Knight and Cooper (2008) compared rotenone and electrofishing sampling methods in four stream reaches and found no significant difference between predicted and observed number of fish during electrofishing; however, fish biomass was underestimated during 15-minute run intervals and would be most accurate with 30-minute run intervals. TVA electrofishing methods for data used in this study included sampling runs ranging from 10-30 minutes. Although we cannot assume that the electrofishing data is an extension of rotenone data, the data exhibited the same general trends, sampled similar habitats (shoreline, littoral zone), and is supported by similar studies.

Future Research

Further studies are needed in order to fully understand the impacts and interactions of *L. auritus* with native congeners as well as other native fishes in the TRD. First, Pearson's linear correlation analysis could be used to test relationships between *L. auritus* abundance and native sunfish abundance/diversity, and between sunfish and environmental parameters (e.g., geological variables, land use, and water quality). This analysis will examine factors that may influence the spatial distribution and abundance of *L. auritus* and native sunfish populations within various ecoregions, which may help identify areas of concern. Furthermore, using Principle Components Analysis (PCA) or another multivariate ordination method could provide overall summaries of *Lepomis* assemblage composition/structure across spatial (groups of reservoirs) and temporal (years before and after *L. auritus*) scales.

Analysis of additional TVA data from the Index of Biological Integrity (IBI) surveys (1993-2012) would provide a more accurate understanding of the current status of *Lepomis* species in the TRD and extend that knowledge into smaller streams. Furthermore, suitable habitat of *L. megalotis* could be mapped, which would allow for comparison of percentage of suitable habitat versus actual spatial distribution. Lastly, conducting competition studies through mesocosm experiments between *L. auritus*, *L. megalotis*, and other native fish taxa will provide direct statistical evidence of *L. auritus* impacts on native fish taxa. Knowledge obtained from this study and future studies will be vital in protecting native species such as *L. megalotis* and preserving biodiversity in the TRD.

Conclusions

L. auritus was introduced into the upper portions of TRD in the early 1940s by intentional stocking. Historical rotenone data (1947-1997) suggest two major points of *L. auritus* entry into the TRD in the 1950s: 1) Fort Loudoun (1953)-Watts Bar (1957) in upper reaches 2) Wilson-Wheeler-Guntersville (1950 in each) in middle reaches. *L. auritus* is now well established throughout most of the TRD and may produce more impacts in the future (e.g., Kentucky-Pickwick River section, where it is likely to increase in abundance). However, *L. auritus* appears to thrive mainly in low gradient lotic river sections with moderate flow/low WRT (i.e., Nickajack-Chickamauga) and remains in low abundances in higher gradient sections or areas with low flow/highWRT.

L. auritus correlation with native congeneric sunfishes varied. It did not significantly impact the abundance of *L. macrochirus* and *L. microlophus* in any river section; however, *L. megalotis* abundance declined in reservoirs where *L.* auritus was found to be in high/increasing abundance, and was particularly impacted in Nickajack-Chickamauga River section. *L. megalotis* consistently remained one of the two most abundant *Lepomis* species in the Lower-Middle TRD (Kentucky-Pickwick-Wilson-Wheeler). However, *L. auritus* abundance surpassed *L. megalotis* in portions of the middle-upper reaches of the TRD (Nickajack-Chickamauga). Both species remained in low abundances in upper reaches of the TRD (Watts Bar-Fort Loudoun). Although it is difficult to isolate causal variables and determine exactly which biotic and abiotic factors are influencing these trends, there is substantial evidence that *L. auritus* is negatively impacting *L. megalotis* and altering *Lepomis* species composition in Nickajack-Chickamauga River section and possibly in Guntersville River section. The interaction of both biotic (i.e., *L. auritus* competition) and abiotic (i.e., ecoregion, water quality, flow) factors likely explain the changes

in *L. megalotis* abundance, shifting *Lepomis* species composition, and variability within river sections. It is also likely that the full impact of *L. auritus* has not been seen because nonnative species can take considerable time to become established and to see evidence of impacts (≥100 years; Smith *et al.* 2004).

Quantifying the distribution and abundance of an introduced fish species and native congeneric species in an aquatic system is an important first step to understanding and studying its possible interactions and effects of nonnative species on native species. These spatiotemporal patterns provide a better understanding of the current status of nonnative *L. auritus* as well as native congeneric sunfishes.

REFERENCES

Adams, S. B., Frissell, C. A., & Rieman, B. E. (2001). Geography of invasion in mountain streams: Consequences of headwater lake fish introductions. *Ecosystems, 4*(4), 296-307.

Aho, J. M., Anderson, C. S., & Terrell, J. W. (1986). Habitat suitability index models and instream flow suitability curves: Redbreast sunfish. U.S. Fish and Wildlife Service Biological Report, *82*(10.119), 1-23.

Ayala, J.R., Rader, R.B., Belk, M.C., & Schaalje, G.B. (2007). Ground-truthing the impact of invasive species: spatio-temporal overlap between native least chub and introduced western mosquitofish. *Biol. Invasions, 9*, 857-869.

Baker, T. F. (2011). Evaluation of the fish community in the vicinity of the Kingston Fossil Plant, 2001-2010. Tennessee Valley Authority, Aquatic Monitoring and Analysis. Chattanooga, TN, 1-50.

Baldwin, C. C., Collette, B. B., Parenti, L. R., Smith, D. G., & Springer, V. G. (1996). Collecting Fishes. Washington, D.C.: National Museum of Natural History.

Bass, D. G., Jr., & Hitt, V. G. (1975). Ecological aspects of the redbreast sunfish, *Lepomis auritus*, in Florida. *Proc. Conf. S.E. Assoc. Game and Fish Comm., 28*, 269-307

Boschung, H. T., & Mayden, R. L. (2004). Fishes of Alabama (pp. 520-736). Washington, D.C.: Smithsonian Books.

Bunn, S. E., & Arthington, A. H. (2002). Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity. *Environ. Mgmt., 30*(4), 492-507.

Byers, J. E., Reichard, S., Randall, J. M., Parker, I. M., Smith, C. S., Lonsdale, W. M., Hayes, D. (2002). Directing research to reduce the impacts of nonindigenous species. *Conserv. Biol., 16*(3), 630-640.

Carey, M.P., & Wahl, D.H. (2010). Native fish diversity alters the effects of an invasive species on food webs. *Ecology, 91*(10), 2965-2974.

Clavero, M., & García-Berthou, E. (2006). Homogenization dynamics and introduction routes of invasive freshwater fish in the Iberian Peninsula. *Ecol. Appl., 16*(6), 2313-2324.

Cooner, R. W., & Bayne, D. R. (1982). Diet overlap in redbreast and longear sunfishes from small streams of east central Alabama. *Proc. Annu. Conf. Southeast Assoc. Fish and Wildl. Agencies, 36,* 106-114.

Cucherousset, J., & Olden, J. D. (2011). Ecological Impacts of Nonnative Freshwater Fishes. *Fisheries, 36*(5), 215-230.

Davies, W. D., & Shelton, W. L. (1983). Sampling with toxicants. In Editors:, L. A. Nielson & D. L. Johnson (Eds.), *Fisheries Techniques Manual* (pp. 199-213): American Fisheries Society Special Publication.

Davis, J. R. (1972). The spawning behavior, fecundity rates, and food habits of the redbreast sunfish in southeastern North Carolina. *Proc. Conf. S.E. Assoc. Game and Fish Comm., 25*, 556-560.

Deacon, J. E., Hubbs, C., & Zahuranec, B. J. (1964). Some effects of introduced fishes on the native fish fauna of southern Nevada. *Copeia, 1964*(2), 384-388.

Drummond, M.A. (2012). Interior Plateau. *United States Geological Survey,* Land Cover Trends Report. Retrieved from http://landcovertrends.usgs.gov/east/eco71Report.html

Dudgeon, D., Arthington, A. H., Gessner, M. O., Kawabata, Z., Knowler, D. J., Leveque, C., Sullivan, C. A. (2006). Freshwater biodiversity: Importance, threats, status and conservation challenges. *Biol. Rev. Camb. Philos. Soc., 81*(2), 163-182.

Ellis, L.E., & Jones, N.E. (2013). Longitudinal trends in regulated rivers: a review and synthesis within the context of the serial discontinuity concept. *Environ. Rev., 21*(3), 136-142.

Environmental Protection Agency (EPA). (2010). Level III CEC Descriptions. Retrieved from ftp://ftp.epa.gov/wed/ecoregions/pubs/CEC_LEVEL_III_Descriptionss_US_May2010

Etnier, D. A., & Starnes, W. C. (1993). The Fishes of Tennessee (pp. 11-27, 398-422). Knoxville, TN: University of Tennessee.

Flecker, A. S., & Townsend, C. R. (1994). Community-wide consequences of trout introduction in New Zealand streams. *Ecol. Appl., 4*(4), 798-807.

Friesen, B.A. & Stier, M.P. (2012). Ridge and Valley. *United States Geological Survey,* Land Cover Trends Report. Retrieved from http://landcovertrends.usgs.gov/east/eco67Report.html

Gatz, A. J., Jr. (1979). Community organization in fishes as indicated by morphological features. *Ecology, 60*(4), 711-718.

Gautreau, M.D. and R.A. Curry. (2012). Ecology and status of the Redbreast Sunfish *Lepomis*

auritus, in Yoho Lake, New Brunswick. *Northeast. Natural, 19*(4), 653-664.

Gerald, J. W. (1971). Sound production during courtship in six species of sunfish (Centrarchidae). *Evolution, 25*(1), 75-87.

Gerking, S.D. (1953). Evidence for the concepts of home range and territory in stream fishes. *Ecology, 34*(2), 347-365.

Gido, K. B., & Brown, J. H. (1999). Invasion of North American drainages by alien fish species. *Freshwater Biol., 42*(2), 387-399.

Gido, K. B., Schaefer, J. F., & Pigg, J. (2004). Patterns of fish invasions in the Great Plains of North America. *Biol. Conserv., 118*(2), 121-131.

Gozlan, R. E., Britton, J. R., Cowx, I., & Copp, G. H. (2010). Current knowledge on non-native freshwater fish introductions. *Journ. Fish Biol., 76*(4), 751-786.

Griffith, G.E., Omernik, J.M., & Azevedo, S.H., (1997). Ecoregions of Tennessee. U.S. Environmental Protection Agency EPA/600R-97/022, Corvallis, Oregon, 51 p.

Hickman, G. D., & Brown, M. L. (2002). Proposed methods and endpoints for defining and assessing adverse environmental impact (AEI) on fish communities/populations in Tennessee River reservoirs. *Scientific World Journ., 2*, 204-218.

Hubert, G. D., & McDonough, T. A. (1996). Passive capture techniques, entanglement gears. In Editors:, B. R. Murphy & D. W. Willis (Eds.), *Fisheries Techniques, 2nd Edition* (pp. 160-165). Bethseda, MD: American Fisheries Society.

Huckins, C. J. F., Osenberg, C. W., & Mittelbach, G. G. (2000). Species introductions and their ecological consequences: An example with congeneric sunfish. *Ecol. Appl., 10*(2), 612-625.

Hudson, R.G., & Hester, F.E. (1976). Movements of the Redbreast Sunfish in Little River, near Raleigh, North Carolina. *Proc. 29th Ann. Conf. Southeast. Assoc. Game and Fish Comm., 29*, 325-329.

Idelberger, C. F., Stafford, C. J., & Erickson, S. E. (2011). Distribution and abundance of introduced fishes in Florida's Charlotte Harbor Estuary. *Gulf and Car. Journ. Fish. Aquat. Sci., 23*, 13-22.

Jackson, D. A., Peres-Neto, P. R., & Olden, J. D. (2001). What controls who is where in freshwater fish communities - the roles of biotic, abiotic, and spatial factors. *Can. Journ. Fish. Aquat. Sci., 58*(1), 157-170.

Jenkins, R. E., & Burkhead, N.M. (1994). The Freshwater Fishes of Virginia. American Fisheries

Society, Bethesda, MD.

Jennings, M. J., & Philipp, D. P. (1992). Genetic variation in the longear sunfish (*Lepomis megalotis*). *Can. Journ. Zool., 70*(9), 1673-1680.

Jennings, M. (2013). Fishes of Wisconsin. Wisconsin Department of Natural Resources. Retrieved from http://infotrek.er.usgs.gov/wdnr_fishes/account.jsp?species_param=1464

Johnston, C. E., & Smithson, E.B. (2000). Movement patterns of stream-dwelling sunfishes: effects of pool size. *Journ. Freshwater Ecol., 15*, 4565–566.

Knight, S.S., & Cooper, C.M. (2008). Bias associated with sampling interval in removal method for fish population estimates. *Journ. Intl. Environ. Appl. Sci., 3*(4), 201-206.

Lukas, J. A., & Orth, D. J. (1993). Reproductive ecology of redbreast sunfish (*Lepomis auritus*) in a Virginia Stream. *Journ. Freshwater Ecol., 8*(3), 235-244.

Maceina, M. J., Bettoli, P. W., & DeVries, D. R. (1994). Use of a split-plot analysis of variance design for repeated- measures fishery data. *Fisheries 19*, 14-20.

Maes, J., Stevens, M., & Ollivier, F. (2005). The composition and community structure of the ichthyofauna of the Upper Scheldt estuary: Synthesis of a 10-year data collection (1991-F2001). *Journ. Appl. Ichthyol., 21*, 86-93.

Marchetti, M.P. (1999). An experimental study of competition between the native Sacramento Perch (*Archoplites interruptus*) and introduced Bluegill (*Lepomis macrochirus*). *Biol. Invasions, 1*, 55-65.

Marchetti, M. P., & Moyle, P. B. (2001). Effects of flow regime on fish assemblages in a regulated California stream. *Ecol. Appl., 11*(2), 530-539.

Marchetti, M. P., Light, T., Moyle, P. B., & Viers, J. H. (2004). Fish Invasions in California Watersheds: Testing Hypotheses Using Landscape Patterns. *Ecol. Appl., 14*(5), 1507-1525.

Marsh, P. C., & Douglas, M. E. (1997). Predation by introduced fishes on endangered humpback chub and other native species in the Little Colorado River, Arizona. *Trans. American Fish. Soc., 126*(2), 343-346.

Marsh-Matthews, E., & Matthews, W. J. (2000). Spatial variation in relative abundance of a widespread, numerically dominant fish species and its effect on fish assemblage structure. *Oecologia, 125*(2), 283-292.

Matthews, W. J., Hough, D. J., & Robison, H. W. (1992). Similarities in fish distribution and

water-quality patterns in streams of arkansas - congruence of multivariate analyses. *Copeia, 1992*(2), 296-305.

Matthews, W. J.& Robison, H. W. (1988). The distribution of the fishes of Arkansas: a multivariate analysis. *Copeia, 1988*, 358-374.

Mosher, J.J., Klein, G.C., Marshall, A.G, & Findlay, R.H. (2010). Influence of bedrock geology on dissolved organic matter quality in stream water. *Organ. Geochem., 41*, 1177-1188.

Moyle, P. B., & Marchetti, M. P. (2006). Predicting invasion success: Freshwater fishes in California as a model. *BioScience, 56*(6), 515-524.

Page, L. M., & Burr, B. M. (2011). Peterson field guide to freshwater fishes of North America and north of Mexico *2nd Edition* (pp. 486-507): Houghton Mifflin Harcourt.

Peres-Neto, P. R. (2004). Patterns in the co-occurrence of fish species in streams: the role of site suitability, morphology and phylogeny versus species interactions. *Oecologia, 140*(2), 352-360.

Persson, L. (1997). Competition, predation, and environmental factors as structuring forces in freshwater fish communities: Sumari (1971) revisited. *Can. Journ. Fish. Aquatic Sci., 54*, 85-88.

Pimentel, D., Zuniga, R., & Morrison, D. (2005). Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecol. Econ., 52*(3), 273-288.

Pombo, L., Elliott, M., & Rebelo, J. E. (2005). Environmental influences on fish assemblage distribution of an estuarine coastal lagoon, Ria de Aveiro (Portugal). *Scientia Marina, 69*(1), 143-159.

Rahel, F. J. (2002). Homogenization of Freshwater Faunas. *Ann. Rev. Ecol. System., 33*, 291-315.

Reynolds, J. B. (1996). Electrofishing. In Editors:, B. R. Murphy & D. W. Willis (Eds.), *Fisheries Techniques, 2nd Edition* (pp. 221-251). Bethseda, MD: Am. Fish. Soc.

Rice WR. (1989). Analyzing tables of statistical tests. *Evolution, 43*(1), 223-225.

Ross, S.T. (1991). Mechanisms structuring stream fish assemblages: are there lessons from introduced species?. *Environ. Biol. Fishes, 30, 3*59-368.

Sammons, S.M., & Maceina, M.J. (2009). Effects of river flows on growth of redbreast sunfish *Lepomis auritus* (Centrarchidae) in Georgia rivers. *Journ. Fish Biol., 74*, 1580-1593.

Sanderson, B. L., Barnas, K. A., & Rub, A. M. W. (2009). Nonindigenous species of the pacific northwest: An overlooked risk to endangered salmon? *BioScience, 59*(3), 245-256.

Sandow, J. T., Jr., Holder, D. R., & McSwain, L. E. (1974). Life history of the redbreast sunfish in the Satilla River, Georgia. *Proc. Conf. S.E. Assoc. Game and Fish Comm. 28*, 279-285.

SAS Institute. (2014). Statistical Analysis. Retrieved from http://www.sas.com/en_us/software/analytics/stat.html

Schorr, M.S. & Baker, J.C. (2006). Localized effects of coal mine drainage on fish assemblages in a Cumberland Plateau stream in Tennessee. *Journ. Freshwater Ecol., 21*, 17-24.

Seegert, S. E. Z. (2010). Diet overlap and competition among native and non-native small-bodied fishes in the Colorado River, Grand Canyon, Arizona. *Loyola University Chicago: Master's Theses, paper 563*, 1-95.

Smith, S. A., Bell, G., & Bermingham, E. (2004). Cross-Cordillera exchange mediated by the Panama Canal increased the species richness of local freshwater fish assemblages. *Proc Biol. Sci., 271*(1551), 1889-1896.

Sohl, T.L$_a$ (2012). Southeastern Plains. United States Geological Survey, Land Cover Trends Report. Retrieved from http://landcovertrends.usgs.gov/east/eco65Report.html

Sohl, T.L$_b$ (2012). Southwestern Appalachians. United States Geological Survey, Land Cover Trends Report. Retrieved from http://landcovertrends.usgs.gov/east/eco68Report.html

Tate, W.B., Allen, M.S., Myers, R.A., & Estes, J.R. (2003). Comparison of Electrofishing and Rotenone for Sampling Largemouth Bass in Vegetated Areas of Two Florida Lakes. *North Am. Journ. Fish. Mgmt., 23*(1), 181-188.

Taylor, J.L. & Kurtz, R. (2012). Blue Ridge Mountains. United States Geological Survey, Land Cover Trends Report. Retrieved from http://landcovertrends.usgs.gov/east/eco66Report.html

Tennessee Valley Authority (TVA). (2004). Water Quality. Final Programmatic Environmental Impact Statement Reservoir Operations Study, *Vol. 1*, 4.1-4.12.

Tonn, W. M., Magnuson, J. J., Rask, M., & Toivonen, J. (1990). Intercontinental comparison of small-lake fish assemblages: the balance between local and regional processes. *Am. Natural., 136*(3), 345-375.

Tsunoda, H., & Mitsuo, Y. (2012). Multiple effects of exotic largemouth bass (*Micropterus salmoides*) and environmental factors on species richness and composition of pond-dwelling fishes. *Aquat. Living Res., 25*(2), 163-171.

United States Geological Survey (USGS). (2014). Nonindigenous Aquatic Species Database.

Gainesville, Florida. Retrieved from http://nas.er.usgs.gov/

Vander Zanden, M.J., Casselman, J.M., & Rasmussen, J.B. (1999). Stable isotope evidence for the food web consequences of species invasions in lakes. *Nature, 401*, 464-467.

VanderKooy, K. E., Rakocinski, C. F., & Heard, R. W. (2000). Trophic relationships of three sunfishes (*Lepomis* spp.) in an estuarine bayou. *Estuaries, 23*(5), 621-632.

Vannote, R.L., Minshall, G.W., Cummins, K.W., Sedell, J.R., Cushing, C.E. (1980). The river continuum concept. *Can. Journ. Fish. Aquat. Sci., 37*, 130-137.

Wenger, S. J., Peterson, J. T., Freeman, M. C., Freeman, B. J., & Homans, D. D. (2008). Stream fish occurrence in response to impervious cover, historic land use, and hydrogeomorphic factors. *Can. Journ. Fish. Aquat. Sci., 65*(7), 1250-1264.

Wilcove, D. S., Rothstein, D., Dubow, J., Phillips, A., & Losos, E. (1998). Quantifying threats to imperiled species in the United States: Assessing the relative importance of habitat destruction, alien species, pollution, overexploitation, and disease. *Bioscience, 48*, 607-615.

Winston, M. R. (1995). Co-occurrence of morphologically similar species of stream fishes. *Am. Natural., 145*(4), 527-545.

Wooten, A.C., Preer, J., & Edwards, P.J. (1999). Geologic and tributary influences on the chemistry of a headwater stream. USDA Forest Service Northeastern Research Station, *report 708*, 1-12.

Zar, J. H. (2010). Biostatistical Analysis, *5th edition*. Upper Saddle River, NJ: Pearson Prentice Hall.

TABLES

Table 1 Description of reservoirs sampled by TVA rotenone surveys (1947-1997) and/or electrofishing surveys (1993-2012) in the Tennessee River drainage.

Reservoir (river impounded): mainstem, tributary	Ecoregion[d]	Years of data: Rotenone[a]	Years of data: RFAI[b]	River km at the mouth		Year of completion	Surface area (ha)
Kentucky (Tennessee River)[a,b]	IP/SEP	22	12	36.0	(22.4)	1938	64,922
Redbud (Dry Creek) [a]	SEP	2		1.6	(1.0)	1965	181
Sycamore (Dry Branch Creek) [a]	IP			1.8	(1.1)	1965	91
Cedar (Haley Creek) [a]	SEP	1		6.4	(4.0)	1963	57
Pine (Piney Creek) [a]	IP	2		7.7	(4.8)	1964	189
Pin Oak (Browns Creek) [a]	SEP	1		8.2	(5.1)	1964	269
Dogwood (Big Creek) [a]	SEP	1		10.8	(6.7)	1965	85
Beech (Beech Creek) [a,b]	IP	1	10	56.3	(35.0)	1963	355
Normandy (Duck River) [a,b]	IP	5	11	400.1	(248.6)	1976	1,280
Pickwick (Tennessee River) [a,b]	SEP	23	16	332.7	(206.7)	1938	17,456
Little Bear Creek (Little Bear Creek) [a,b]	IP	4	12	18.7	(11.6)	1975	632
Cedar Creek (Cedar Creek) [a,b]	IP	2	11	37.2	(23.1)	1979	1,701
Bear Creek (Bear Creek) [a,b]	IP	7	12	120.1	(74.6)	1969	271
Upper Bear Creek (Bear Creek) [a]	IP	1		184.6	(114.7)	1978	749
Wilson (Tennessee River) [a,b]	IP	15	10	417.5	(671.9)	1924	6,278
Wheeler (Tennessee River) [a,b]	IP	42	17	442.4	(274.9)	1936	27,176
Tims Ford (Elk River) [a,b]	IP	3	11	214.5	(345.2)	1970	4,293
Guntersville (Tennessee River) [a,b]	SWA	31	15	561.6	(349.0)	1939	27,500
Nickajack (Tennessee River) [a,b,c]	RV/SWA	5	11	683.5	(424.7)	1967	4,200
Hales Bar (Tennessee River) [a,c]	RV/SWA	7		693.8	(431.1)	ca. 1913	2,705
Chickamauga (Tennessee River) [a,b]	RV	36	19	758.0	(471.0)	1940	14,337
Parksville (Ocoee River) [a,b]	RV	6	12	19.2	(11.9)	1911	765

Table 1 Continued.

Reservoir (river impounded): mainstem, tributary	Ecoregion[d]	Years of data Rotenone[a]	Years of data RFAI[b]	River km at the mouth		Year of completion	Surface area (ha)
Nottely (Nottely River) [a,b]	BR	7	12	33.8	(21.0)	1942	1,693
Blue Ridge (Toccoa River) [a,b]	BR	4	11	85.3	(53.0)	1930	1,332
Apalachia (Hiwassee River) [a]	BR	5	10	106.2	(66.0)	1943	446
Hiwassee (Hiwassee River)[b]	BR		10	122.3	(76.0)	1940	2,400
Chatuge (Hiwassee River) [a,b]	BR	7	15	194.7	(121.0)	1942	2,855
Watts Bar (Tennessee River) [a,b]	RV	17	18	852.8	(529.9)	1942	15,795
Santeetlah (Cheoah River) [a]	BR	8		15.0	(9.3)	1927	1,154
Thorpe (West Fork Tuckasegee River) [a]	BR	5		15.6	(9.7)	1941	591
Nantahala (Nantahala River) [a]	BR	1		36.7	(22.8)	1942	638
Melton Hill (Clinch River) [a,b]	RV	1	15	37.2	(23.1)	1963	2,304
Norris (Clinch River) [a,b]	RV	35	10	128.4	(79.8)	1936	13,851
Tellico (Little Tennessee River) [a,b]	RV	7	12	0.48	(0.3)	1979	6,423
Cheoah (Little Tennessee River) [a]	BR	3		82.7	(51.4)	1918	256
Fontana (Little Tennessee River) [a,b]	BR	11	11	98.2	(61.0)	1944	4,309
Fort Loudoun (Tennessee River) [a,b]	RV	13	17	969.3	(602.3)	1943	5,913
Douglas (French Broad River) [a,b]	RV	20	11	52.0	(32.3)	1943	12,312
Watauga (Watauga River) [a,b]	RV	22	9	59.1	(36.7)	1948	2,604
Fort Patrick Henry (South Fork Holston River)	RV	5	12	13.2	(8.2)	1953	353
Boone (South Fork Holston River) [a,b]	RV	14	11	29.9	(18.6)	1952	1,746
South Holston (South Fork Holston River) [a,b]	RV	17	9	80.1	(49.8)	1950	3,070
Cherokee (Holston River) [a,b]	RV	32	9	42.3	(68.1)	1941	12,272
John Sevier (Holston River) [a]	RV	5		171.1	(106.3)	1955	324

[a]Cove rotenone sampling data collected by TVA.
[b]Electrofishing/gillnetting data collected by TVA (Vital Signs program) to calculate the Reservoir Fish Assemblage Index (RFAI).
[c]In 1967 Hales Bar dam was dismantled and replaced by Nickajack dam (10.3 km downriver).
[d]Interior Plateau (IP), Southeastern Plains (SEP), Southwest Appalachians (SWA), Ridge and Valley (RV), Blue Ridge (BR).

Table 2 Regression equations describing relationships between sunfish parameters (ŷ) and year (x), based on rotenone (~1950-60s; ~1970-90s) samples, in Kentucky-Pickwick mainstem section of the Tennessee River.

Parameter, time period	Species	Model	n	P
Kentucky-Pickwick section (TR km 36-418)				
Proportional abundance (arcsin√pi)				
1949-1963 (14 yrs.)	*Lepomis auritus*	NA (species was not present)		
	L. megalotis	$\hat{y} = 0.02648 + 0.01562x$	102	0.0031
	L. macrochirus	$\hat{y} = 0.2436 + 0.1103x - 0.00385x^2$	102	0.0126
	L. microlophus	$\hat{y} = 0.6726 - 0.1341x + 0.008741x^2 - 0.00018x^3$	102	0.0142
Proportional abundance (arcsin√pi)				
1971-1982 (10 yrs.)	*Lepomis auritus*	NA (species was not present)		
	L. megalotis	$\hat{y} = -10.6159 + 0.5883x - 0.000781x2$	69	0.0215
	L. macrochirus	$\hat{y} = 2.2868 - 0.04619x$	69	<0.0001
	L. microlophus	$\hat{y} = -0.1704 + 0.00599x$	69	0.0020
Density [log10 (number/ha + 1)]				
1971-1982 (10 yrs.)	*Lepomis auritus*	NA (species was not present)		
	L. megalotis	$\hat{y} = -4.6981 + 0.7764x - 0.02154x^2$	69	0.0127
	L. macrochirus	$\hat{y} = 12.82921 - 2.17041x + 0.14369x^2 - 0.00304x^3$	69	0.0311
	L. microlophus	$\hat{y} = -0.6339 + 0.1107x$	69	<0.0001
Biomass [log10 (kg/ha + 1)]				
1971-1982 (10 yrs.)	*Lepomis auritus*	NA (species was not present)		
	L. megalotis	$\hat{y} = -3.5110 + 0.4874x - 0.01348x^2$	69	0.0036
	L. macrochirus	$\hat{y} = 111.62 - 27.6877x + 2.5258x^2 - 0.09994x^3 + 0.001452x^4$	69	0.0113
	L. microlophus	$\hat{y} = -0.3770 + 0.04262x$	69	<0.0001

Table 3 Regression equations describing relationships between sunfish parameters (ŷ) and year (x), based on electrofishing (1993-2011) samples, in Kentucky-Pickwick mainstem section of the Tennessee River.

Parameter, time period	Species	Model	n	P
		Kentucky-Pickwick section (TR km 36-418)		
Proportional abundance (arcsin√pi)				
1993-2011 (19 yrs.)	*Lepomis auritus*	NS	129	NA
	L. megalotis	$\hat{y} = 0.6516 + 0.03217x - 0.00156x^2$	129	0.0019
	L. macrochirus	$\hat{y} = 0.7420 + 0.3823x - 0.001574x^2$	129	0.0028
	L. microlophus	$\hat{y} = 0.3574 + 0.02975x - 0.00423x^2 - 0.000147x^3$	129	0.0607
CPUE [log10 (number/site + 1)]				
1993-2011 (19 yrs.)	*Lepomis auritus*	NS	129	NA
	L. megalotis	$\hat{y} = 0.9085 + 0.02748x$	129	0.0011
	L. macrochirus	$\hat{y} = 0.7127 + 3.019x - 0.08003x^2 + 0.006763x^3 - 0.00018x^4$	129	0.0003
	L. microlophus	$\hat{y} = 0.5409 + 0.01725x$	129	<0.0001

Table 4 Regression models describing relationships between sunfish parameters ($\hat{y}$) and year (x), based on rotenone (~1950-60s; ~1970-90s) samples, in Wilson-Wheeler mainstem section of the Tennessee River.

Parameter, time period	Species	Model	n	P
Wheeler-Wilson section (TR km 418-562)				
Proportional abundance (arcsin√pi)				
1949-1962 (14 yrs.)	*Lepomis auritus*	NS	40	NA
	L. megalotis	$\hat{y} = -1.8658 + 0.4449x - 0.03268x^2 + 0.000769x^3$	40	0.0259
	L. macrochirus	NS	40	NA
	L. microlophus	$\hat{y} = -0.04857 + 0.004785x$	40	<0.0001
Proportional abundance (arcsin√pi)				
1970-1997 (28 yrs.)	*Lepomis auritus*	NS	74	NA
	L. megalotis	$\hat{y} = 0.6676 - 0.00668x$	74	<0.0001
	L. macrochirus	$\hat{y} = 0.1972 + 0.00894x$	74	<0.0001
	L. microlophus	$\hat{y} = -0.00083 + 0.001636x$	74	0.0314
Density [log10 (number/ha + 1)]				
1970-1997 (28 yrs.)	*Lepomis auritus*	NS	74	NA
	L. megalotis	$\hat{y} = 1.5759 + 0.07357x - 0.00190x^2$	74	<0.0001
	L. macrochirus	$\hat{y} = 2.30256 + 0.05793x - 0.0009784x^2$	74	0.0004
	L. microlophus	$\hat{y} = 5.46523 - 0.56225x + 0.02798x^2 - 0.00041592x^3$	74	0.0010
Biomass [log10 (kg/ha + 1)]				
1970-1997 (28 yrs.)	*Lepomis auritus*	NS	74	NA
	L. megalotis	$\hat{y} = 0.3784 + 0.06433x - 0.00161x^2$	74	<0.0001
	L. macrochirus	$\hat{y} = 0.6501 + 0.05161x - 0.00106x^2$	74	0.0302
	L. microlophus	$\hat{y} = -0.03925 + 0.07771x - 0.00152x^2$	74	0.0006

Table 5 Regression equations describing relationships between sunfish parameters (ŷ) and year (x), based on electrofishing (1993-2011) samples, in Wilson-Wheeler mainstem section of the Tennessee River.

Parameter, time period	Species	Model	n	P
		Wheeler-Wilson section (TR km 418-562)		
Proportional abundance (arcsin√pi)				
1993-2011 (19 yrs.)	*Lepomis auritus*	NS	93	NA
	L. megalotis	$\hat{y} = 0.7061 - 0.1007x + 0.01365x^2 - 0.00047x^3$	93	0.0015
	L. macrochirus	$\hat{y} = 0.7973 - 0.001134x$	93	0.0020
	L. microlophus	$\hat{y} = 0.3182 + 0.01505x - 0.00095x^2$	93	0.0286
CPUE [log10 (number/site + 1)]				
1993-2011 (19 yrs.)	*Lepomis auritus*	NS	93	NA
	L. megalotis	$\hat{y} = 1.5827 - 0.3901x + 0.04653x^2 - 0.00143x^3$	93	<0.0001
	L. macrochirus	$\hat{y} = 1.3509 - 0.09167x + 0.005454x2$	93	<0.0001
	L. microlophus	$\hat{y} = 0.9293 - 0.1905x + 0.02216x^2 - 0.00066x^3$	93	0.0017

Table 6 Regression models describing relationships between sunfish parameters (ŷ) and year (x), based on rotenone (~1950-60s; ~1970-90s) samples, in Guntersville mainstem section of the Tennessee River.

Parameter, time period	Species	Model	n	P
		Guntersville section (TR km 562-684)		
Proportional abundance (arcsin√pi)				
1949-1961 (11 yrs.)	*Lepomis auritus*	NS	21	
	L. megalotis	NS	21	
	L. macrochirus	$\hat{y} = 7.5355 - 1.4418x + 0.1004x^2 - 0.00227x^3$	21	0.0414
	L. microlophus	NS	21	
Proportional abundance (arcsin√pi)				
1971-1993 (19 yrs.)	*Lepomis auritus*	NS	90	
	L. megalotis	$\hat{y} = 0.1012 - 0.00198x$	90	0.0050
	L. macrochirus	$\hat{y} = 0.4708 + 0.006232x$	90	0.0738
	L. microlophus	NS	90	
Density [log10 (number/ha + 1)]				
1970-1993 (19 yrs.)	*Lepomis auritus*	NS	90	
	L. megalotis	$\hat{y} = -4.8007 + 0.9377x - 0.04642x^2 + 0.000688x^3$	90	0.0030
	L. macrochirus	$\hat{y} = -12.5188 + 3.0381x - 0.2164x^2 + 0.006581x^3 - 0.00007x^4$	90	0.0022
	L. microlophus	$\hat{y} = -13.78992 + 3.28707x - 0.2328x^2 + 0.00739x^3 - 0.00008297x^4$	90	0.0205
Biomass [log10 (kg/ha + 1)]				
1970-1993 (19 yrs.)	*Lepomis auritus*	NS	90	
	L. megalotis	$\hat{y} = -1.4636 + 0.2772x - 0.01391x^2 + 0.000209x^3$	90	0.0004
	L. macrochirus	$\hat{y} = -11.4906 + 2.6135 - 0.1913x^2 + 0.005965x^3 - 0.00007x^4$	90	0.0030
	L. microlophus	$\hat{y} = -5.6906 + 1.488x - 0.1156x^2 + 0.003772x^3 - 0.00004x^4$	90	0.0076

Table 7 Regression equations describing relationships between sunfish parameters (ŷ) and year (x), based on electrofishing (1993-2011) samples, in Guntersville mainstem section of the Tennessee River.

Parameter, time period	Species	Model	n	P
		Guntersville section (TR km 562-684)		
Proportional abundance (arcsin√pi)				
1993-2011 (16 yrs.)	*Lepomis auritus*	NS	57	NA
	L. megalotis	$\hat{y} = 0.06502 + 0.2147x - 0.04342x^2 + 0.003129x^3 - 0.00008x^4$	57	0.0123
	L. macrochirus	NS	57	NA
	L. microlophus	NS	57	NA
CPUE [log10 (number/site + 1)]				
1993-2011 (16 yrs.)	*Lepomis auritus*	$\hat{y} = 1.1997 - 0.3655x + 0.04828x^2 - 0.00165x^3$	57	0.0011
	L. megalotis	$\hat{y} = 0.1967 + 0.3408x - 0.08720x^2 + 0.007684x^3 - 0.00021x^4$	57	0.0260
	L. macrochirus	$\hat{y} = 1.6371 - 0.3798x + 0.04862x^2 - 0.00152x^3$	57	0.0002
	L. microlophus	$\hat{y} = 1.1099 - 0.2795x + 0.03554x^2 - 0.0011x^3$	57	0.0003

Table 8 Regression models describing relationships between sunfish parameters (ŷ) and year (x), based on rotenone (~1950-60s; ~1970-90s) samples, in Nickajack-Chickamauga mainstem section of the Tennessee River.

Parameter, time period	Species	Model	n	P
Nickajack-Chickamauga section (TR km 684-853)				
Proportional abundance (arcsin√pi)				
1949-1964 (12 yrs.)	*Lepomis auritus*	NA (species was not present)		
	L. megalotis	NS	28	NA
	L. macrochirus	$\hat{y} = 1.4073 - 0.03239x$	28	0.0098
	L. microlophus	$\hat{y} = -0.08689 + 0.01126x$	28	0.0023
Proportional abundance (arcsin√pi)				
1970-1997 (26 yrs.)	*Lepomis auritus*	$\hat{y} = -0.02952 + 0.001212x$	158	0.0006
	L. megalotis	$\hat{y} = 0.1840-0.00331x$	158	0.0001
	L. macrochirus	$\hat{y} = 1.6242 - 0.03831x + 0.00427x^2$	158	0.0761
	L. microlophus	$\hat{y} = -0.1081 + 0.005786x$	158	<0.0001
Density [log10 (number/ha + 1)]				
1970-1997 (26 yrs.)	*Lepomis auritus*	$\hat{y} = -0.5254 + 0.04630x$	158	<0.0001
	L. megalotis	$\hat{y} = 1.1066 - 0.01989x$	158	0.0017
	L. macrochirus	$\hat{y}= 1.8305 + 0.01594x$	158	<0.0001
	L. microlophus	$\hat{y}= 0.9213 + 0.02828x$	158	<0.0001
Biomass [log10 (kg/ha + 1)]				
1970-1997 (26 yrs.)	*Lepomis auritus*	$\hat{y} = -0.09232 + 0.009721x$	158	<0.0001
	L. megalotis	$\hat{y} = 0.3134 - 0.00816x$	158	0.0001
	L. macrochirus	$\hat{y}= 0.7929 + 0.01039x$	158	0.0009
	L. microlophus	$\hat{y}= 0.3545 + 0.01400x$	158	<0.0001

Table 9 Regression equations describing relationships between sunfish parameters ($\hat{y}$) and year (x), based on electrofishing (1993-2011) samples, Nickajack-Chickamauga mainstem section of the Tennessee River.

Parameter, period	Species	Model	n	P
Nickajack-Chickamauga section (TR km 684-853)				
Proportional abundance (arcsin√pi)				
1993-2011 (19 yrs.)	*Lepomis auritus*	$\hat{y} = 0.1251 + 0.0687x - 0.0028x^2$	103	<0.0001
	L. megalotis	$\hat{y} = 0.07973 + 0.03515x - 0.00141x^2$	103	0.0029
	L. macrochirus	$\hat{y} = 1.0826 - 0.0888x + 0.004068x^2$	103	<0.0001
	L. microlophus	$\hat{y} = 0.2950 + 0.09379x - 0.01183x^2 + 0.000375x^3$	103	<0.0001
CPUE [log10 (number/site + 1)]				
1993-2011 (19 yrs.)	*Lepomis auritus*	$\hat{y} = 0.5453 + 0.05120x$	103	<0.0001
	L. megalotis	$\hat{y} = 0.3753 + 0.03124x$	103	<0.0001
	L. macrochirus	$\hat{y} = 1.6898 - 0.1032x + 0.006218x^2$	103	<0.0001
	L. microlophus	$\hat{y} = 0.9249 + 0.01003x$	103	<0.0001

Table 10 Regression models describing relationships between sunfish parameters ($\hat{y}$) and year (x), based on rotenone (~1950-60s; ~1970-90s) samples, in Watts Bar-Fort Loudoun mainstem section of the Tennessee River.

Parameter, time period	Species	Model	n	P
Watts Bar-Fort Loudoun section (TR km 853-1426)				
Proportional abundance (arcsin√pi)			40	
1949-64 (10 yrs.)	*Lepomis auritus*	NS	40	NA
	L. megalotis	$\hat{y} = 0.0421 - 0.00175x$	40	0.0220
	L. macrochirus	NS	40	NA
	L. microlophus	NS		NA
Proportional abundance (arcsin√pi)				
1972-1988 (12 yrs.)	*Lepomis auritus*	$\hat{y} = -13.8133 + 1.0484x - 0.02606x^2 + 0.000213x^3$	57	0.0045
	L. megalotis	$\hat{y} = -0.6069 + 0.03238 - 0.00042x^2$	57	0.0274
	L. macrochirus	$\hat{y} = 5.481 - 0.2276x + 0.00289x^2$	57	0.0034
	L. microlophus	$\hat{y} = -0.0168 + 0.000602x$	57	0.0576
Density [log10 (number/ha + 1)]				
1972-1988 (12 yrs.)	*Lepomis auritus*	$\hat{y} = -15.1990 + 2.8785x - 0.1589x^2 + 0.002767x^3$	57	0.0038
	L. megalotis	$\hat{y} = -2.5219 + 0.3176x - 0.00795x^2$	57	0.0310
	L. macrochirus	$\hat{y} = 4.4392 - 0.1935x + 0.005544x^2$	57	0.0011
	L. microlophus	$\hat{y} = -0.3677 + 0.04295x$	57	0.0061
Biomass [log10 (kg/ha + 1)]				
1972-1988 (12 yrs.)	*Lepomis auritus*	$\hat{y} = -3.4228 + 0.7067x - 0.04064x^2 + 0.000726x^3$	57	0.0467
	L. megalotis	NS	57	NA
	L. macrochirus	$\hat{y} = 2.8642 - 0.1692x + 0.004579x^2$	57	0.0013
	L. microlophus	$\hat{y} = -0.1270 + 0.01290x$	57	0.0129

Table 11 Regression equations describing relationships between sunfish parameters ($\hat{y}$) and year (x), based on electrofishing (1993-2011) samples, Watts Bar-Fort Loudoun mainstem section of the Tennessee River.

Parameter, period	Species	Model	n	P
Watts Bar-Fort Loudoun section (TR km 853-1426)				
Proportional abundance (arcsin√pi)				
1993-2011 (21 yrs.)	*Lepomis auritus*	$\hat{y} = 0.1249 + 0.006749x$	95	0.0031
	L. megalotis	$\hat{y} = 0.04588 + 0.006646x$	95	0.0014
	L. macrochirus	$\hat{y} = 1.0277 - 0.01829x$	95	<0.0001
	L. microlophus	$\hat{y} = 0.3294 - 0.07624x + 0.02016x^2 - 0.00165x^3 + 0.000042x^4$	95	0.0247
CPUE [log10 (number/site + 1)]				
1993-2011 (21 yrs.)	*Lepomis auritus*	$\hat{y} = 0.1656 + 0.02758x$	95	<0.0001
	L. megalotis	$\hat{y} = 0.08689 + 0.0215x$	95	<0.0001
	L. macrochirus	$\hat{y} = 0.9693 + 0.2620x - 0.05528x^2 + 0.004187x^3 - 0.00010x^4$	95	0.0155
	L. microlophus	$\hat{y} = 0.5021 + 0.01953x$	95	<0.0001

FIGURES

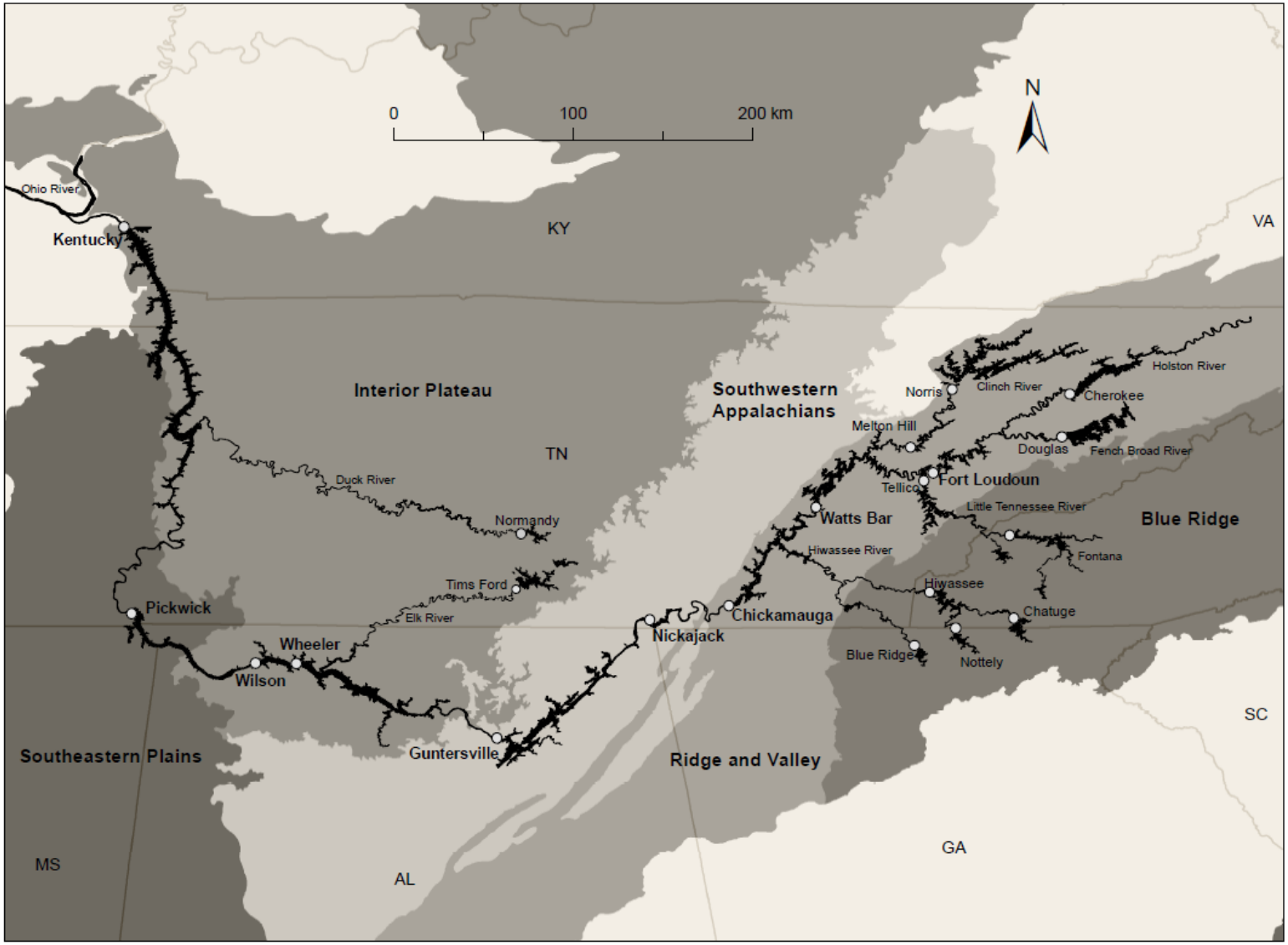


Figure 1 Major Level III ecoregions and mainstem river sections within the Tennessee River drainage.

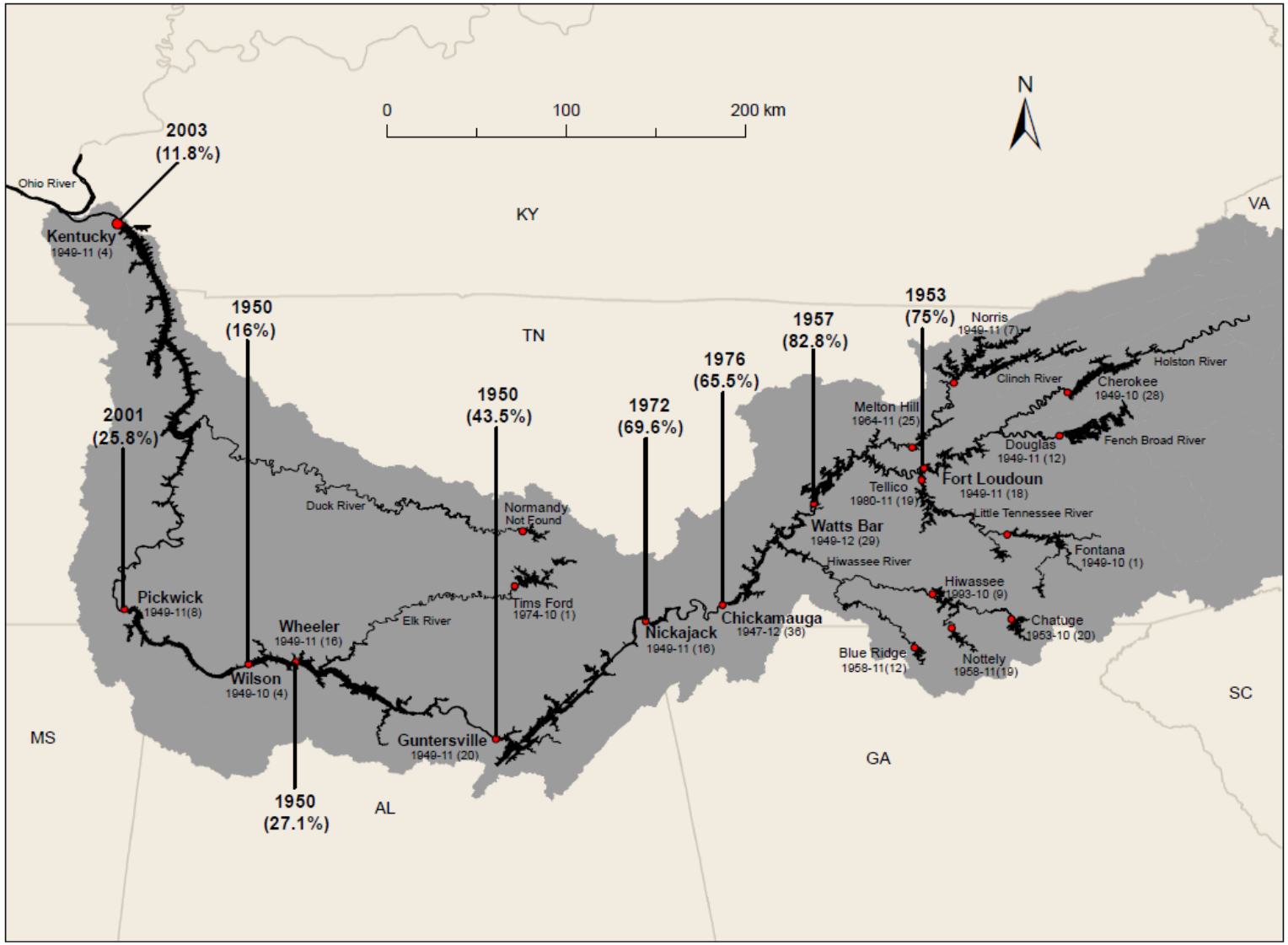


Figure 2 Tennessee River drainage mainstem reservoirs and selected tributary reservoirs. Reservoirs show the first and last years that *Lepomis auritus* was detected and total years *L. auritus* was found. Percentages indicate the number of years *L. auritus* was found compared to the number of years sampled for each mainstem reservoir.

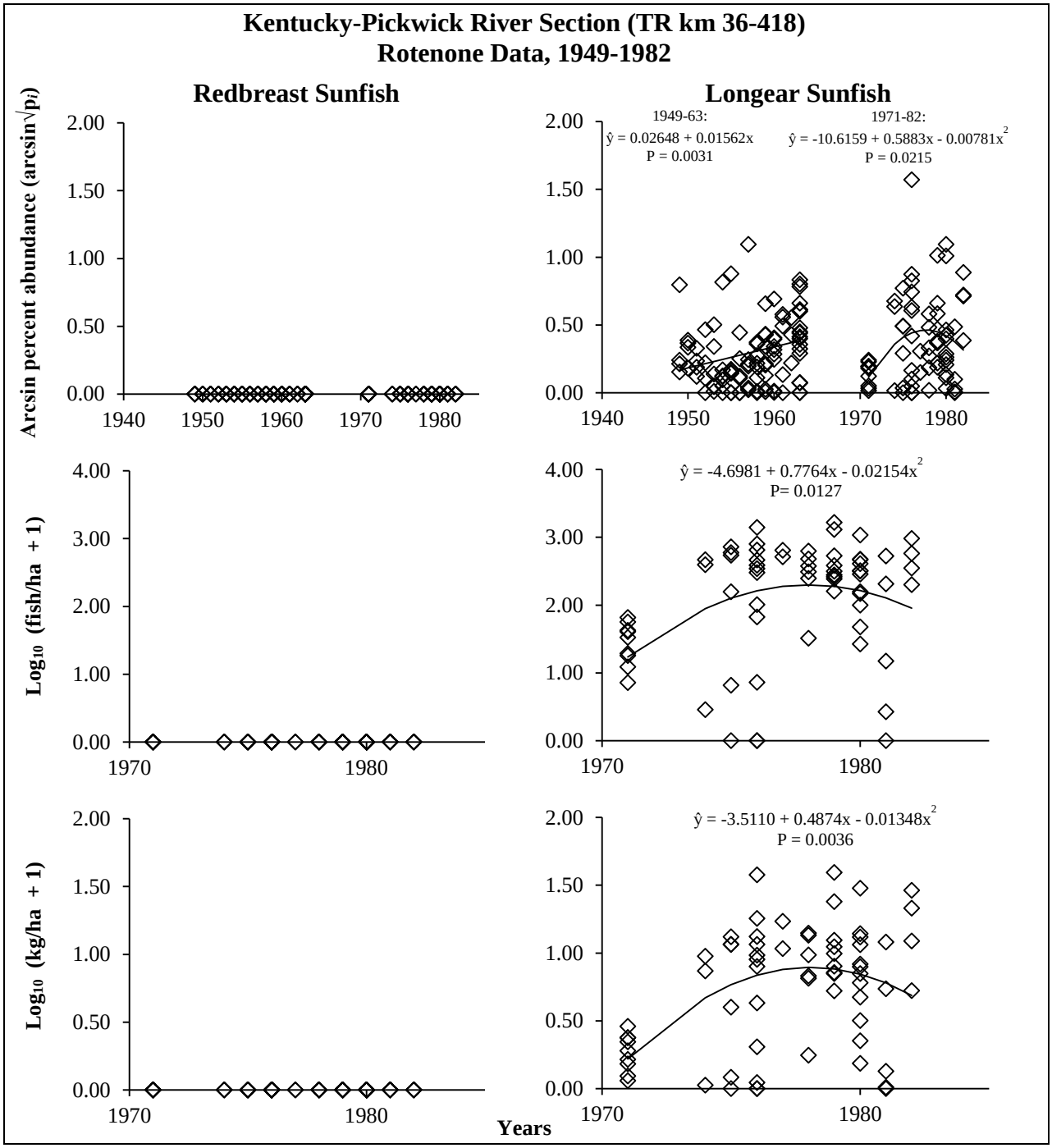


Figure 3 Arcsine-transformed percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes) and log-transformed density [$\log_{10}$(fish/ha + 1), $\log_{10}$(kg/ha + 1)] of *Lepomis auritus* (Redbreast Sunfish) and *L. megalotis* (Longear Sunfish) in rotenone samples (1949-1982) from Kentucky-Pickwick section of the Tennessee River; predicted curves are based on mixed-model regression analysis ($P \leq 0.05$, with Bonferroni adjustment).

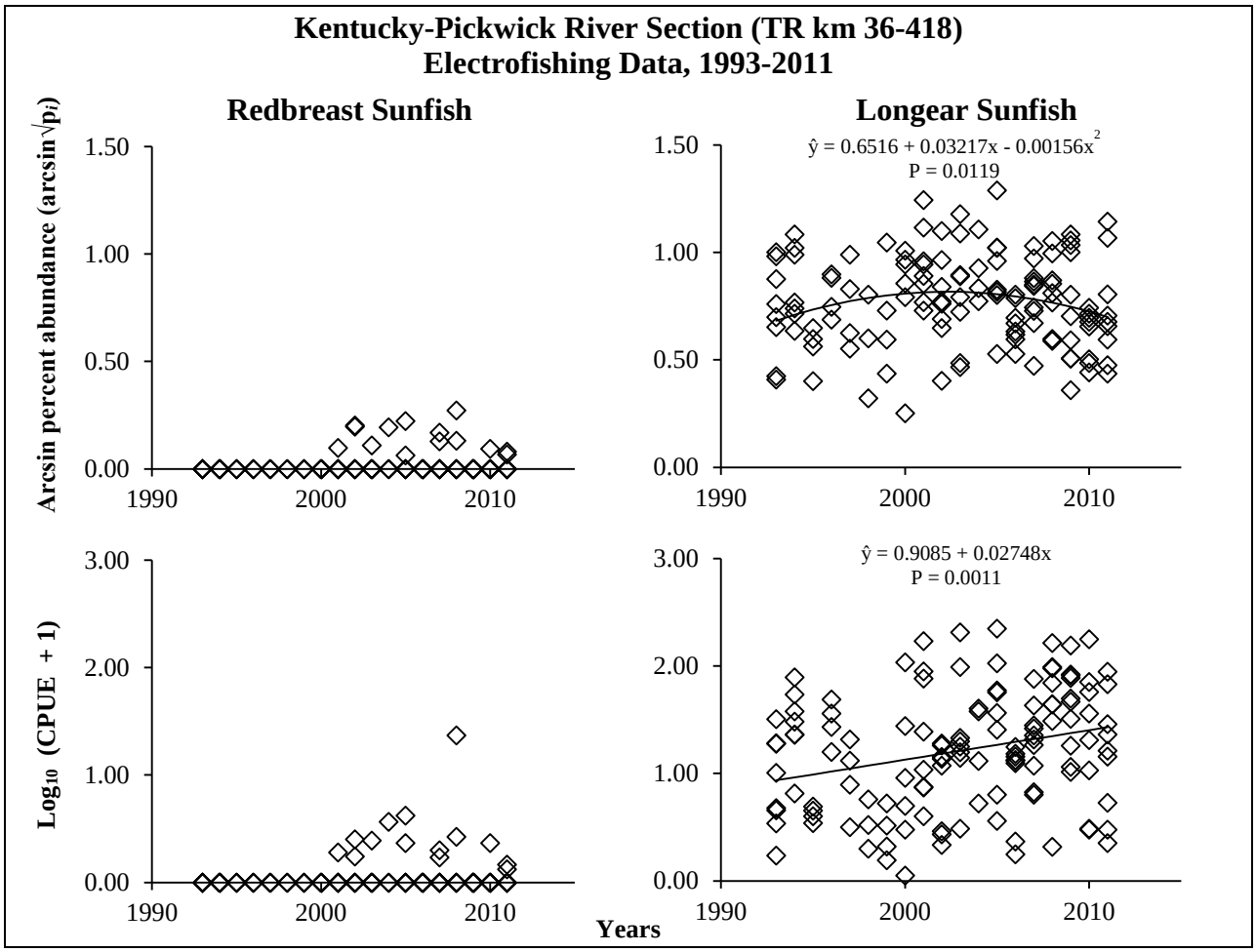


Figure 4 Arcsine-transformed percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes) and log-transformed density [$\log_{10}$(CPUE + 1)] of *Lepomis auritus* (Redbreast Sunfish) and *L. megalotis* (Longear Sunfish) in electrofishing samples (1993-2011) from Kentucky-Pickwick section of the Tennessee River; predicted curves are based on mixed-model regression analysis ($P \leq 0.05$, with Bonferroni adjustment).

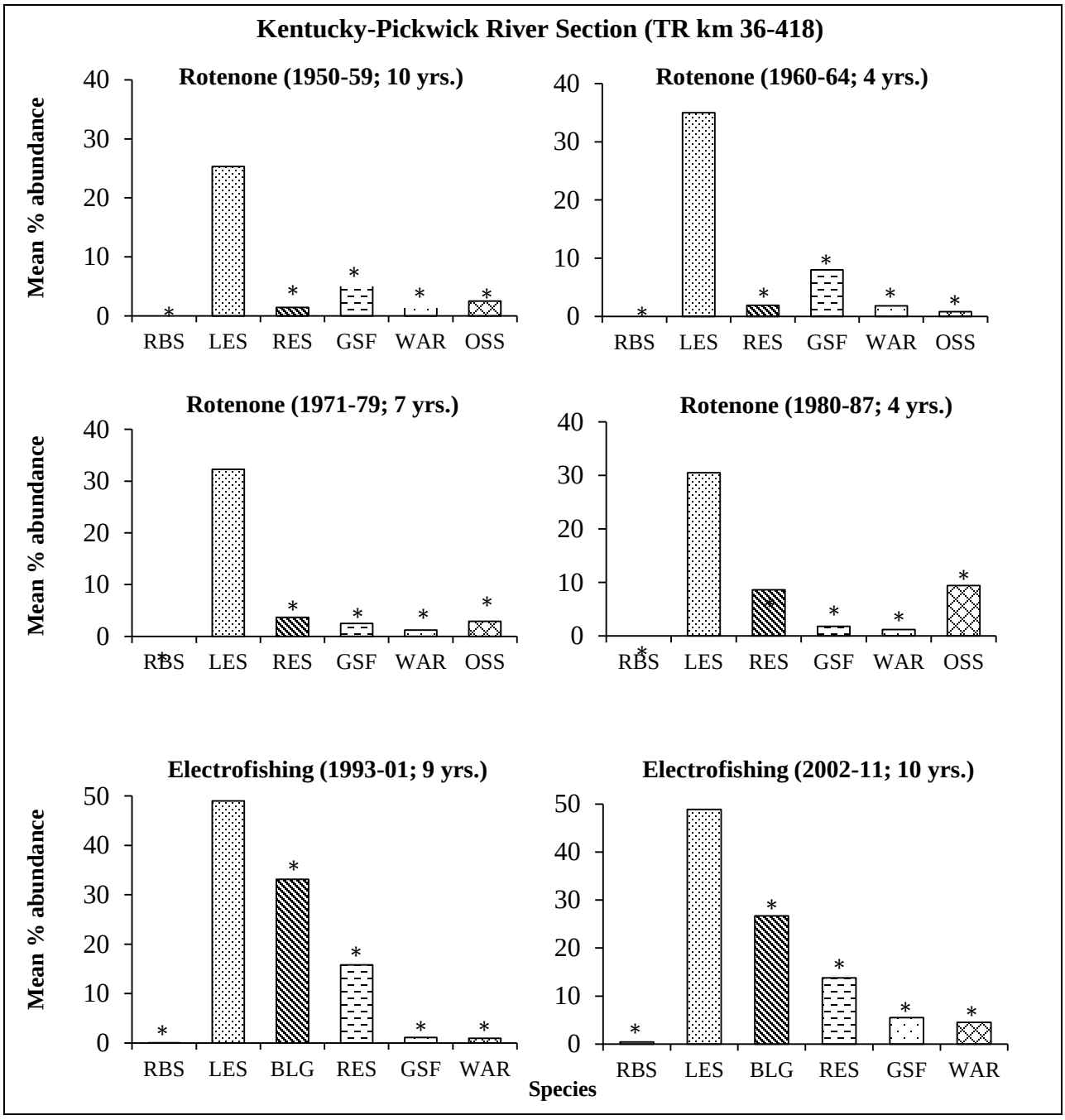


Figure 5 Sunfish species composition (% of total number of *Lepomis* spp.) in Kentucky-Pickwick River section during successive time periods (n = 4-10 years) of rotenone (1949-1982) and electrofishing (1993-2011) TVA datasets. Repeated-measures ANOVA and Dunnett's test (*P $\leq$ 0.05) compared mean arcsin % abundance of *L. megalotis* with other congeneric sunfishes. Asterisks indicate that means were different from *L. megalotis*. *L. macrochirus* (BLG) was the dominant species in rotenone data (means ranging 48.5-62.7) but is not presented in rotenone figures in order to enhance comparisons between other congeneric sunfishes.

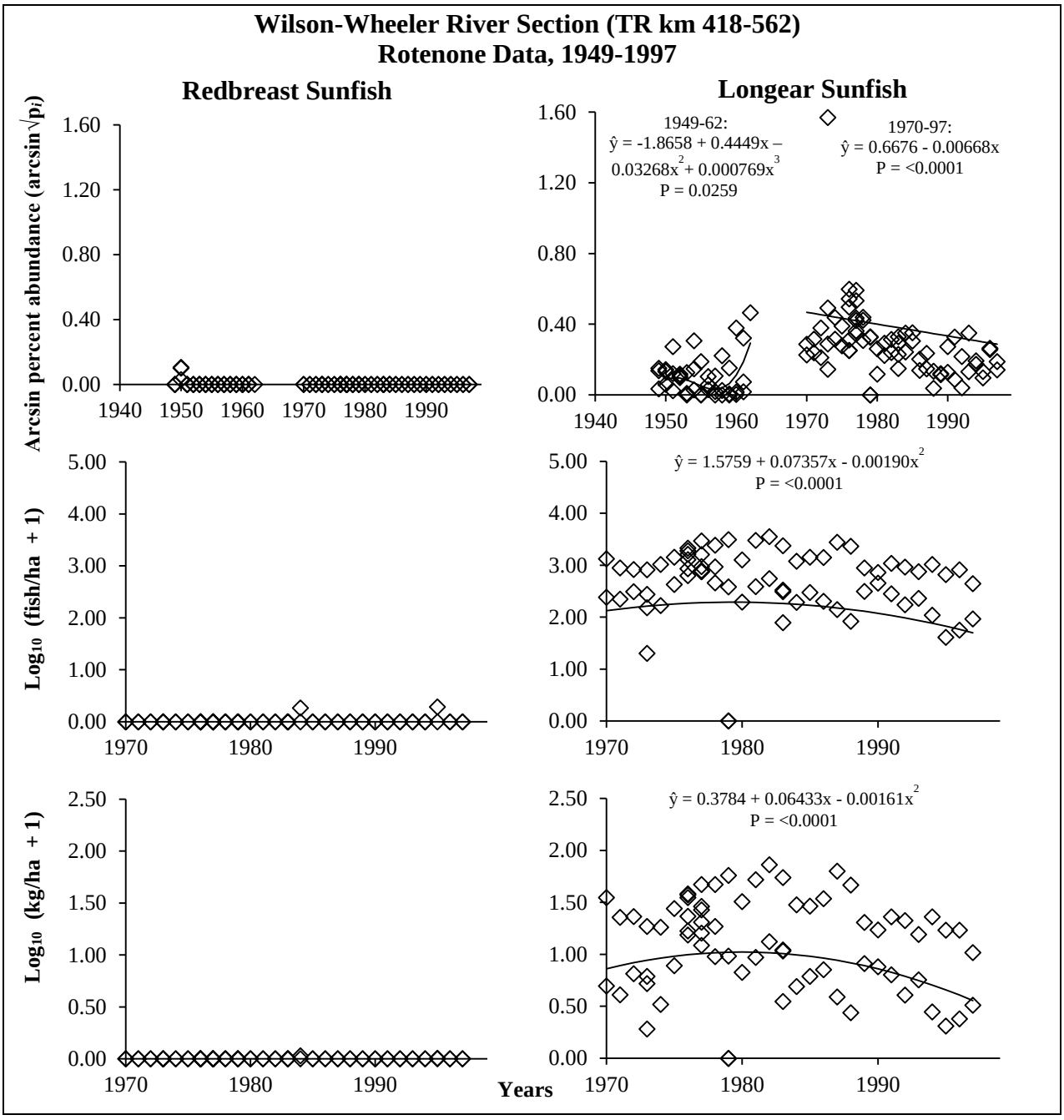


Figure 6 Arcsine-transformed percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes) and log-transformed density [$\log_{10}$(fish/ha + 1), $\log_{10}$(kg/ha + 1)] of *Lepomis auritus* (Redbreast Sunfish) and *L. megalotis* (Longear Sunfish) in rotenone samples (1949-1997) from Wilson-Wheeler section of the Tennessee River; predicted curves are based on mixed-model regression analysis ($P \leq 0.05$, with Bonferroni adjustment).

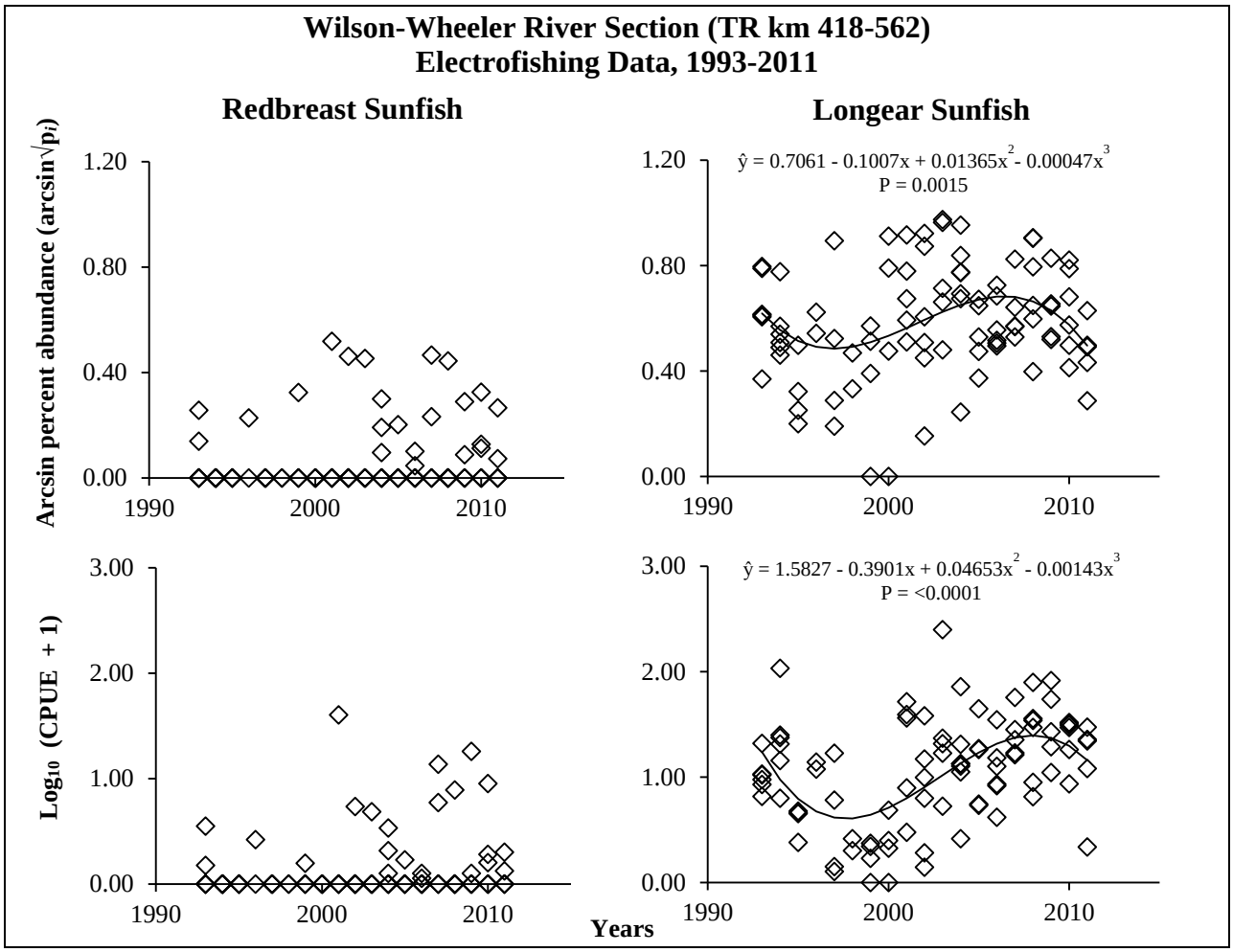


Figure 7 Arcsine-transformed percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes) and log-transformed density [$\log_{10}$(CPUE + 1)] of *Lepomis auritus* (Redbreast Sunfish) and *L. megalotis* (Longear Sunfish) in electrofishing samples (1993-2011) from Wilson-Wheeler section of the Tennessee River; predicted curves are based on mixed-model regression analysis ($P \leq 0.05$, with Bonferroni adjustment).

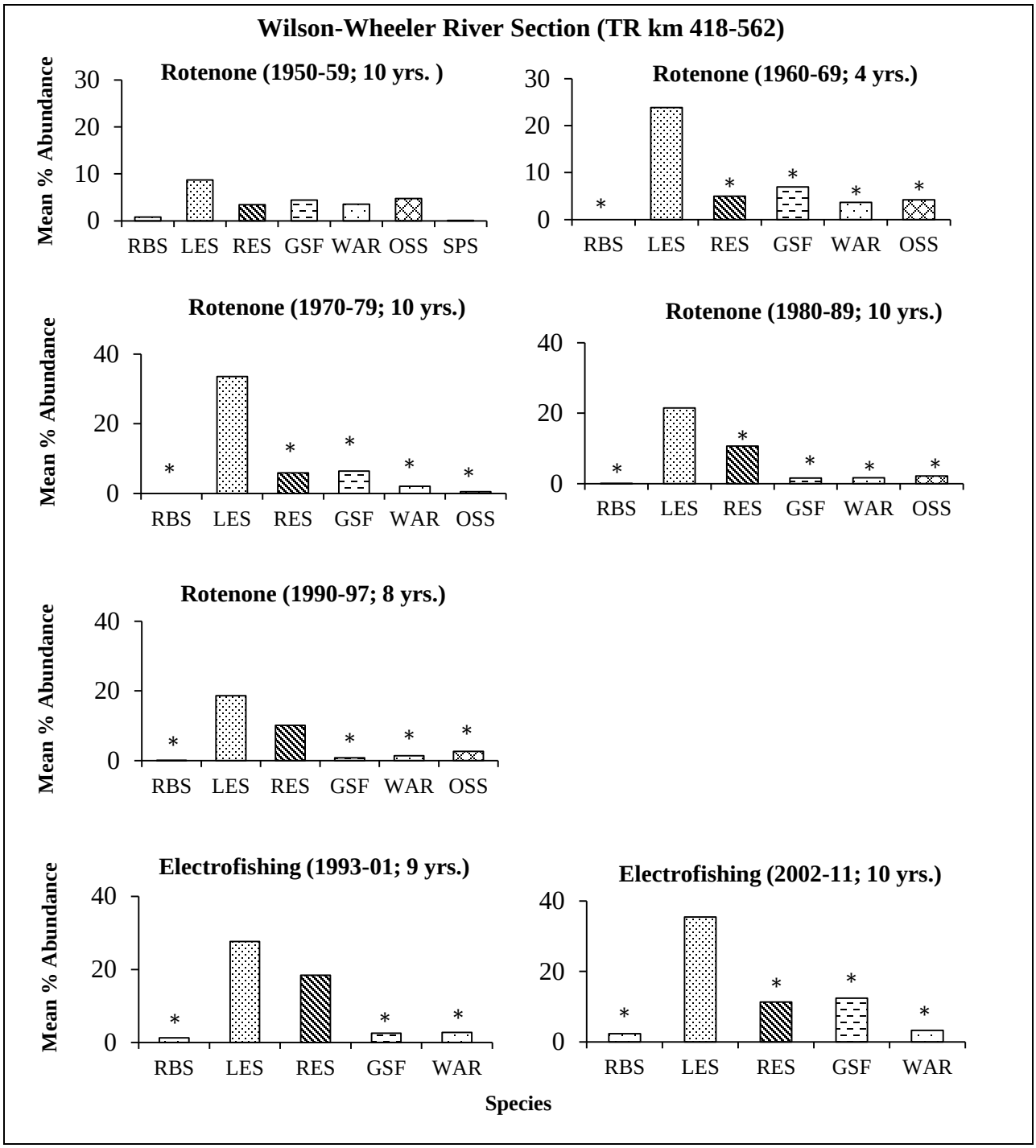


Figure 8 Sunfish species composition (% of total number of *Lepomis* spp.) in Wilson-Wheeler River section during successive time periods (n = 4-10 years) of rotenone (1949-82) and electrofishing (1993-2011) TVA datasets. Repeated-measures ANOVA and Dunnett's test (*P $\leq$ 0.05) compared mean arcsin % abundance of *L. megalotis* with other congeneric sunfishes. Asterisks indicate that means were different from *L. megalotis*. *L. macrochirus* (BLG) was the dominant species (mean % abundances ranging 35.2-70.6) but is not presented in order to enhance comparisons between other congeneric sunfishes.

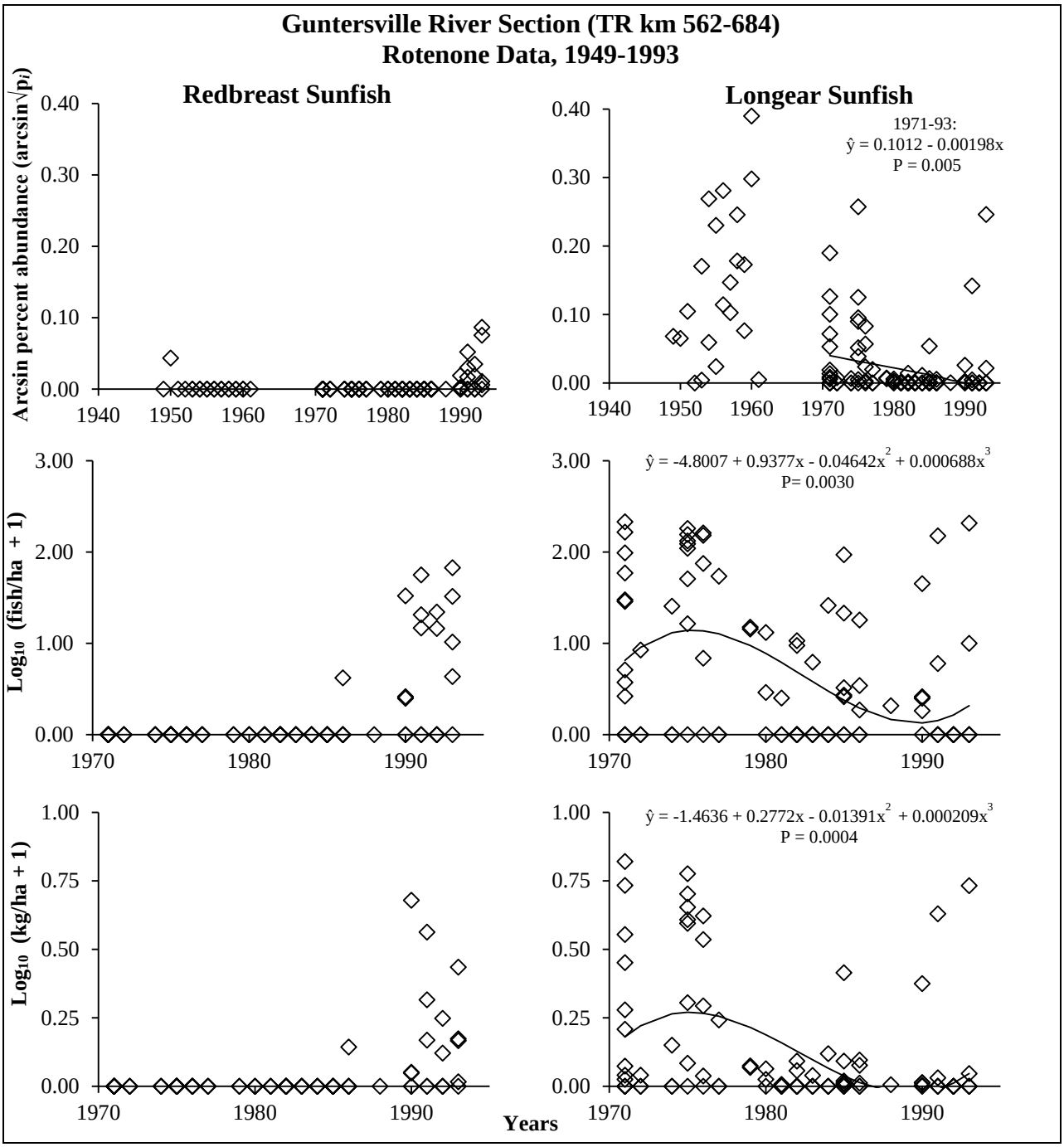


Figure 9 Arcsine-transformed percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes) and log-transformed density [$\log_{10}$(fish/ha + 1), $\log_{10}$(kg/ha + 1)] of *Lepomis auritus* (Redbreast Sunfish) and *L. megalotis* (Longear Sunfish) in rotenone samples (1949-1993) from Guntersville section of the Tennessee River; predicted curves are based on mixed-model regression analysis ($P \leq 0.05$, with Bonferroni adjustment).

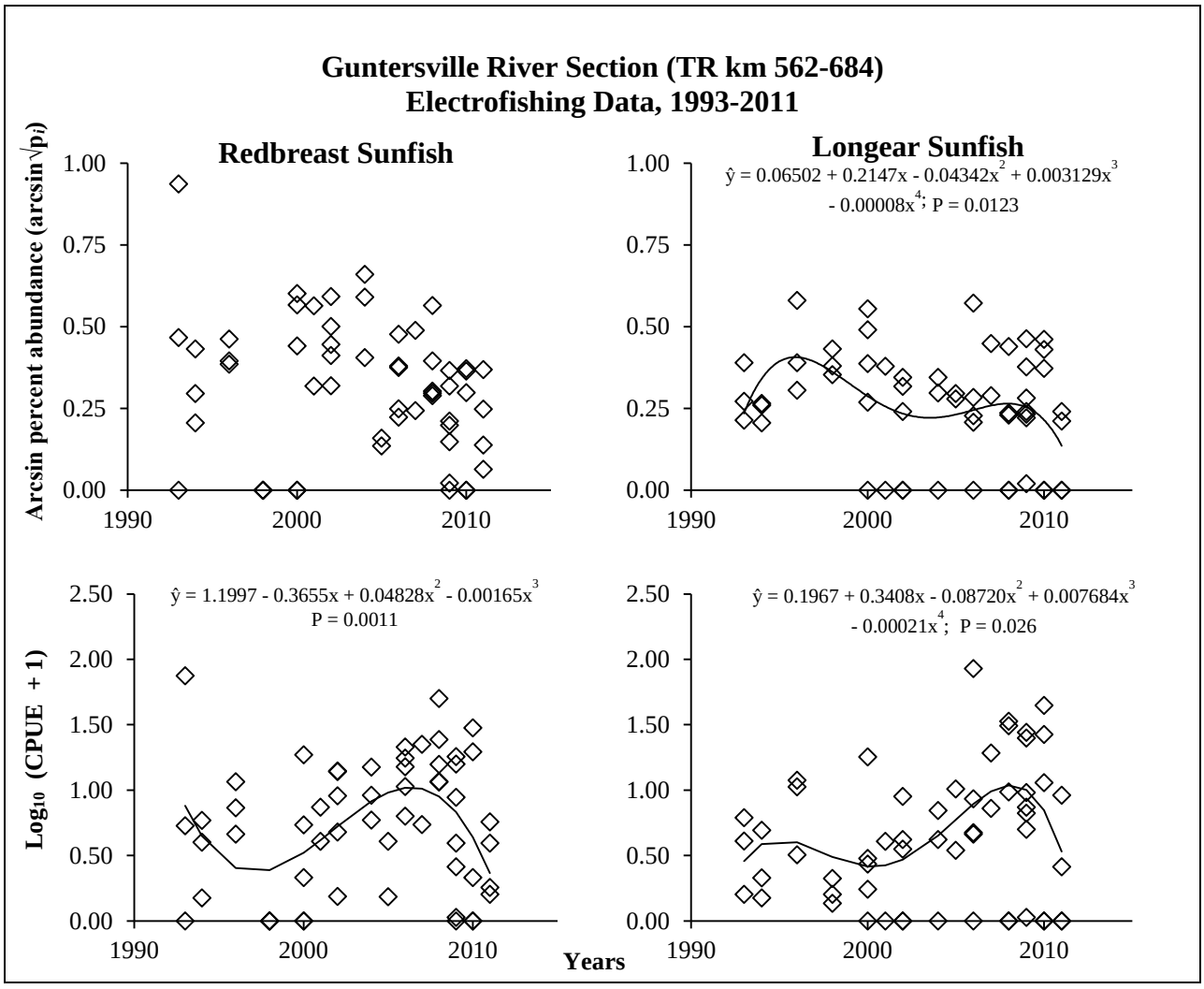


Figure 10 Arcsine-transformed percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes) and log-transformed density [$\log_{10}$(CPUE + 1)] of *Lepomis auritus* (Redbreast Sunfish) and *L. megalotis* (Longear Sunfish) in electrofishing samples (1993-2011) from Guntersville section of the Tennessee River; predicted curves are based on mixed-model regression analysis ($P \leq 0.05$, with Bonferroni adjustment).

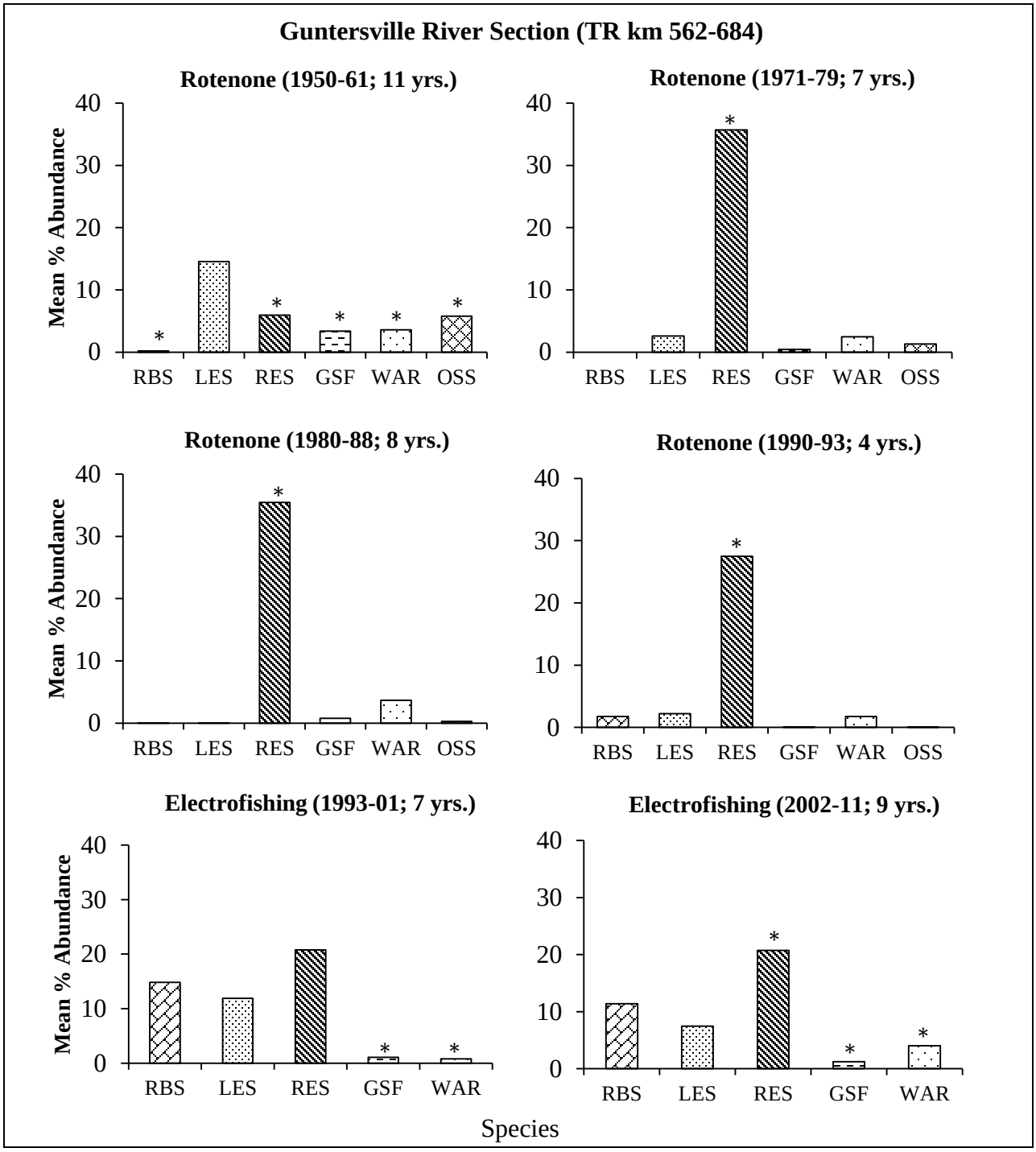


Figure 11 Sunfish species composition (% of total number of *Lepomis* spp.) in Guntersville River section during successive time periods (n = 7-10 years) of rotenone (1949-82) and electrofishing (1993-2011) TVA datasets Repeated-measures ANOVA and Dunnett's test (*$P \leq 0.05$) compared mean arcsin % abundance of *L. megalotis* with other congeneric sunfishes. Asterisks indicate that means were different from *L. megalotis*. *L. macrochirus* (BLG) was the dominant species (mean % abundances ranging 50.7-74.1) but is not presented in order to enhance comparisons between other congeneric sunfishes.

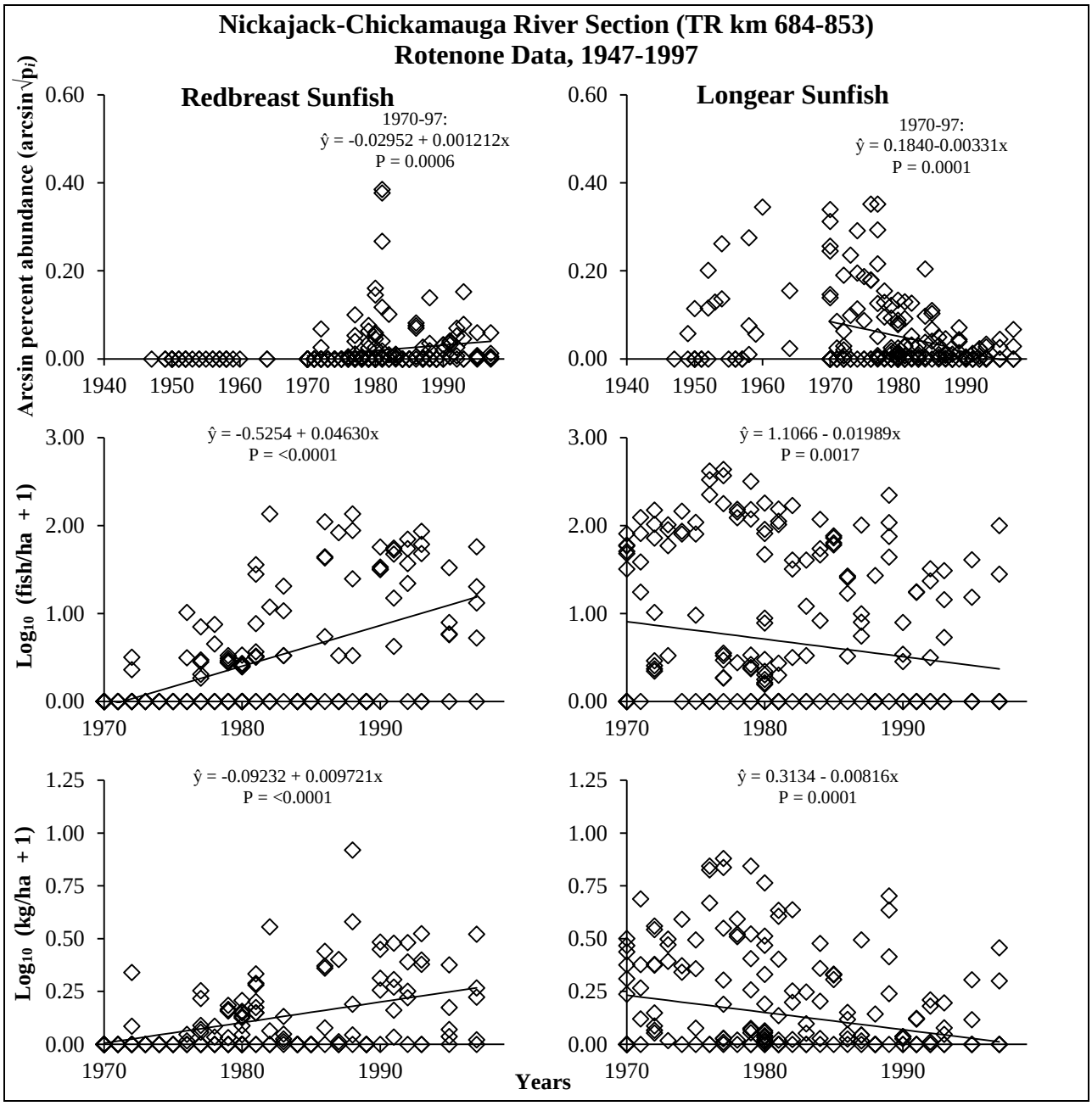


Figure 12 Arcsine-transformed percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes) and log-transformed density [$\log_{10}$(fish/ha + 1), $\log_{10}$(kg/ha + 1)] of *Lepomis auritus* (Redbreast Sunfish) and *L. megalotis* (Longear Sunfish) in rotenone samples (1949-1997) from Nickajack-Chickamauga section of the Tennessee River; predicted curves are based on mixed-model regression analysis ($P \leq 0.05$, with Bonferroni adjustment).

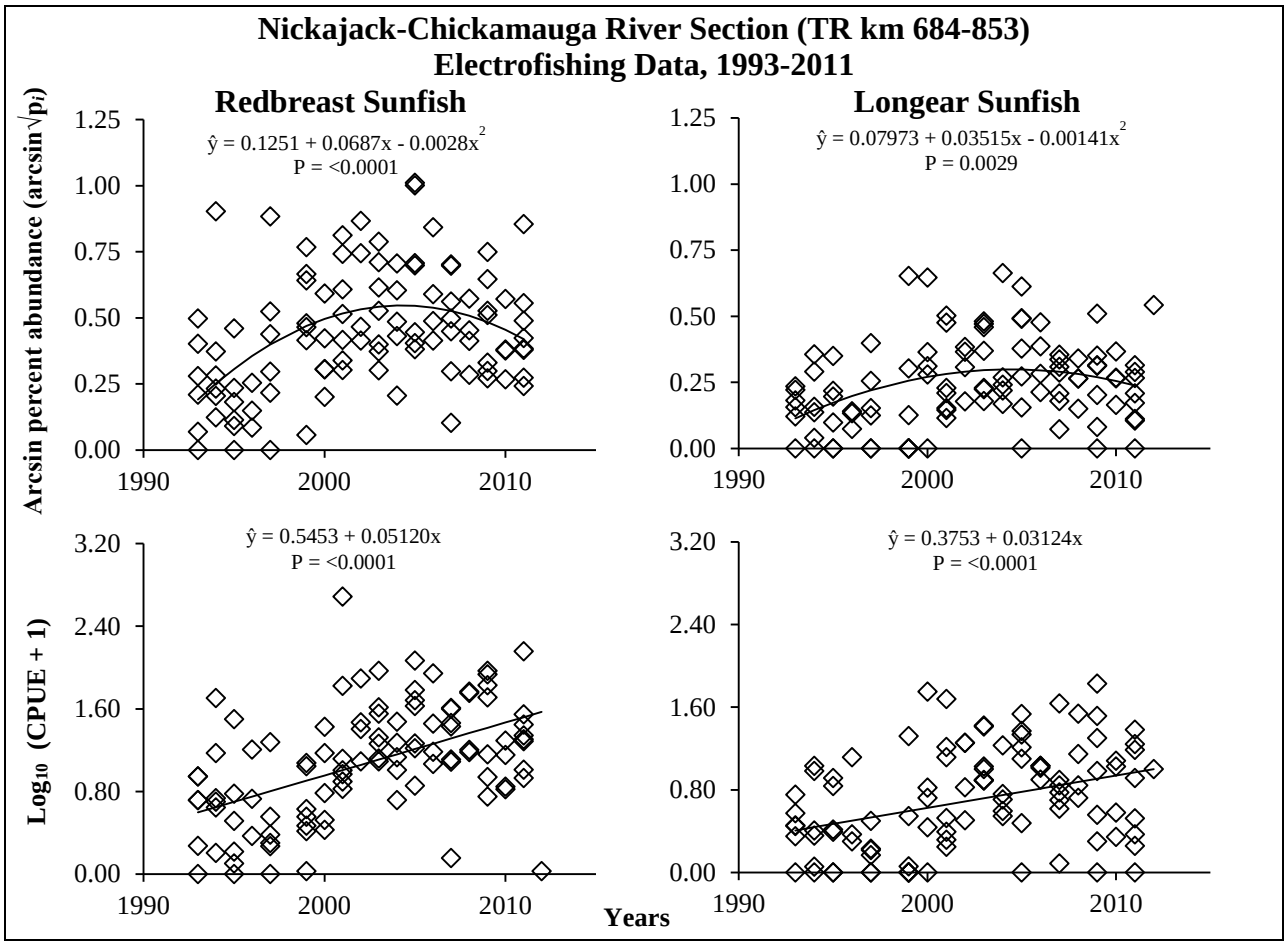


Figure 13 Arcsine-transformed percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes) and log-transformed density [$\log_{10}$(CPUE + 1)] of *Lepomis auritus* (Redbreast Sunfish) and *L. megalotis* (Longear Sunfish) in electrofishing samples (1993-2011) from Nickajack-Chickamauga section of the Tennessee River; predicted curves are based on mixed-model regression analysis ($P \leq 0.05$, with Bonferroni adjustment).

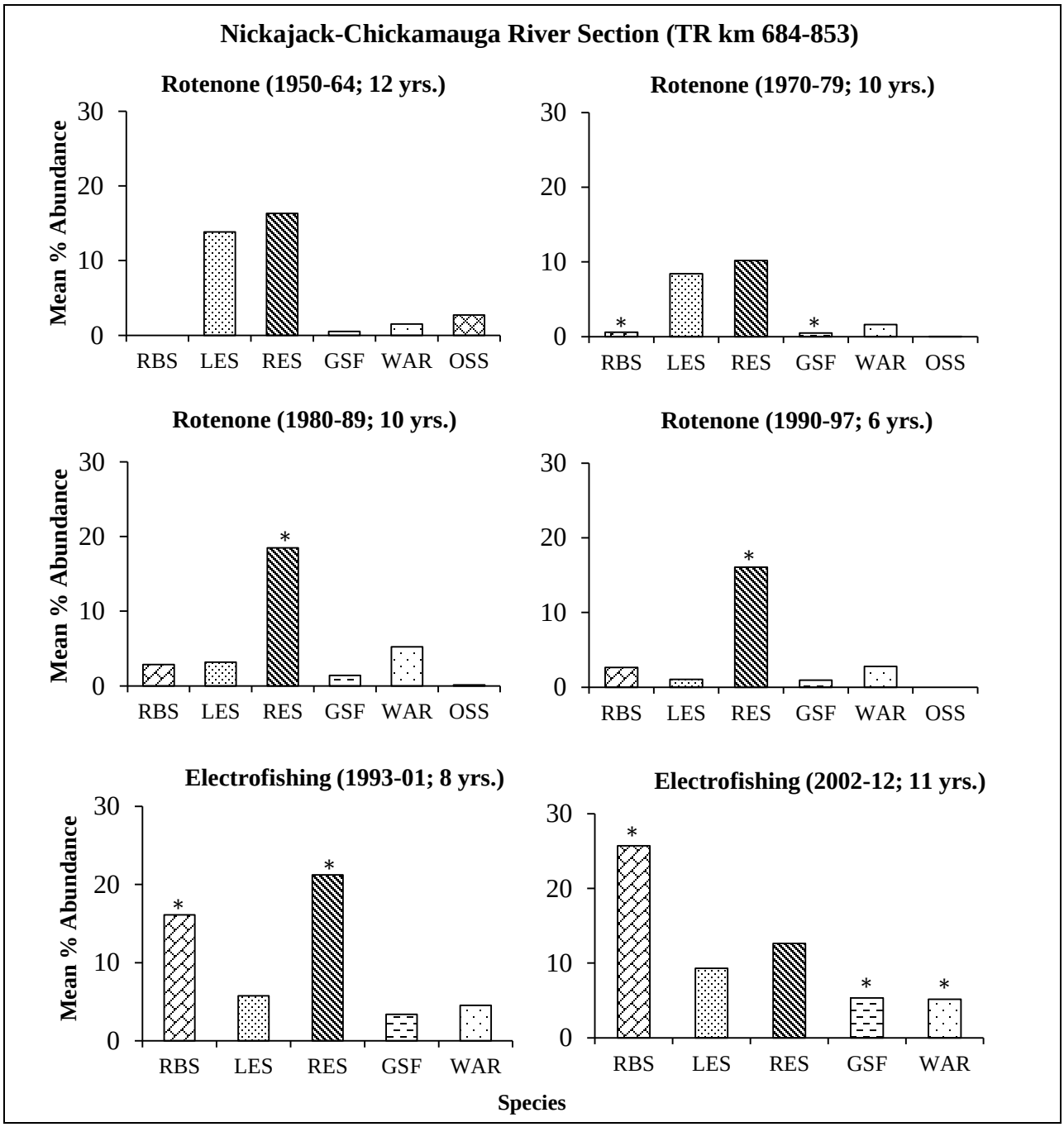


Figure 14 Sunfish species composition (% of total number of *Lepomis* spp.) in Nickajack-Chickamauga River section during successive time periods (n = 10-12 years) of rotenone (1949-82) and electrofishing (1993-2011) TVA datasets. Repeated-measures ANOVA and Dunnett's test (*$P \leq 0.05$) compared mean arcsin % abundance of *L. megalotis* with other congeneric sunfishes. Asterisks indicate that means were different from *L. megalotis*. *L. macrochirus* (BLG) was the dominant species (mean % abundances ranging 41.8-73.2) but is not presented in the figure in order to enhance comparisons between other congeneric sunfishes.

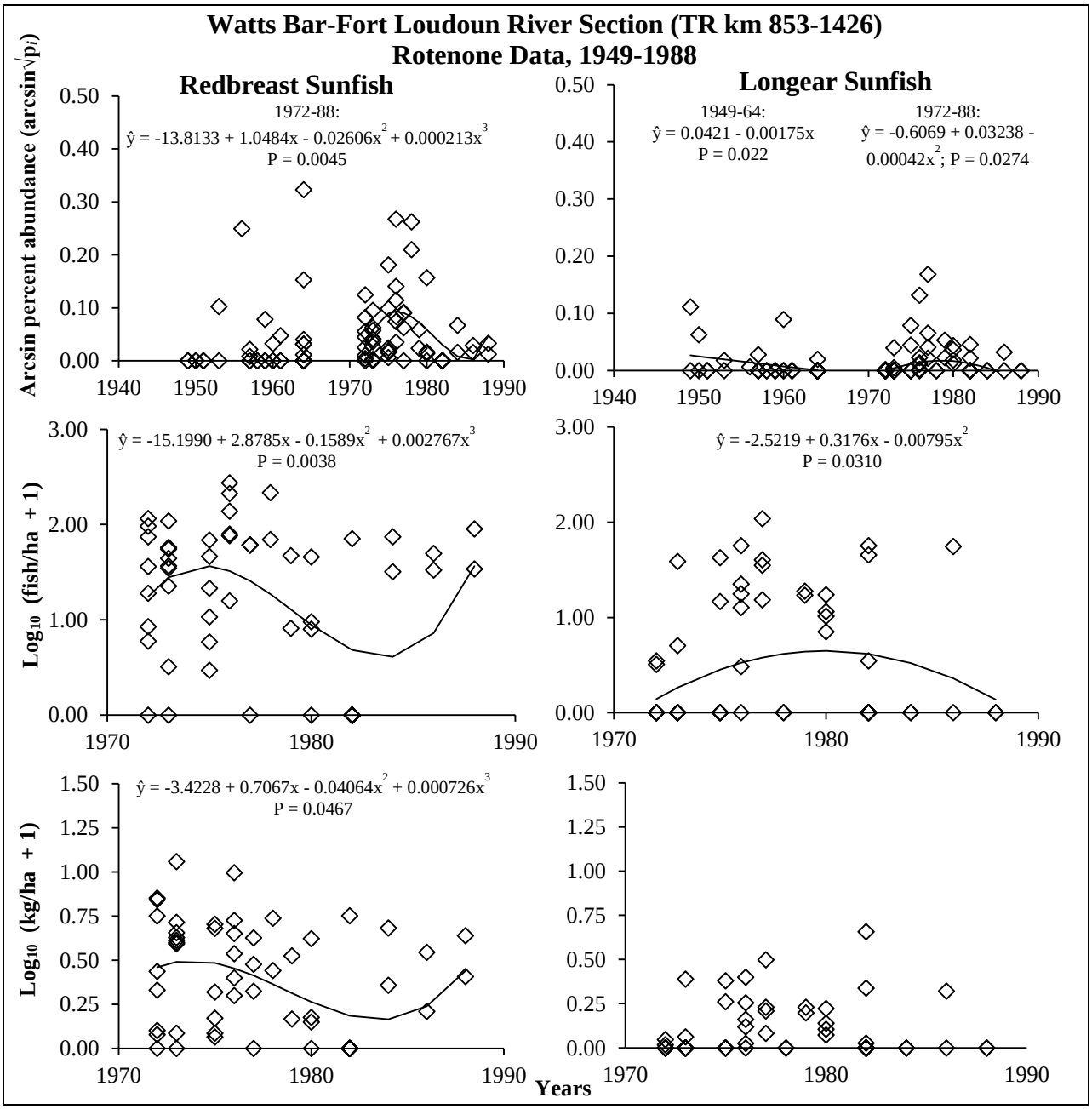


Figure 15 Arcsine-transformed percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes) and log-transformed density [$\log_{10}$(fish/ha + 1), $\log_{10}$(kg/ha + 1)] of *Lepomis auritus* (Redbreast Sunfish) and *L. megalotis* (Longear Sunfish) in rotenone samples (1949-1993) from Watts Bar-Fort Loudoun section of the Tennessee River; predicted curves are based on mixed-model regression analysis ($P \leq 0.05$, with Bonferroni adjustment).

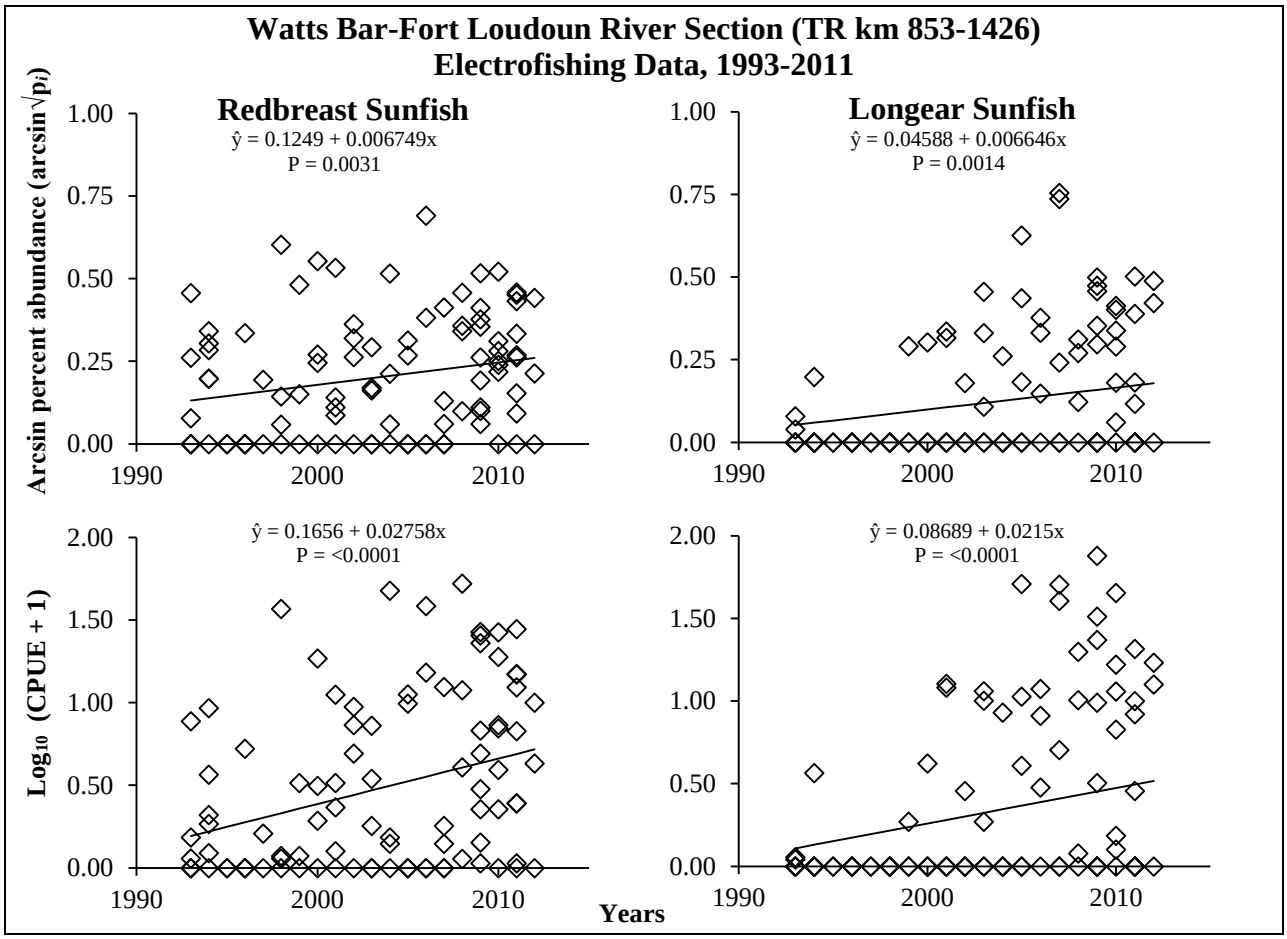


Figure 16 Arcsine-transformed percent abundance (arcsin square root of species proportion [p_i], where p_i = number of individuals of a species / total number of individuals of all *Lepomis* sunfishes) and log-transformed density [$\log_{10}$(CPUE + 1)] of *Lepomis auritus* (Redbreast Sunfish) and *L. megalotis* (Longear Sunfish) in electrofishing samples (1993-2011) from Watts Bar-Fort Loudoun section of the Tennessee River; predicted curves are based on mixed-model regression analysis ($P \leq 0.05$, with Bonferroni adjustment).

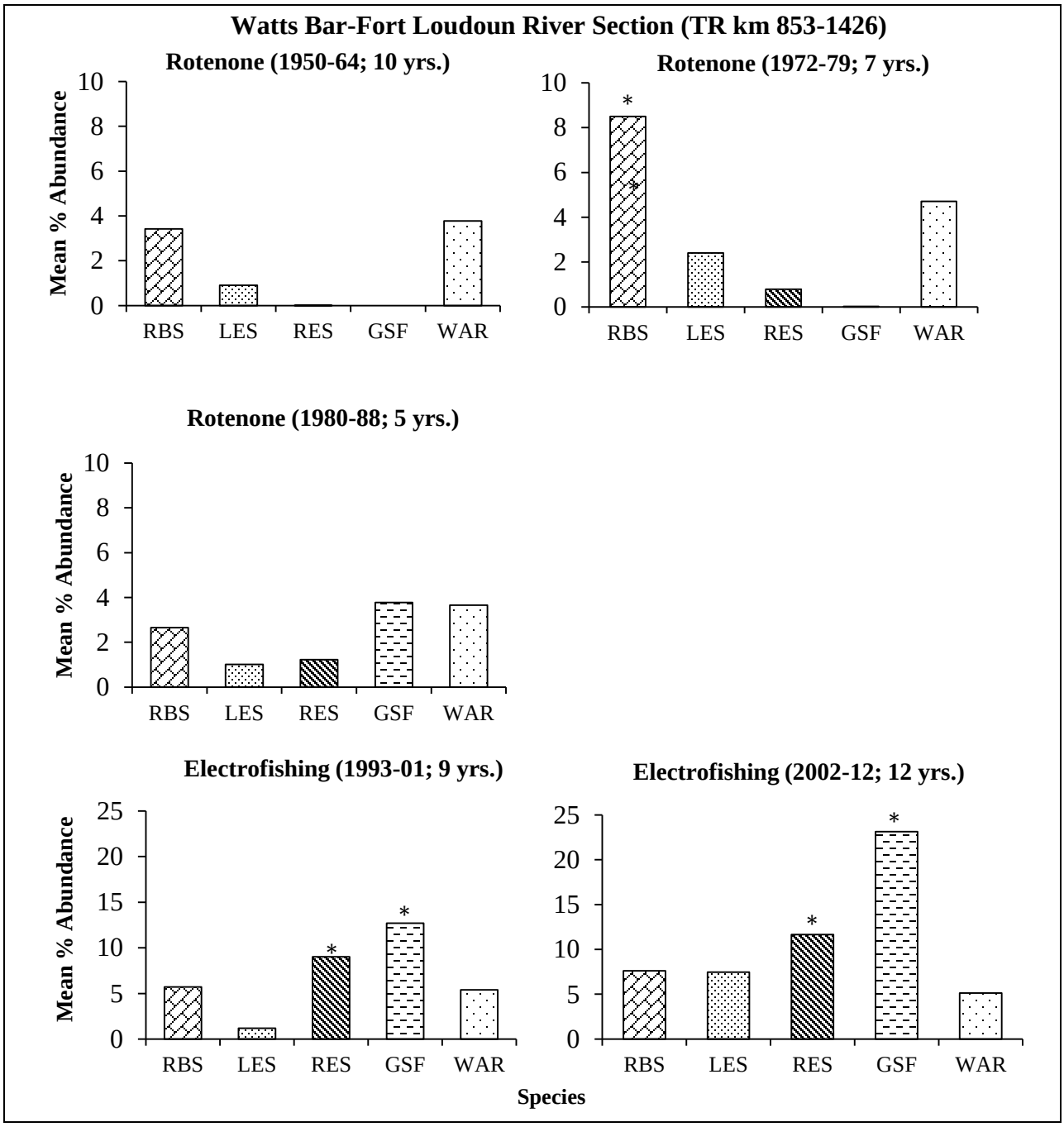


Figure 17 Sunfish species composition (% of total number of *Lepomis* spp.) in Watts Bar-Fort Loudoun River section during successive time periods (n = 5-10 years) of rotenone (1949-88) and electrofishing (1993-2011) TVA datasets. Repeated-measures ANOVA and Dunnett's test (*P ≤ 0.05) compared mean arcsin % abundance of *L. megalotis* with other congeneric sunfishes. Asterisks indicate that means were different from *L. megalotis*. *L. macrochirus* (BLG) was the dominant species (mean % abundances ranging 45.0-85.7) but is not presented in the figure in order to enhance comparisons between other congeneric sunfishes.

APPENDICES

APPENDIX A

YEARS OF REDBREAST SUNFISH (*L. AURITUS*) OCCURRENCE IN THE TENNESSEE RIVER DRAINAGE MAINSTEM AND TRIBUTARY RESERVOIRS

Appendix A.1 Years of Redbreast Sunfish (*L. auritus*) occurrence in the Tennessee River drainage mainstem and tributary reservoirs; fish assemblage data collected by TVA cove-rotenone (1947-1997) and electrofishing (1993-2012) surveys[a].

Reservoir (River impounded)	Years present (First, last years detected)	(Total years) Years sampled
	Cove-rotenone Samples	
Kentucky (Tennessee River)	Not present	(22) 1949-61, 1963, 1974-82
Redbud (Dry Creek)	Not present	(2) 1980, 1984
Sycamore (Dry Branch Creek)	Not present	(1) 1980
Cedar (Haley Creek)	Not present	(1) 1980
Pine (Piney Creek)	2 (1980, 1984)	(2) 1980, 1984
Pin Oak (Browns Creek)	Not present	(1) 1980
Dogwood (Big Creek)	Not present	(1) 1980
Beech (Beech Creek)	Not present	(1) 1980
Normandy (Duck River)	Not present	(5) 1976-79, 1983
Pickwick (Tennessee River)	Not present	(23) 1949-62, 1971, 1974-80, 1987
Little Bear Creek (Little Bear Creek)	Not present	(4) 1976-1979
Cedar Creek (Cedar Creek)	Not present	(2) 1979, 1984
Bear Creek (Bear Creek)	Not present	(7) 1974, 1976-81
Upper Bear Creek (Bear Creek)	Not present	(1) 1979
Wilson (Tennessee River)	1 (1950)	(15) 1949-60, 1962, 1976-77, 1983
Wheeler (Tennessee River)	3 (1950, 1995)	(42) 1949-61, 1969-97
Tims Ford (Elk River)	Not present	(3) 1974, 1976, 1984
Guntersville (Tennessee River)	6 (1950,1993)	(31) 1949-61, 1971-72, 1974-77, 1979-86, 1988, 1990-93
Hales Bar (Tennessee River)[b]	Not present	(7) 1949-51, 1953, 1958, 1960, 1964
Nickajack (Tennessee River)	5 (1972, 1981)	(5) 1972, 1977, 1979-81
Chickamauga (Tennessee River)	17 (1976, 1997)	(36) 1947, 1949-52, 1954-59, 1970-93, 1995, 1997

Appendix A.1 Continued.

Reservoir (River impounded)	Years present (First, last years detected)	(Total Years) Years sampled
Parksville (Ocoee River)	Not present	(6) 1951-54, 1959, 1970
Nottely (Nottely River)	7 (1958, 1970)	(7) 1958, 1961, 1964-67, 1970
Blue Ridge (Toccoa River)	1 (1962)	(4) 1958, 1961-63
Apalachia (Hiwassee River)	1 (1983)	(5) 1952, 1958-59, 1965, 1983
Chatuge (Hiwassee River)	5 (1953, 1980)	(7) 1953-54, 1957-58, 1965, 1973, 1980
Watts Bar (Tennessee River)	11 (1957, 1986)	(17) 1949-51, 1953, 1957-60, 1964, 1973, 1975-80, 1986
Santeetlah (Cheoah River)	Not present	(8) 1949-51, 1957-59, 1963, 1965
Thorpe (West Fork Tuckasegee River)	1 (1952)	(5) 1952, 1957-59, 1965
Nantahala (Nantahala River)	Not present	(1) 1952
Melton Hill (Clinch River)	10 (1964, 1987)	(11) 1964, 1972, 1974-80, 1982, 1987
Norris (Clinch River)	5 (1957, 1991)	(35) 1949-61, 1963, 1969-70, 1975-84, 1986-94
Tellico (Little Tennessee River)	7 (1980, 1992)	(7) 1980-82, 1984-85, 1989, 1992
Cheoah (Little Tennessee River)	Not present	(3) 1952, 1955, 1965
Fontana (Little Tennessee River)	1 (1964)	(11) 1949-52, 1954-56, 1962, 1964, 1979, 1984
Fort Loudon (Tennessee River)	10 (1953, 1988)	(13) 1949-51, 1953, 1956-59, 1961, 1972, 1982, 1984, 1988
Douglas (French Broad River)	4 (1952, 1986)	(19) 1949-52, 1954-59, 1961, 1964, 1973, 1983, 1986-87, 1989-91
Watauga (Watauga River)	1 (1988)	(22) 1949-52, 1954-59, 1961, 1971-73, 1979-84, 1988, 1991
Fort Patrick Henry (South Fork Holston River)	2 (1956, 1960)	(5) 1954-56, 1960, 1985
Boone (South Fork Holston River)	7 (1959, 1994)	(14) 1953, 1955-56, 1959, 1961-62, 1982-83, 1987-91, 1994
South Holston (S. F. Holston River)	2 (1960, 1990)	(17) 1951, 1953, 1955-60, 1962, 1972, 1977-79, 1985-86, 1990, 1993
Cherokee (Holston River)	25 (1956, 1993)	(32) 1949-51, 1953-60, 1963, 1972-89, 1991, 1993
	Electrofishing Samples	
Kentucky (Tennessee River)	4 (2003, 2011)	(12) 1993-95, 1996-97, 1999, 2001, 2003, 2005, 2007, 2009-11
Beech (Beech Creek)	Not present	(10) 1994-96, 1998, 2000, 2002, 2004, 2006, 2008, 2010
Normandy (Duck River)	1 (1993)	(11) 1993-96, 1998, 2000, 2002, 2004, 2006, 2008, 2010
Pickwick (Tennessee River)	8 (2001, 2011)	(16) 1993-94, 1996, 1998, 2000-11
Little Bear Creek (Little Bear Creek)	1 (1993)	(12) 1993-97, 1999, 2001, 2003, 2005, 2007, 2009, 2011
Cedar Creek (Cedar Creek)	Not present	(11) 1993, 1995-97, 1999, 2001, 2003, 2005, 2007, 2009, 2011
Bear Creek (Bear Creek)	1 (1999)	(12) 1993-99, 2001, 2003, 2005, 2007 ,2009, 2011

Appendix A.1 Continued.

Reservoir (River impounded)	Years present (First, last years detected)	(Total Years) Years sampled
Wilson (Tennessee River)	3 (1996, 2010)	(10) 1993-94, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010
Wheeler (Tennessee River)	13 (1993, 2011)	(17) 1993-95, 1997, 1999-11
Tims Ford (Elk River)	1 (1993)	(11) 1993-96, 1998, 2000, 2002, 2004, 2006, 2008, 2010
Guntersville (Tennessee River)	14 (1993, 2011)	(15) 1993-94, 1996, 1998, 2000-02, 2004-11
Nickajack (Tennessee River)	11 (1993, 2011)	(11) 1993-95, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011
Chickamauga (Tennessee River)	19 (1993, 2012)	(19) 1993-97, 1999-12
Nottely (Nottely River)	12 (1993, 2011)	(12) 1993-95, 1997, 1999, 2001-03, 2005, 2007, 2009, 2011
Blue Ridge (Toccoa River)	11 (1993, 2011)	(11) 1993-95, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011
Apalachia (Hiwassee River)	10 (1996, 2010)	(10) 1996-00, 2002, 2004, 2006, 2008, 2010
Hiwassee (Hiwassee River)	9 (1993, 2010)	(10) 1993-94, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010
Chatuge (Hiwassee River)	15 (1993, 2010)	(15) 1993-94, 1996, 1998-08, 2010
Watts Bar (Tennessee River)	18 (1993, 2012)	(18) 1993-94, 1996, 1998-12
Melton Hill (Clinch River)	15 (1993, 2011)	(15) 1993-94, 1996, 1998, 2000-11
Norris (Clinch River)	2 (1993, 2011)	(10) 1993-95, 1999, 2001, 2003, 2005, 2007, 2009, 2011
Tellico (Little Tennessee River)	12 (1993, 2011)	(12) 1993-95, 1997, 1999, 2001, 2003-05, 2007, 2009, 2011
Fontana (Little Tennessee River)	Not Present	(11) 1993-96, 1998, 2000, 2002, 2004, 2006, 2008, 2010
Fort Loudoun (Tennessee River)	8 (1994, 2011)	(11) 1993-95, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011
Douglas (French Broad River)	8 (1994, 2011)	(11) 1993-95, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011
Watauga (Watauga River)	2 (1993, 2010)	(9) 1993-94, 1996, 2000, 2002, 2004, 2006, 2008, 2010
Fort Patrick Henry (South Fork Holston River)	1 (1993)	(12) 1993-97, 1999, 2001, 2003, 2005, 2007, 2009, 2011
Boone (South Fork Holston River)	3 (1993, 2011)	(11) 1993-95, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011
South Holston (South Fork Holston River)	Not Present	(9) 1993-94, 1996, 2000, 2002, 2004, 2006, 2008, 2010
Cherokee (Holston River)	3 (1993, 2010)	(9) 1993, 1995, 1996, 2000, 2002, 2004, 2006, 2008, 2010

[a]The young-of-year age class was not included in this assessment.
[b] dam dismantled in 1967.

Appendix A.2 Years of Redbreast Sunfish (*L. auritus*) occurrence from TVA cove-rotenone (1947-1997) and electrofishing (1993-2012) surveys in the nine mainstem reservoirs of the Tennessee River drainage (TRD). Mainstems include data from corresponding tributary reservoirs.

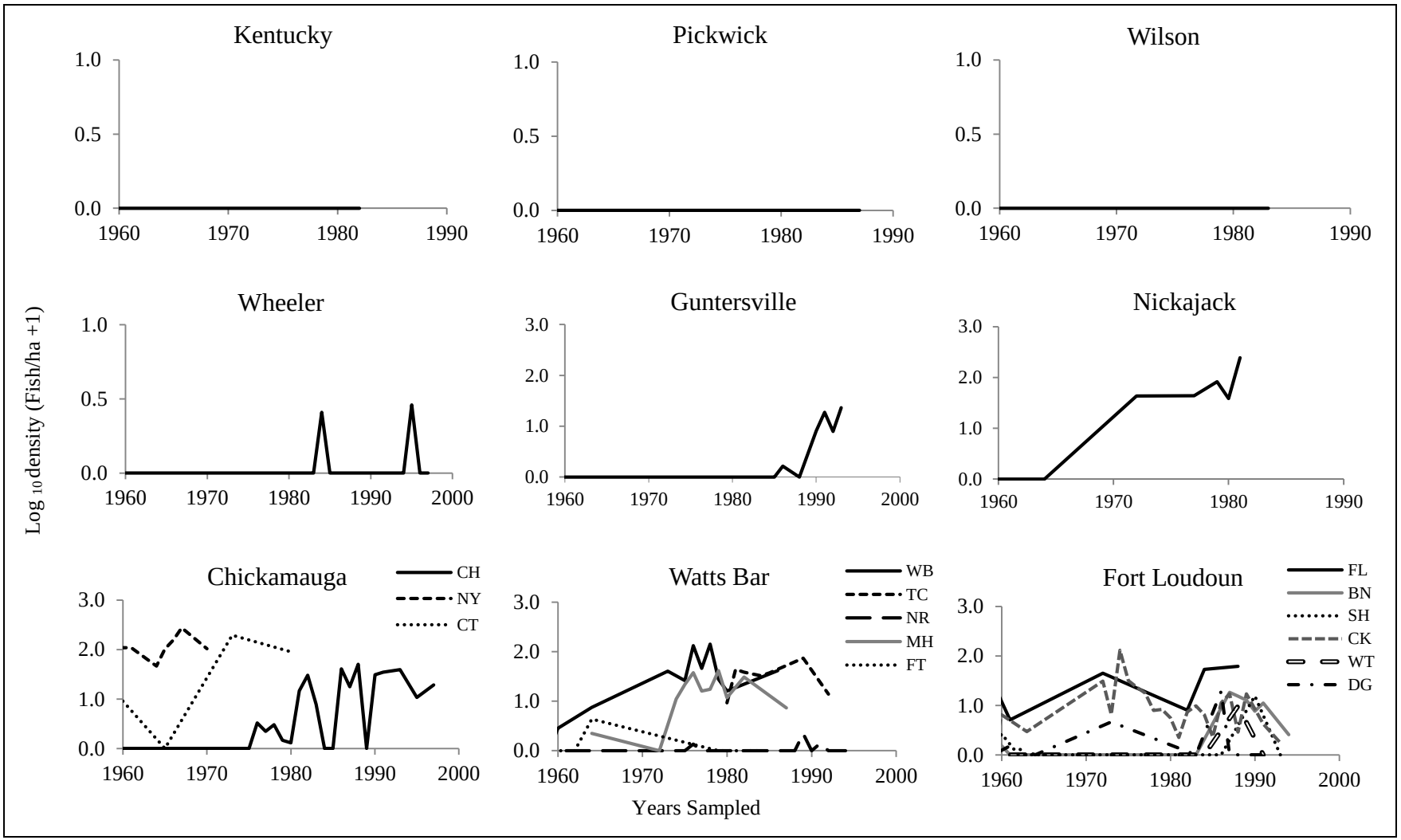
	Mainstem reservoirs								
Year	Kentucky (36.0)[a]	Pickwick (332.7)[a]	Wilson (417.5)[a]	Wheeler (442.4)[a]	Guntersville (561.6)[a]	Nickajack (683.5)[a]	Chickamauga (758.0)[a]	Watts Bar (852.8)[a]	Fort Loudoun (969.3)[a]
1947-49									
1950-54			X	X	X		X	X	X
1955-59							X	X	X
1960-64							X	X	X
1965-69							X		
1970-74						X	X	X	X
1975-79						X	X	X	X
1980-84				X		X	X	X	X
1985-89					X		X	X	X
1990-94				X	X	X	X	X	X
1995-99			X	X	X	X	X	X	X
2000-05	X	X	X	X	X	X	X	X	X
2006-10	X	X	X	X	X	X	X	X	X
2011-12		X		X	X	X	X	X	X

[a] Kilometers (km) from the mouth of the Tennessee River at location of impoundment.

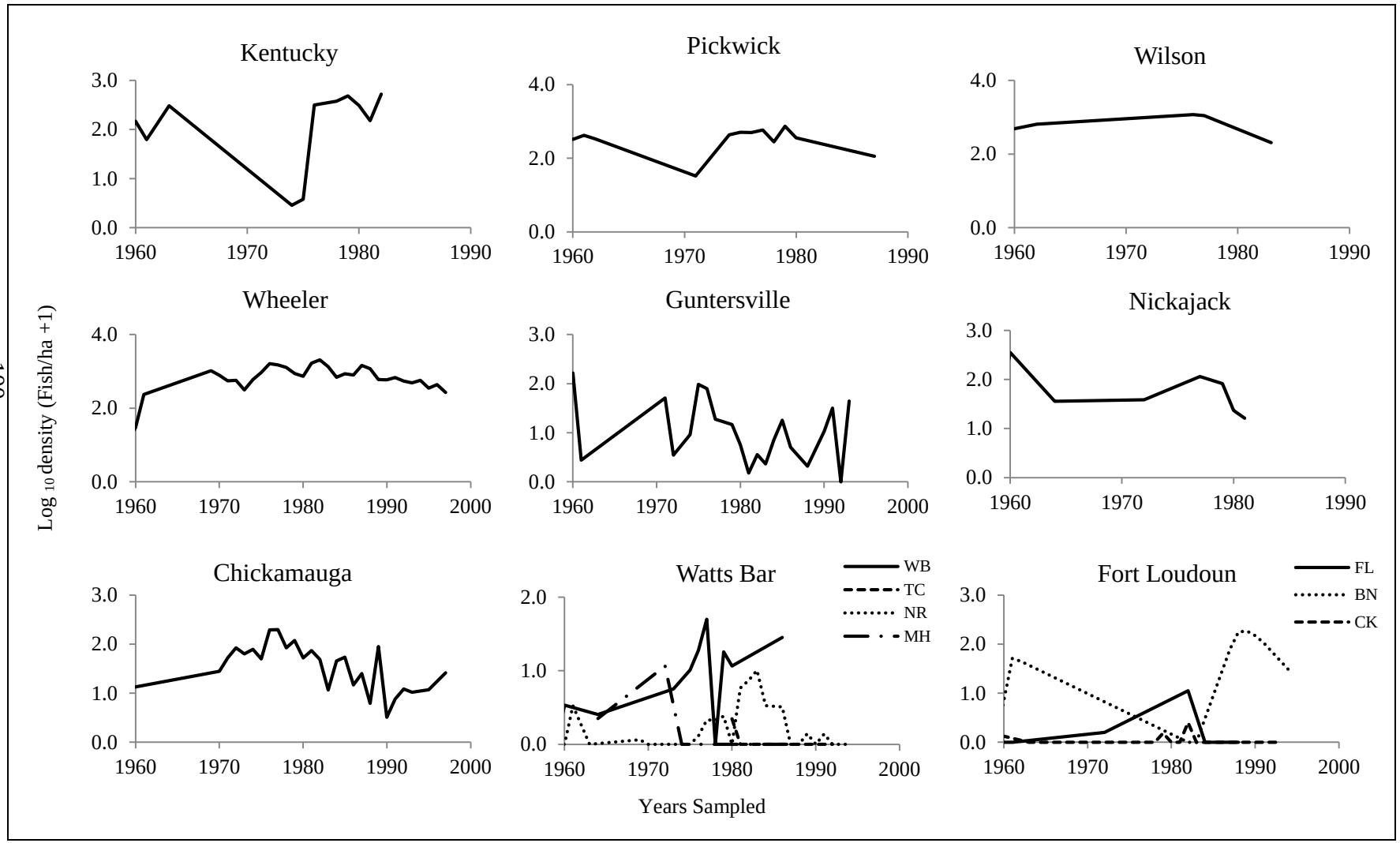
APPENDIX B

DENSITY (FISH/HA) AND BIOMASS (KG/HA) OF *LEPOMIS* SPECIES COLLECTED BY TVA COVE-ROTENONE SURVEYS (1947-1997) IN MAINSTEM AND SELECTED TRIBUTARY RESERVOIRS IN THE TENNESSEE RIVER DRAINAGE

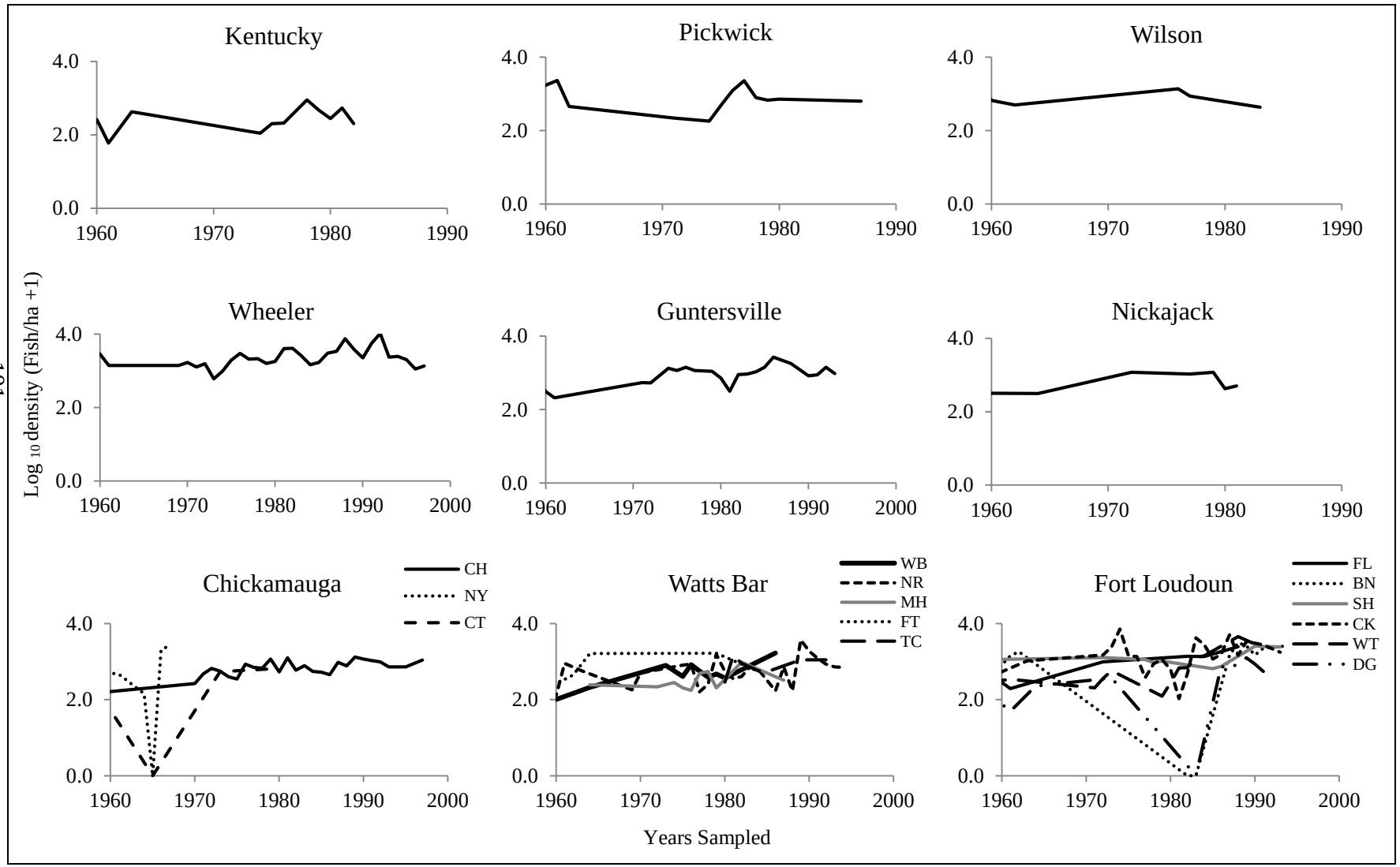
Appendix B.1 Density (fish/ha) of *L. auritus* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



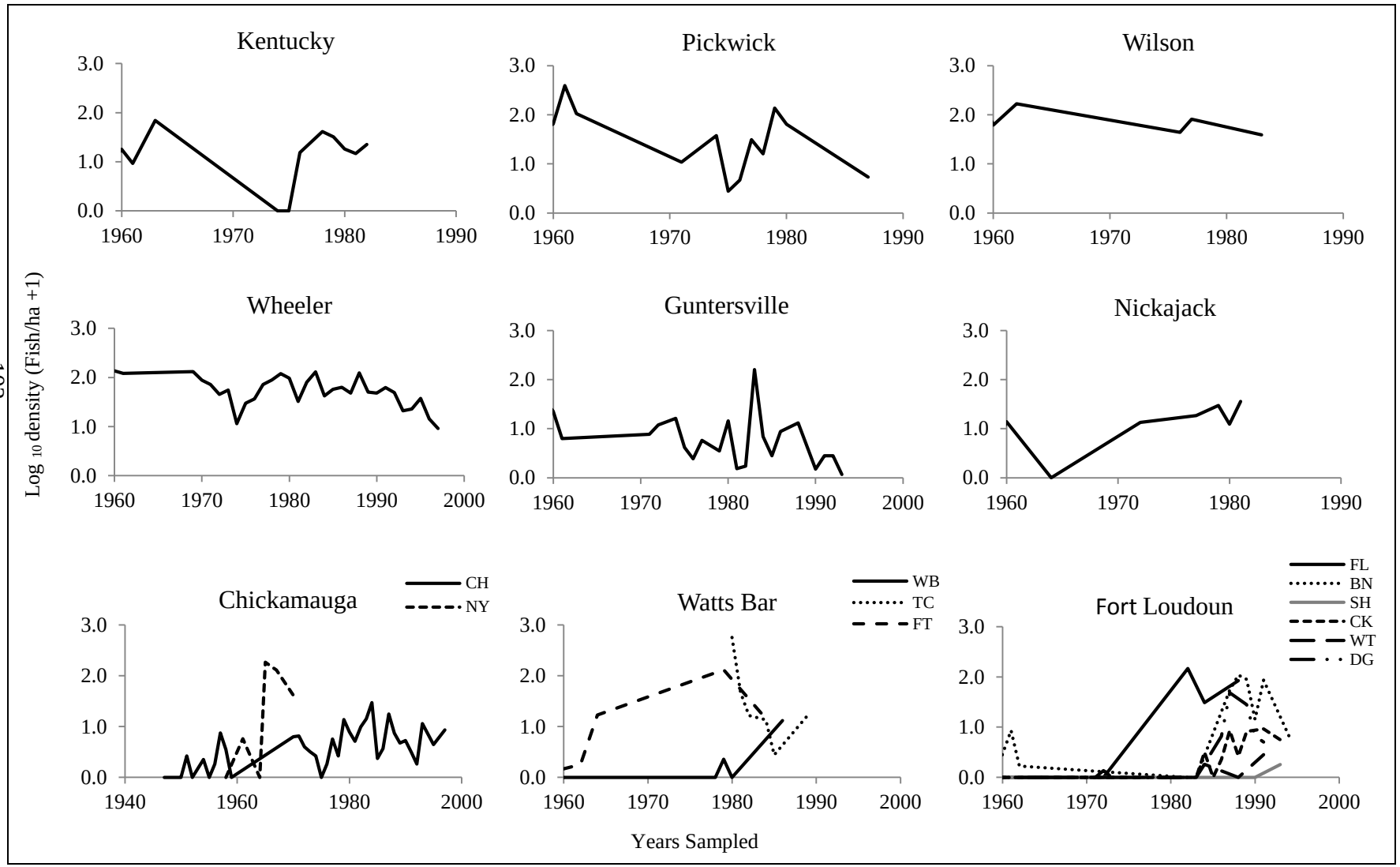
Appendix B.2 Density (fish/ha) of *L. megalotis* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



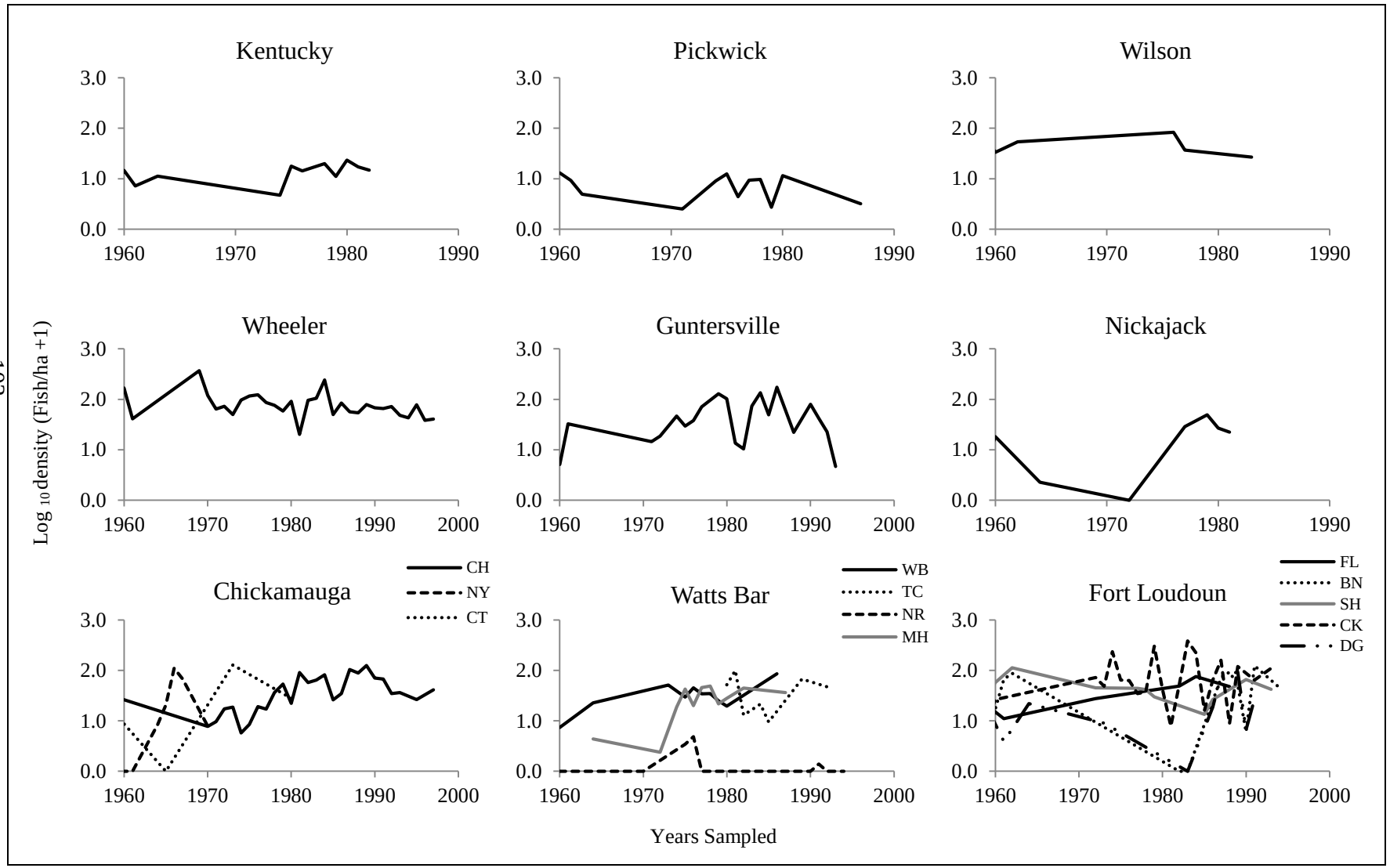
Appendix B.3 Density (fish/ha) of *L. macrochirus* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



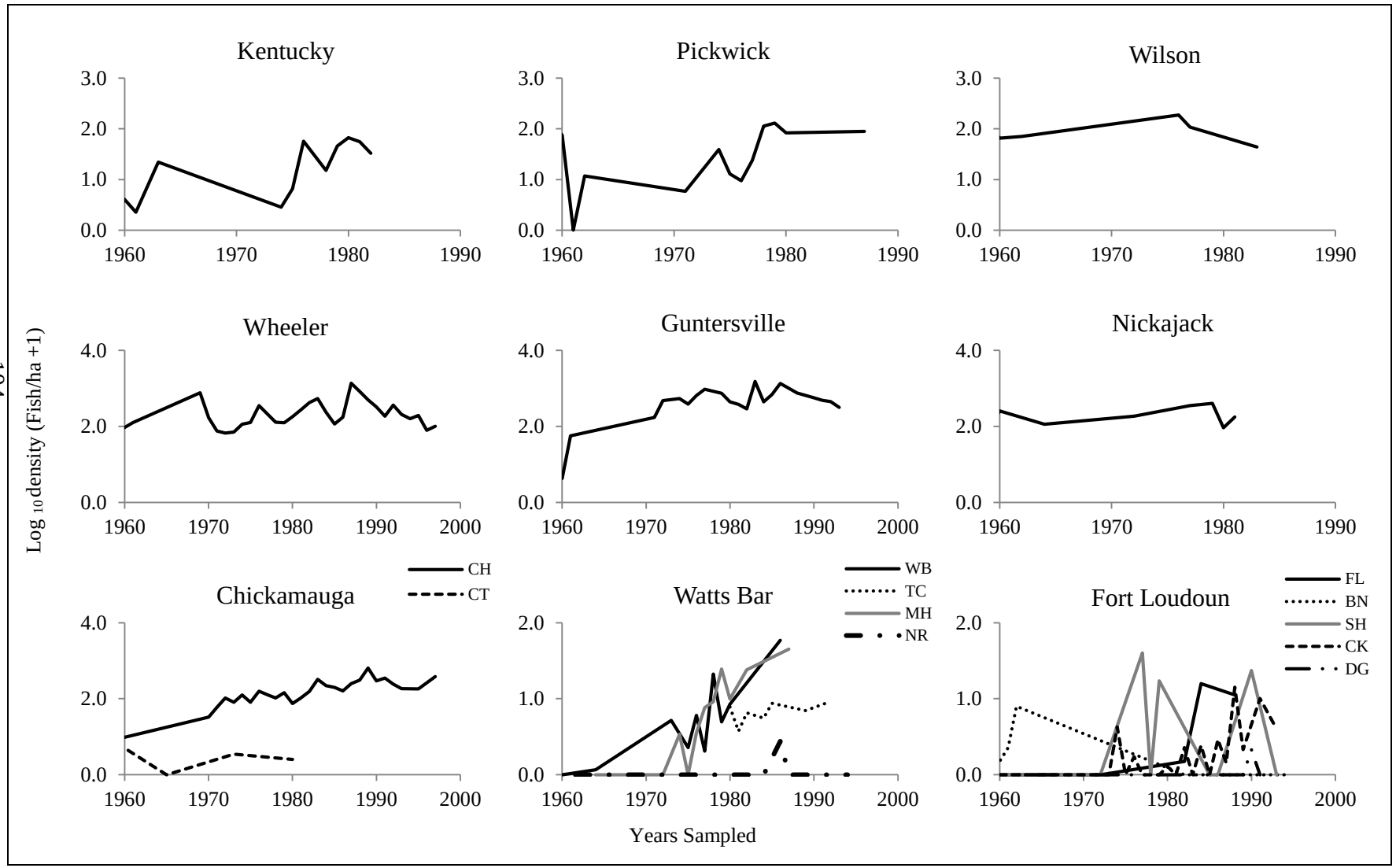
Appendix B.4 Density (fish/ha) of *L. cyanellus* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



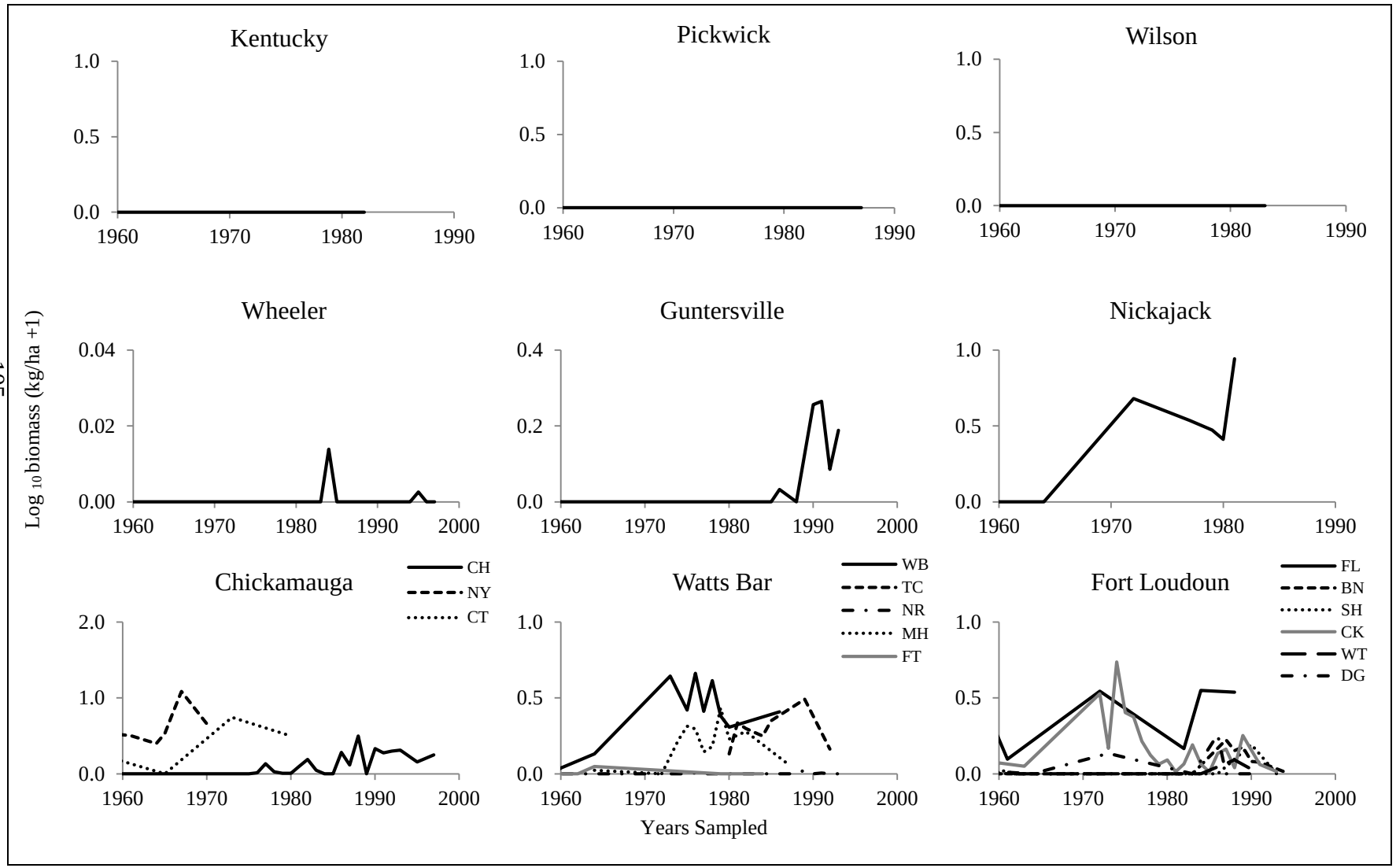
Appendix B.5 Density (fish/ha) of *L. gulosus* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



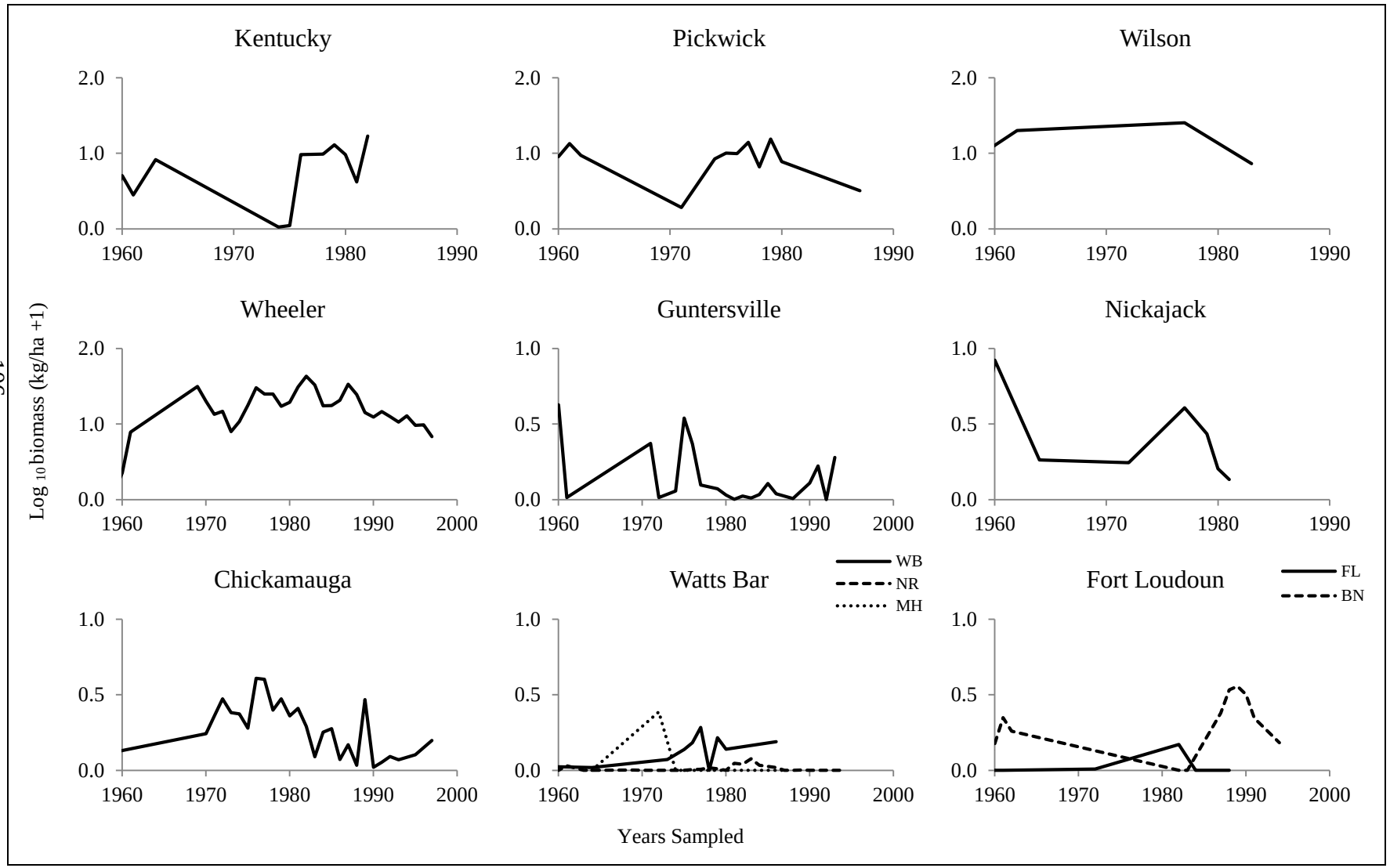
Appendix B.6 Density (fish/ha) of *L. microlophus* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



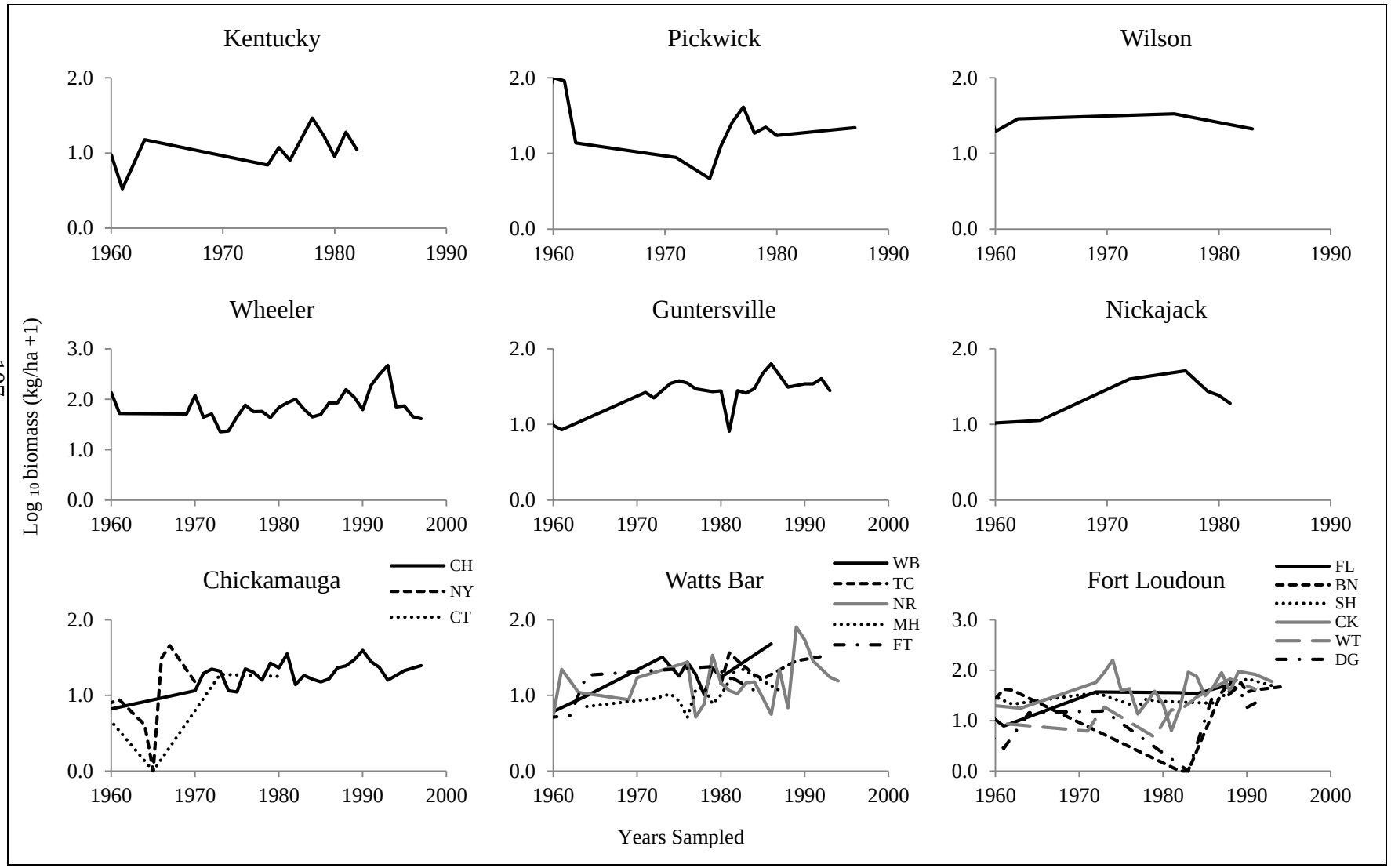
Appendix B.7 Biomass (kg/ha) of *L. auritus* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



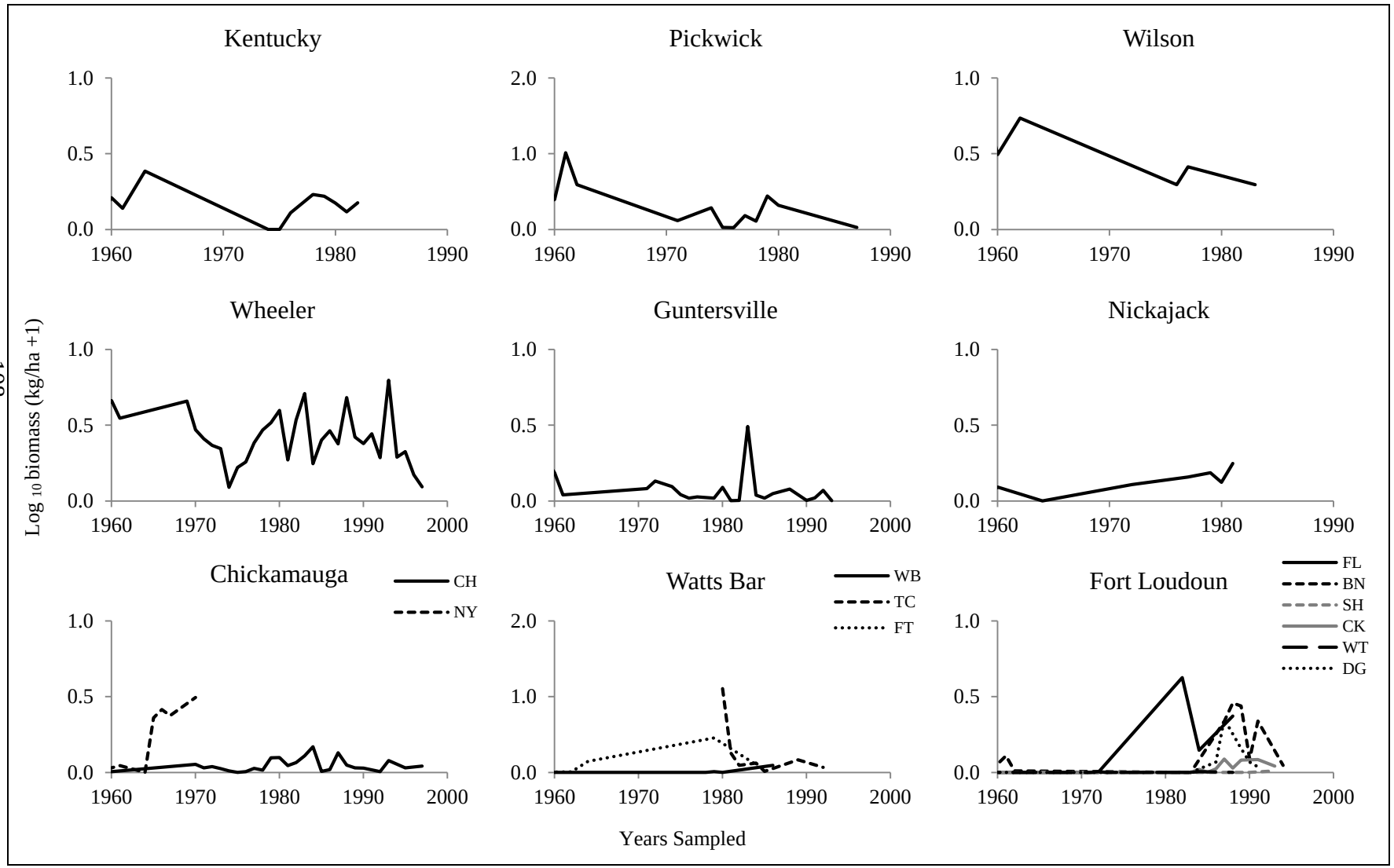
Appendix B.8 Biomass (kg/ha) of *L. megalotis* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



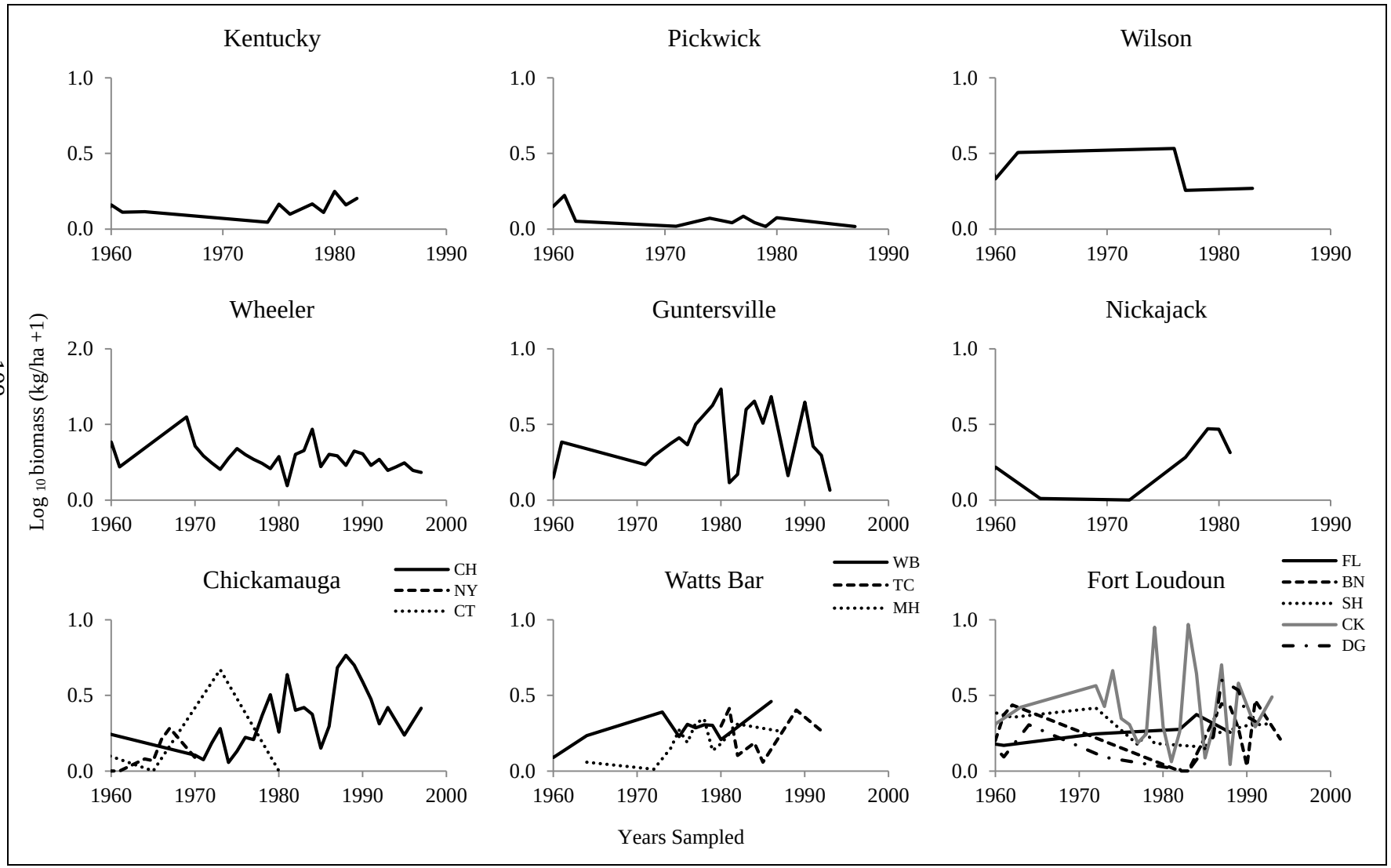
Appendix B.9 Biomass (kg/ha) of *L. macrochirus* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



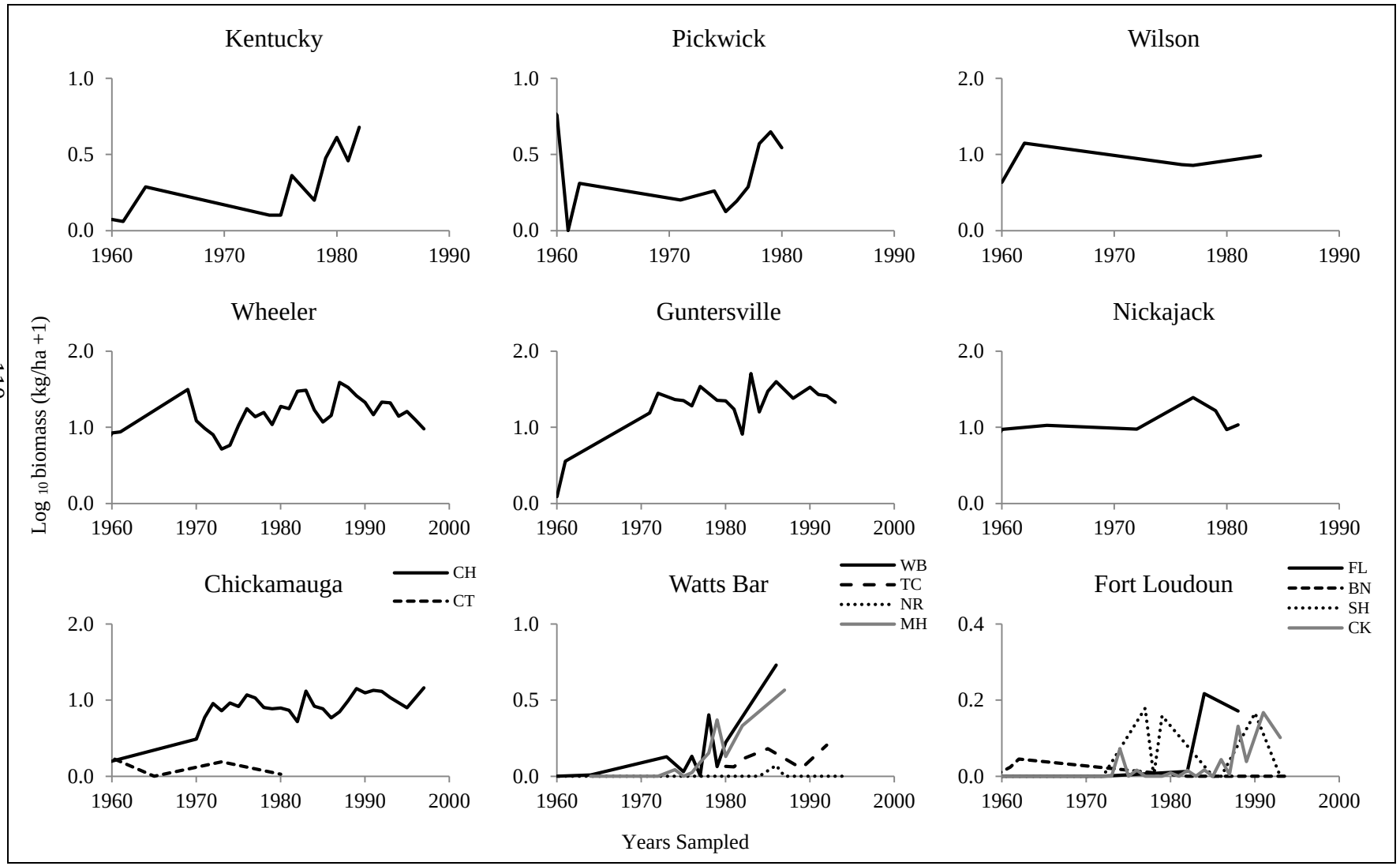
Appendix B.10 Biomass (kg/ha) of *L. cyanellus* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



Appendix B.11 Biomass (kg/ha) of *L. gulosus* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



Appendix B.12 Biomass (kg/ha) of *L. microlophus* collected by TVA cove-rotenone surveys (1960-97) in mainstem and selected tributary reservoirs in the Tennessee River drainage. Data collected during or prior to 1960 is not suitable for quantitative analysis; therefore, only data occurring after 1960 is shown.



APPENDIX C

SUMMARY STATISTICS OF POPULATION PARAMETERS FOR *LEPOMIS* SPECIES COLLECTED FROM TVA COVE-ROTENONE SAMPLES (1949-1984) AND ELECTROFISHING SAMPLES (1993-2011) IN KENTUCKY RESERVOIR AND TRIBUTARY RESERVOIRS

Appendix C.1 Summary statistics for density (fish/ha) of *Lepomis* spp. in Kentucky Reservoir and tributary reservoirs collected from TVA cove-rotenone samples (1960-1984).

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						Kentucky Reservoir						
						1960 (n=4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	17.0	±	15.4	5.0	-	38.8	0.6	±	0.7	0.2	-	1.7
Lepomis gulosus	13.7	±	11.8	2.5	-	26.7	0.4	±	0.2	0.2	-	0.7
Lepomis macrochirus	260.5	±	171.4	137.5	-	514.3	8.5	±	5.9	4.4	-	17.3
Lepomis megalotis	146.9	±	108.8	3.0	-	260.0	4.1	±	2.9	0.1	-	6.9
Lepomis microlophus	3.1	±	6.1	0.0	-	12.2	0.2	±	0.4	0.0	-	0.7
						1961 (n=4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	8.2	±	9.8	0.0	-	22.4	0.4	±	0.3	0.0	-	0.8
Lepomis gulosus	6.2	±	7.2	0.0	-	16.3	0.3	±	0.2	0.0	-	0.6
Lepomis macrochirus	58.2	±	36.8	24.5	-	110.2	2.3	±	1.2	0.8	-	3.8
Lepomis megalotis	61.0	±	58.7	0.0	-	136.7	1.8	±	1.6	0.0	-	3.6
Lepomis microlophus	1.3	±	1.9	0.0	-	4.1	0.1	±	0.2	0.0	-	0.4
						1963 (n=20)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	68.6	±	76.8	0.0	-	336.8	1.4	±	1.2	0.0	-	3.7
Lepomis gulosus	10.2	±	20.1	0.0	-	88.7	0.3	±	0.6	0.0	-	2.4
Lepomis macrochirus	426.2	±	286.2	18.9	-	1137.5	14.0	±	10.0	0.7	-	36.0
Lepomis megalotis	302.3	±	221.8	0.0	-	666.7	7.2	±	5.3	0.0	-	15.7
Lepomis microlophus	21.1	±	28.6	0.0	-	111.2	0.9	±	0.2	0.0	-	3.8
						1974 (n=1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	3.7	±	0.0	3.1	-	3.1	0.1	±	0.1	0.1	-	0.1
Lepomis macrochirus	109.3	±	0.0	109.3	-	109.3	5.9	±	5.9	5.9	-	5.9
Lepomis megalotis	1.9	±	0.0	1.9	-	1.9	0.1	±	0.1	0.1	-	0.1
Lepomis microlophus	1.9	±	0.0	1.9	-	1.9	0.3	±	0.3	0.3	-	0.3
						1975 (n=2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	16.7	±	11.8	8.3	-	25.0	0.5	±	0.5	0.1	-	0.8
Lepomis macrochirus	202.1	±	85.4	141.7	-	262.5	10.9	±	7.9	5.3	-	16.4
Lepomis megalotis	2.8	±	3.9	0.0	-	5.6	0.1	±	0.1	0.0	-	0.2
Lepomis microlophus	5.6	±	3.9	2.8	-	8.3	0.3	±	0.1	0.2	-	0.4

Appendix C.1 Continued.

Species	Fish/ha						Kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						1976 (n=8)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	14.4	±	24.1	0.0	-	64.3	0.3	±	0.6	0.0	-	1.8
Lepomis gulosus	13.3	±	22.0	0.0	-	60.7	0.3	±	0.5	0.0	-	1.4
Lepomis macrochirus	207.1	±	204.8	0.0	-	510.5	7.0	±	7.6	0.0	-	23.4
Lepomis megalotis	314.7	±	491.2	0.0	-	1400.0	8.6	±	13.0	0.0	-	36.8
Lepomis microlophus	56.3	±	115.3	0.0	-	339.3	1.3	±	1.9	0.0	-	5.7
						1978 (n=4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	40.1	±	26.2	4.5	-	65.0	0.7	±	0.5	0.0	-	1.2
Lepomis gulosus	18.9	±	12.7	3.0	-	32.0	0.5	±	0.4	0.0	-	0.9
Lepomis macrochirus	895.6	±	686.2	278.7	-	1516.0	28.2	±	9.9	14.6	-	36.8
Lepomis megalotis	376.5	±	251.7	31.3	-	623.2	8.7	±	5.7	0.8	-	13.0
Lepomis microlophus	14.1	±	10.7	6.1	-	29.9	0.6	±	0.6	0.1	-	1.5
						1979 (n=6)						
Lepomis auritus	0.0	+	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	31.2	+	35.0	0.0	-	100.0	0.7	±	0.7	0.0	-	2.0
Lepomis gulosus	10.1	+	6.9	2.8	-	19.1	0.3	±	0.2	0.1	-	0.6
Lepomis macrochirus	475.1	+	417.6	30.0	-	1192.5	16.2	±	15.6	1.7	-	45.0
Lepomis megalotis	484.1	+	574.7	158.4	-	1652.5	12.0	±	13.0	4.3	-	38.2
Lepomis microlophus	44.6	+	42.6	0.0	-	98.7	2.0	±	1.4	0.0	-	3.2
						1981 (n=5)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	13.8	±	16.0	0.0	-	33.3	0.3	±	0.4	0.0	-	0.7
Lepomis gulosus	16.0	±	35.0	0.0	-	78.6	0.4	±	1.0	0.0	-	2.2
Lepomis macrochirus	535.9	±	528.8	103.7	-	1414.3	17.9	±	2454.0	2.3	-	60.8
Lepomis megalotis	149.5	±	228.2	0.0	-	527.3	3.2	±	4.8	0.0	-	11.0
Lepomis microlophus	54.4	±	25.2	12.1	-	76.2	1.9	±	1.0	1.3	-	3.6
						1982 (n=4)						
Lepomis auritus	0.0	±		0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	21.4	±	26.2	1.4	-	58.6	0.5	±	0.6	0.0	-	1.3
Lepomis gulosus	13.8	±	12.1	0.0	-	27.3	0.6	±	0.6	0.0	-	1.3
Lepomis macrochirus	199.5	±	109.4	111.0	-	356.3	10.1	±	5.2	6.4	-	17.7
Lepomis megalotis	521.7	±	331.7	198.8	-	960.9	16.0	±	10.4	4.3	-	28.0
Lepomis microlophus	31.9	±	23.8	3.5	-	56.2	3.8	±	3.1	0.3	-	7.1
						Normandy Reservoir						
						1976 (n=2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	372.2	±	203.9	228.0	-	516.3	8.2	±	3.3	5.9	-	10.5
Lepomis gulosus	17.3	±	21.7	2.0	-	32.7	0.6	±	0.8	0.1	-	1.2

Appendix C.1 Continued.

Species	Fish/ha						Kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis macrochirus	138.6	±	34.8	114.0	-	163.3	6.8	±	1.6	5.7	-	7.9
Lepomis megalotis	276.8	±	278.9	79.6	-	474.0	6.9	±	6.9	2.0	-	11.7
Lepomis microlophus	26.1	±	25.3	8.2	-	44.0	1.8	±	1.9	0.4	-	3.2
						1977 (n=2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	84.4	±	2.4	82.8	-	86.1	2.1	±	0.0	2.1	-	2.2
Lepomis gulosus	46.8	±	51.6	10.3	-	83.3	1.7	±	2.2	0.1	-	3.2
Lepomis macrochirus	389.3	±	282.3	189.7	-	588.9	7.4	±	4.1	4.5	-	10.4
Lepomis megalotis	437.8	±	29.1	417.2	-	458.3	9.0	±	1.3	8.1	-	10.0
Lepomis microlophus	22.8	±	16.5	11.1	-	34.5	1.3	±	1.0	0.6	-	2.0
						1978 (n=4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	137.8	±	119.5	2.9	-	271.1	3.0	±	2.7	0.0	-	5.7
Lepomis gulosus	221.0	±	131.9	65.7	-	382.2	3.4	±	1.8	1.2	-	5.0
Lepomis macrochirus	4496.7	±	1655.4	2688.6	-	6438.9	68.0	±	19.5	48.5	-	94.1
Lepomis megalotis	790.5	±	280.6	385.7	-	1022.2	14.2	±	5.7	6.7	-	20.4
Lepomis microlophus	33.5	±	29.7	2.6	-	63.9	0.9	±	0.9	0.1	-	2.2
						1979 (n=4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	36.5	±	25.4	3.2	-	57.1	0.6	±	0.4	0.1	-	0.9
Lepomis gulosus	117.0	±	46.7	51.6	-	157.1	2.5	±	1.2	0.9	-	3.7
Lepomis macrochirus	1930.4	±	627.0	1112.9	-	2625.0	37.5	±	6.3	31.9	-	46.7
Lepomis megalotis	319.8	±	112.8	167.7	-	439.3	7.2	±	2.2	5.0	-	10.2
Lepomis microlophus	36.9	±	6.9	29.0	-	42.9	1.2	±	0.5	0.8	-	2.0
						1983 (n=2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	55.9	±	79.0	0.0	-	111.8	0.7	±	1.0	0.0	-	1.4
Lepomis gulosus	79.3	±	19.3	65.7	-	92.9	1.0	±	0.1	0.9	-	1.1
Lepomis macrochirus	2309.2	±	879.9	1687.1	-	2931.4	45.6	±	23.0	29.4	-	61.9
Lepomis megalotis	204.1	±	22.5	188.2	-	220.0	3.8	±	1.7	2.6	-	5.0
Lepomis microlophus	42.2	±	15.2	31.4	-	52.9	1.9	±	0.8	1.3	-	2.5
						Beech Lake Reservoir						
						1980 (n=1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	194.4	±	0.0	194.4	-	194.4	9.5	±	0.0	9.5	-	9.5
Lepomis macrochirus	861.1	±	0.0	861.1	-	861.1	58.8	±	0.0	58.8	-	58.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	50.0	±	0.0	50.0	-	50.0	6.2	±	0.0	6.2	-	6.2

Appendix C.1 Continued.

Species	Fish/ha						Kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Cedar Lake Reservoir												
1980 (n=1)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	11.1	±	0.0	11.1	-	11.1	0.1	±	0.0	0.1	-	0.1
Lepomis gulosus	94.4	±	0.0	94.4	-	94.4	6.4	±	0.0	6.4	-	6.4
Lepomis macrochirus	277.8	±	0.0	277.8	-	277.8	10.5	±	0.0	10.5	-	10.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	27.8	±	0.0	27.8	-	27.8	4.7	±	0.0	4.7	-	4.7
Dogwood Lake Reservoir												
1980 (n=1)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	57.1	±	0.0	57.1	-	57.1	0.7	±	0.0	0.7	-	0.7
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	717.9	±	0.0	717.9	-	717.9	15.4	±	0.0	15.4	-	15.4
Lepomis megalotis	60.7	±	0.0	60.7	-	60.7	2.2	±	0.0	2.2	-	2.2
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Pine Lake Reservoir												
1980 (n=1)												
Lepomis auritus	57.7	±	0.0	57.7	-	57.7	2.8	±	0.0	2.8	-	2.8
Lepomis cyanellus	96.2	±	0.0	96.2	-	96.2	4.9	±	0.0	4.9	-	4.9
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	657.7	±	0.0	657.7	-	657.7	30.1	±	0.0	30.1	-	30.1
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
1984 (n=1)												
Lepomis auritus	50.0	±	0.0	50.0	-	50.0	2.7	±	0.0	2.7	-	2.7
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	61.5	±	0.0	61.5	-	61.5	1.1	±	0.0	1.1	-	1.1
Lepomis macrochirus	476.9	±	0.0	476.9	-	476.9	19.6	±	0.0	19.6	-	19.6
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Pin Oak Lake Reservoir												
1980 (n=1)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	112.0	±	0.0	112.0	-	112.0	5.5	±	0.0	5.5	-	5.5
Lepomis gulosus	68.0	±	0.0	68.0	-	68.0	4.0	±	0.0	4.0	-	4.0
Lepomis macrochirus	512.0	±	0.0	512.0	-	512.0	22.6	±	0.0	22.6	-	22.6
Lepomis megalotis	48.0	±	0.0	48.0	-	48.0	1.4	±	0.0	1.4	-	1.4

Appendix C.1 Continued.

Species	Fish/ha						Kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis microlophus	8.0	±	0.0	8.0	-	8.0	0.6	±	0.0	0.6	-	0.6
						Redbud Lake Reservoir						
						1980 (n=1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	39.1	±	0.0	39.1	-	39.1	1.3	±	0.0	1.3	-	1.3
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	452.2	±	0.0	452.2	-	452.2	40.3	±	0.0	40.3	-	40.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1984 (n=1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	173.9	±	0.0	173.9	-	173.9	5.5	±	0.0	5.5	-	5.5
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	669.6	±	0.0	669.6	-	669.6	24.4	±	0.0	24.4	-	24.4
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						Sycamore Lake Reservoir						
						1980 (n=1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	103.1	±	0.0	103.1	-	103.1	0.8	±	0.0	0.8	-	0.8
Lepomis gulosus	634.4	±	0.0	634.4	-	634.4	11.2	±	0.0	11.2	-	11.2
Lepomis macrochirus	20987.5	±	0.0	20987.5	-	20987.5	55.2	±	0.0	55.2	-	55.2
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	15.6	±	0.0	15.6	-	15.6	3.3	±	0.0	3.3	-	3.3

Appendix C.2 Percent abundance of *Lepomis* spp. in Kentucky reservoir and tributary reservoirs collected from TVA cove-rotenone samples (1949-1984).

Year	Percent Abundance						
	Lepomis auritus	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
				Kentucky Reservoir			
1949	0.0	2.9	1.4	69.9	20.2	0.1	694
1950	0.0	5.6	2.8	50.1	31.0	0.0	503
1951	0.0	1.6	2.5	68.8	25.8	0.0	690
1952	0.0	5.6	1.1	77.5	9.1	0.7	285
1953	0.0	6.7	2.2	61.6	28.9	0.0	596
1954	0.0	3.2	0.3	86.8	8.1	0.0	1155
1955	0.0	3.5	1.2	83.7	4.9	0.1	822
1956	0.0	1.9	1.0	70.0	24.8	0.5	210
1957	0.0	4.5	3.8	72.5	16.8	0.7	291
1958	0.0	6.3	1.3	75.7	14.1	0.5	559
1959	0.0	5.6	3.8	48.1	34.2	0.4	266
1960	0.0	4.3	4.2	61.3	26.7	0.6	950
1961	0.0	5.7	5.3	47.3	40.6	1.1	283
1963	0.0	8.3	1.3	53.0	34.2	2.4	10168
1974	0.0	0.0	3.2	93.7	1.6	1.6	63
1975	0.0	0.0	6.9	87.0	1.5	2.3	131
1976	0.0	2.3	2.3	35.1	50.7	9.4	6181
1978	0.0	2.0	1.3	64.5	24.6	0.6	1372
1979	0.0	2.8	1.0	43.4	41.0	4.8	2912
1980	0.0	1.9	2.7	38.8	31.9	9.4	3218
1981	0.0	1.4	1.9	61.1	14.6	7.3	1829
1982	0.0	2.9	1.7	24.5	64.4	3.6	3329
				Normandy Reservoir			
1976	0.0	44.6	2.1	16.6	33.5	3.2	823
1977	0.0	8.4	5.0	40.8	43.7	2.1	655
1978	0.0	2.4	4.1	78.8	14.1	0.6	8737
1979	0.0	1.5	4.7	79.6	12.8	1.5	3366
1983	0.0	3.2	3.4	82.2	7.9	1.9	2993
				Beech Reservoir			
1980	0.0	0.0	17.6	77.9	0.0	4.5	597
				Cedar Lake Reservoir			
1980	0.0	2.7	23.0	67.6	0.0	6.8	74

Appendix C.2 Continued.

Year	*Lepomis auritus*	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
			Percent Abundance				
			Dogwood Lake Reservoir				
1980	0.0	6.8	0.0	85.9	7.3	0.0	234
			Pine Lake Reservoir				
1980	7.1	11.8	0.0	81.0	0.0	0.0	211
1984	8.5	0.0	10.5	81.0	0.0	0.0	153
			Pin Oak Lake Reservoir				
1980	0.0	15.0	9.1	68.4	6.4	1.1	187
			Redbud Lake Reservoir				
1980	0.0	8.0	0.0	92.0	0.0	0.0	113
1984	0.0	20.6	0.0	79.4	0.0	0.0	194
			Sycamore Lake Reservoir				
1980	0.0	0.5	2.9	96.5	0.0	0.1	6957

Appendix C.3 Summary statistics for relative density (CPUE) of *Lepomis* spp. collected from TVA electrofishing samples (1993-2011) in Kentucky Reservoir and tributary reservoirs in the Tennessee River drainage.

Species	Mean	± SD	Min - Max	% Abundance
Kentucky Reservoir				
1993 (n = 4)				
Lepomis auritus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis gulosus	0.41	± 0.69	0.00 - 1.43	4.29
Lepomis macrochirus	2.61	± 2.39	1.00 - 6.10	42.20
Lepomis megalotis	1.92	± 1.74	0.72 - 4.49	35.44
Lepomis microlophus	0.86	± 0.12	0.69 - 0.94	18.07
1994 (n = 3)				
Lepomis auritus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.05	± 0.09	0.00 - 0.15	0.38
Lepomis gulosus	0.02	± 0.03	0.00 - 0.06	0.17
Lepomis macrochirus	3.10	± 1.26	1.65 - 3.89	47.38
Lepomis megalotis	3.36	± 2.08	1.04 - 5.03	42.99
Lepomis microlophus	0.67	± 0.37	0.28 - 1.03	9.08
1995 (n = 4)				
Lepomis auritus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis gulosus	0.00	± 0.01	0.00 - 0.01	0.16
Lepomis macrochirus	1.27	± 0.41	0.92 - 1.82	53.60
Lepomis megalotis	0.66	± 0.24	0.32 - 0.87	28.00
Lepomis microlophus	0.43	± 0.34	0.07 - 0.83	18.24
1997 (n = 4)				
Lepomis auritus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.01	± 0.01	0.00 - 0.02	1.03
Lepomis gulosus	0.07	± 0.08	0.00 - 0.15	1.10
Lepomis macrochirus	0.93	± 0.41	0.40 - 1.38	33.44
Lepomis megalotis	2.49	± 1.29	0.75 - 3.56	46.54
Lepomis microlophus	0.78	± 0.19	0.53 - 0.97	17.90
1999 (n = 4)				
Lepomis auritus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis gulosus	0.02	± 0.05	0.00 - 0.10	1.43

Appendix C.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	0.53	±	0.32	0.19	-	0.96	31.23
Lepomis megalotis	1.04	±	0.97	0.23	-	2.42	42.18
Lepomis microlophus	0.50	±	0.37	0.09	-	0.86	25.16
			2001 (n = 6)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.11	±	0.13	0.00	-	0.33	0.91
Lepomis gulosus	0.24	±	0.33	0.00	-	0.84	1.47
Lepomis macrochirus	0.98	±	0.36	0.65	-	1.69	20.45
Lepomis megalotis	9.20	±	11.51	1.16	-	30.66	61.16
Lepomis microlophus	1.23	±	0.86	0.68	-	2.86	16.01
			2003 (n = 6)				
Lepomis auritus	0.03	±	0.08	0.00	-	0.19	0.20
Lepomis cyanellus	0.42	±	0.56	0.00	-	1.46	2.92
Lepomis gulosus	1.18	±	1.67	0.07	-	4.50	8.46
Lepomis macrochirus	1.07	±	0.44	0.69	-	1.93	15.27
Lepomis megalotis	11.40	±	16.52	1.00	-	44.07	63.32
Lepomis microlophus	0.63	±	0.18	0.43	-	0.87	9.83
			2005 (n = 6)				
Lepomis auritus	0.01	±	0.03	0.00	-	0.08	0.07
Lepomis cyanellus	0.29	±	0.44	0.00	-	1.06	1.87
Lepomis gulosus	0.45	±	0.58	0.00	-	1.36	4.79
Lepomis macrochirus	1.58	±	1.46	0.75	-	4.53	16.44
Lepomis megalotis	8.66	±	6.30	0.61	-	17.60	63.98
Lepomis microlophus	0.82	±	0.26	0.31	-	0.99	12.86
			2007 (n = 6)				
Lepomis auritus	0.02	±	0.05	0.00	-	0.12	0.27
Lepomis cyanellus	0.45	±	0.31	0.06	-	0.80	6.74
Lepomis gulosus	0.39	±	0.30	0.09	-	0.95	4.74
Lepomis macrochirus	1.32	±	0.99	0.79	-	3.34	15.98
Lepomis megalotis	5.31	±	4.60	2.00	-	14.52	60.29
Lepomis microlophus	0.74	±	0.14	0.48	-	0.91	11.97
			2009 (n = 4)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.20	±	0.21	0.01	-	0.38	1.88
Lepomis gulosus	0.50	±	0.35	0.00	-	0.77	8.32
Lepomis macrochirus	1.24	±	0.36	0.92	-	1.67	19.63
Lepomis megalotis	5.07	±	3.74	1.02	-	8.31	56.90
Lepomis microlophus	0.83	±	0.19	0.57	-	0.98	13.28

Appendix C.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2010 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.24	±	0.14	0.14	-	0.34	6.43
Lepomis gulosus	0.60	±	0.16	0.48	-	0.72	17.27
Lepomis macrochirus	0.89	±	0.05	0.85	-	0.92	27.28
Lepomis megalotis	1.09	±	0.87	0.47	-	1.70	27.73
Lepomis microlophus	0.76	±	0.30	0.55	-	0.97	21.29
			2011 (n = 7)				
Lepomis auritus	0.01	±	0.01	0.00	-	0.04	0.07
Lepomis cyanellus	0.33	±	0.25	0.00	-	0.67	6.16
Lepomis gulosus	0.28	±	0.26	0.00	-	0.60	3.34
Lepomis macrochirus	1.45	±	1.42	0.68	-	4.61	26.06
Lepomis megalotis	4.33	±	4.98	0.40	-	12.99	47.15
Lepomis microlophus	0.81	±	0.14	0.58	-	1.00	17.23
			Beech Reservoir				
			1994 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.29	±	0.00	0.29	-	0.29	6.83
Lepomis gulosus	0.40	±	0.00	0.40	-	0.40	9.32
Lepomis macrochirus	2.29	±	0.00	2.29	-	2.29	56.52
Lepomis megalotis	0.63	±	0.00	0.63	-	0.63	14.60
Lepomis microlophus	0.40	±	0.00	0.40	-	0.40	9.63
			1995 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.04	±	0.00	0.04	-	0.04	0.78
Lepomis macrochirus	1.64	±	0.00	1.64	-	1.64	38.52
Lepomis megalotis	0.11	±	0.00	0.11	-	0.11	43.19
Lepomis microlophus	0.49	±	0.00	0.49	-	0.49	17.51
			1996 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.03	±	0.00	0.03	-	0.03	0.61
Lepomis gulosus	1.27	±	0.00	1.27	-	1.27	30.67
Lepomis macrochirus	1.52	±	0.00	1.52	-	1.52	36.50
Lepomis megalotis	0.87	±	0.00	0.87	-	0.87	21.17
Lepomis microlophus	0.46	±	0.00	0.46	-	0.46	11.04
			1998 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.16	±	0.00	0.16	-	0.16	7.14
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix C.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	1.33	±	0.00	1.33	-	1.33	58.16
Lepomis megalotis	0.23	±	0.00	0.23	-	0.23	10.20
Lepomis microlophus	0.56	±	0.00	0.56	-	0.56	24.49
			2000 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.08	±	0.00	0.08	-	0.08	3.73
Lepomis macrochirus	0.92	±	0.00	0.92	-	0.92	42.54
Lepomis megalotis	0.31	±	0.00	0.31	-	0.31	14.18
Lepomis microlophus	0.85	±	0.00	0.85	-	0.86	39.55
			2002 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.58	±	0.00	0.58	-	0.58	12.71
Lepomis gulosus	0.59	±	0.00	0.59	-	0.59	12.88
Lepomis macrochirus	2.86	±	0.00	2.86	-	2.86	62.71
Lepomis megalotis	0.15	±	0.00	0.15	-	0.15	3.18
Lepomis microlophus	0.39	±	0.00	0.39	-	0.39	8.53
			2004 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	3.10	±	0.00	3.10	-	3.10	18.81
Lepomis gulosus	2.34	±	0.00	2.34	-	2.34	14.22
Lepomis macrochirus	1.55	±	0.00	1.55	-	1.55	9.44
Lepomis megalotis	8.50	±	0.00	8.50	-	8.50	51.62
Lepomis microlophus	0.97	±	0.00	0.97	-	0.98	5.92
			2006 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.03	±	0.00	2.03	-	2.03	10.92
Lepomis gulosus	0.89	±	0.00	0.89	-	0.89	4.77
Lepomis macrochirus	1.14	±	0.00	1.14	-	1.14	6.15
Lepomis megalotis	14.02	±	0.00	14.02	-	14.02	75.49
Lepomis microlophus	0.50	±	0.00	0.50	-	0.50	2.67
			2008 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	9.09	±	0.00	9.09	-	9.09	25.28
Lepomis gulosus	8.57	±	0.00	8.57	-	8.57	23.86
Lepomis macrochirus	4.36	±	0.00	4.35	-	4.36	12.12
Lepomis megalotis	12.99	±	0.00	12.99	-	12.99	36.15
Lepomis microlophus	0.94	±	0.00	0.94	-	0.94	2.60
			2010 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix C.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis cyanellus	0.77	±	0.00	0.77	-	0.77	11.46
Lepomis gulosus	0.84	±	0.00	0.84	-	0.84	12.48
Lepomis macrochirus	2.53	±	0.00	2.53	-	2.53	37.71
Lepomis megalotis	1.59	±	0.00	1.59	-	1.59	23.66
Lepomis microlophus	0.99	±	0.00	0.99	-	0.99	14.70
			Normandy Reservoir				
			1993 (n = 1)				
Lepomis auritus	13.27	±	0.00	13.27	-	13.27	14.81
Lepomis cyanellus	59.42	±	0.00	59.42	-	59.42	66.40
Lepomis gulosus	1.51	±	0.00	1.51	-	1.51	1.68
Lepomis macrochirus	4.10	±	0.00	4.10	-	4.10	4.46
Lepomis megalotis	11.42	±	0.00	11.42	-	11.42	12.64
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1994 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	3.03	±	0.00	3.03	-	3.03	30.95
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	3.19	±	0.00	3.19	-	3.19	33.84
Lepomis megalotis	3.31	±	0.00	3.31	-	3.31	35.21
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1995 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.36	±	0.00	0.36	-	0.36	13.93
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	9.51	±	0.00	9.51	-	9.51	65.63
Lepomis megalotis	0.74	±	0.00	0.74	-	0.74	20.31
Lepomis microlophus	0.01	±	0.00	0.01	-	0.01	0.13
			1996 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	6.05	±	0.00	6.05	-	6.05	22.98
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	6.91	±	0.00	6.91	-	6.91	25.54
Lepomis megalotis	13.56	±	0.00	13.56	-	13.56	51.21
Lepomis microlophus	0.07	±	0.00	0.07	-	0.07	0.28
			1998 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.94	±	0.00	1.94	-	1.94	37.56
Lepomis gulosus	0.06	±	0.00	0.06	-	0.06	1.02
Lepomis macrochirus	1.59	±	0.00	1.59	-	1.59	30.46

Appendix C.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis megalotis	1.38	±	0.00	1.38	-	1.38	27.41
Lepomis microlophus	0.15	±	0.00	0.15	-	0.15	3.55
			2000 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.50	±	0.00	0.50	-	0.50	7.69
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.92	±	0.00	0.92	-	0.92	14.20
Lepomis megalotis	5.15	±	0.00	5.15	-	5.15	77.51
Lepomis microlophus	0.04	±	0.00	0.04	-	0.04	0.59
			2002 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	10.49	±	0.00	10.49	-	10.49	8.80
Lepomis gulosus	5.78	±	0.00	5.78	-	5.78	38.83
Lepomis macrochirus	1.44	±	0.00	1.44	-	1.44	9.65
Lepomis megalotis	6.27	±	0.00	6.27	-	6.27	42.11
Lepomis microlophus	0.09	±	0.00	0.09	-	0.09	0.62
			2004 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	4.07	±	0.00	4.07	-	4.07	37.64
Lepomis gulosus	0.70	±	0.00	0.70	-	0.70	6.43
Lepomis macrochirus	4.10	±	0.00	4.10	-	4.10	37.91
Lepomis megalotis	1.91	±	0.00	1.91	-	1.91	17.62
Lepomis microlophus	0.04	±	0.00	0.04	-	0.04	0.40
			2006 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.56	±	0.00	2.56	-	2.56	21.16
Lepomis gulosus	0.09	±	0.00	0.09	-	0.09	0.76
Lepomis macrochirus	3.05	±	0.00	3.05	-	3.05	25.21
Lepomis megalotis	6.27	±	0.00	6.27	-	6.27	51.86
Lepomis microlophus	0.12	±	0.00	0.12	-	0.12	1.01
			2008 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.40	±	0.00	1.40	-	1.40	10.48
Lepomis gulosus	0.04	±	0.00	0.04	-	0.04	0.30
Lepomis macrochirus	4.23	±	0.00	4.23	-	4.23	31.69
Lepomis megalotis	7.44	±	0.00	7.44	-	7.44	55.76
Lepomis microlophus	0.24	±	0.00	0.24	-	0.24	1.77
			2010 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	3.01	±	0.00	3.01	-	3.01	33.48

Appendix C.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis gulosus	0.77	±	0.00	0.77	-	0.77	8.60
Lepomis macrochirus	3.32	±	0.00	3.32	-	3.32	37.01
Lepomis megalotis	1.86	±	0.00	1.86	-	1.86	20.67
Lepomis microlophus	0.02	±	0.00	0.02	-	0.02	0.25

APPENDIX D

SUMMARY STATISTICS OF POPULATION PARAMETERS FOR *LEPOMIS* SPECIES COLLECTED FROM TVA COVE-ROTENONE SAMPLES (1949-1987) AND ELECTROFISHING SAMPLES (1993-2011) IN PICKWICK RESERVOIR AND TRIBUTARY RESERVOIRS

Appendix D.1 Summary statistics for density (fish/ha) of *Lepomis* spp. collected from TVA cove-rotenone samples (1960-1987) in Pickwick Reservoir and tributary reservoirs in the Tennessee River drainage.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						Pickwick Reservoir						
						1960 (n = 5)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	64.0	±	108.4	11.1	-	257.6	1.5	±	2.3	0.3	-	5.6
Lepomis gulosus	12.1	±	21.4	0.0	-	50.0	0.4	±	0.7	0.0	-	1.6
Lepomis macrochirus	1719.1	±	2367.3	69.4	-	5807.5	99.3	±	168.4	2.5	-	398.7
Lepomis megalotis	325.3	±	409.5	7.5	-	1015.2	8.0	±	9.6	0.2	-	24.1
Lepomis microlophus	74.3	±	139.4	0.0	-	322.5	4.7	±	8.5	0.0	-	19.8
						1961 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	390.2	±	0.0	390.2	-	390.2	9.3	±	0.0	9.3	-	9.3
Lepomis gulosus	8.2	±	0.0	8.2	-	8.2	0.7	±	0.0	0.7	-	0.7
Lepomis macrochirus	2329.5	±	0.0	2329.5	-	2329.5	89.8	±	0.0	89.8	-	89.8
Lepomis megalotis	418.0	±	0.0	418.0	-	418.0	12.4	±	0.0	12.4	-	12.4
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1962 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	104.1	±	32.0	77.4	-	139.5	2.9	±	1.9	0.8	-	4.5
Lepomis gulosus	3.9	±	4.9	0.0	-	9.4	0.1	±	0.2	0.0	-	0.3
Lepomis macrochirus	451.9	±	310.3	95.3	-	660.4	12.8	±	8.2	4.1	-	20.3
Lepomis megalotis	336.3	±	161.2	213.4	-	518.9	8.4	±	4.8	3.6	-	13.1
Lepomis microlophus	10.8	±	1.2	9.4	-	11.6	1.0	±	0.8	0.5	-	2.0
						1971 (n = 9)						
Lepomis auritus	0.0	±	0.0	0.0	±	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	9.8	±	7.8	0.0	-	25.5	0.3	±	0.3	0.0	-	0.7
Lepomis gulosus	1.5	±	2.3	0.0	-	4.7	0.4	±	0.1	0.0	-	0.2
Lepomis macrochirus	217.9	±	104.4	100.9	-	416.9	7.8	±	3.4	3.5	-	12.8
Lepomis megalotis	31.4	±	20.2	6.2	-	64.7	0.9	±	0.6	0.1	-	1.9
Lepomis microlophus	4.8	±	4.0	0.0	-	13.1	0.6	±	0.6	0.0	-	1.7
						1974 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	36.6	±	11.0	28.8	-	44.4	0.9	±	0.5	0.6	-	1.3
Lepomis gulosus	8.0	±	5.0	4.4	-	11.5	0.2	±	0.2	0.0	-	0.3
Lepomis macrochirus	181.2	±	36.0	155.8	-	206.7	3.6	±	0.3	3.4	-	3.9
Lepomis megalotis	428.4	±	51.0	392.3	-	464.4	7.4	±	1.5	6.4	-	6.4
Lepomis microlophus	38.0	±	22.4	22.2	-	53.8	0.8	±	0.2	0.7	-	0.9
						1975 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	1.8	±	1.2	0.0	-	2.8	0.1	±	0.1	0.0	-	0.2

Appendix D.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis gulosus	11.4	±	2.9	8.7	-	15.6	0.1	±	0.1	0.1	-	0.2
Lepomis macrochirus	482.5	±	262.9	209.8	-	794.8	11.6	±	6.0	5.5	-	19.6
Lepomis megalotis	502.3	±	243.2	155.6	-	720.7	9.1	±	4.1	3.0	-	12.1
Lepomis microlophus	11.8	±	7.8	5.2	-	22.2	0.3	±	0.2	0.2	-	0.7
						1976 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	3.6	±	2.0	1.0	-	5.4	0.1	±	0.0	0.0	-	0.1
Lepomis gulosus	3.4	±	3.5	0.0	-	8.2	0.1	±	0.1	0.0	-	0.3
Lepomis macrochirus	1236.9	±	1868.7	171.0	-	4029.5	24.6	±	33.9	4.7	-	75.1
Lepomis megalotis	496.2	±	205.2	341.9	-	795.1	8.9	±	2.3	6.9	-	12.2
Lepomis microlophus	8.5	±	5.9	1.0	-	13.5	0.6	±	0.4	0.0	-	0.8
						1977 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	30.2	±	0.6	29.7	-	30.6	0.5	±	0.1	0.5	-	0.6
Lepomis gulosus	8.4	±	7.3	3.2	-	13.5	0.2	±	0.2	0.1	-	0.3
Lepomis macrochirus	2303.1	±	1788.2	1038.7	-	3567.6	40.1	±	26.5	21.3	-	58.8
Lepomis megalotis	578.9	±	91.0	514.5	-	643.2	13.0	±	4.5	9.7	-	16.2
Lepomis microlophus	22.9	±	1.8	21.6	-	24.2	0.9	±	0.3	0.8	-	1.1
						1978 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	15.1	±	6.0	10.8	-	19.4	0.3	±	0.2	0.2	-	0.4
Lepomis gulosus	8.6	±	3.1	6.5	-	10.8	0.1	±	0.0	0.1	-	0.1
Lepomis macrochirus	796.1	±	617.1	359.7	-	1232.4	17.5	±	12.8	8.4	-	26.5
Lepomis megalotis	277.4	±	43.4	246.8	-	308.1	5.6	±	0.2	5.5	-	5.8
Lepomis microlophus	112.7	±	2.6	110.8	-	114.5	2.7	±	1.2	1.9	-	3.6
						1979 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	135.6	±	39.8	90.3	-	164.9	1.8	±	0.6	1.1	-	2.2
Lepomis gulosus	1.7	±	1.5	0.0	-	2.7	0.0	±	0.0	0.0	-	0.1
Lepomis macrochirus	672.3	±	365.3	361.3	-	1074.6	21.3	±	11.1	10.8	-	32.9
Lepomis megalotis	737.4	±	492.4	380.6	-	1299.2	14.4	±	7.5	8.9	-	22.9
Lepomis microlophus	128.6	±	13.3	113.5	-	138.5	3.5	±	1.2	2.6	-	4.9
						1980 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	63.0	±	36.0	40.3	-	104.5	1.1	±	0.4	0.7	-	1.5
Lepomis gulosus	10.5	±	7.3	2.3	-	16.2	0.2	±	0.1	0.0	-	0.3
Lepomis macrochirus	721.8	±	481.5	314.5	-	1253.2	16.4	±	7.2	9.3	-	23.8
Lepomis megalotis	355.6	±	96.1	283.9	-	464.9	6.8	±	0.6	6.1	-	7.3
Lepomis microlophus	82.3	±	19.9	63.6	-	103.2	2.5	±	0.9	2.0	-	3.6
						1987 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	4.4	±	0.0	4.4	-	4.4	0.1	±	0.0	0.1	-	0.1
Lepomis gulosus	2.2	±	0.0	2.2	-	2.2	0.0	±	0.0	0.0	-	0.0

Appendix D.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis macrochirus	636.3	±	0.0	636.3	-	636.3	20.9	±	0.0	20.9	-	20.9
Lepomis megalotis	112.1	±	0.0	112.1	-	112.1	2.2	±	0.0	2.2	-	2.2
Lepomis microlophus	87.9	±	0.0	87.9	-	87.9	4.2	±	0.0	4.2	-	4.2
Cedar Creek Reservoir												
1979 (n = 2)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	222.6	±	69.1	173.7	-	271.4	8.0	±	2.8	6.0	-	10.0
Lepomis gulosus	17.1	±	24.2	0.0	-	34.3	0.6	±	0.9	0.0	-	1.3
Lepomis macrochirus	21.3	±	10.3	14.0	-	28.6	1.1	±	0.0	1.1	-	1.1
Lepomis megalotis	468.8	±	72.4	417.5	-	520.0	11.2	±	2.9	9.2	-	13.3
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
1984 (n = 2)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	17.6	±	15.6	6.5	-	28.6	0.3	±	0.3	0.1	-	0.5
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	446.7	±	84.6	386.9	-	506.5	11.4	±	5.0	7.8	-	14.9
Lepomis megalotis	160.3	±	1.1	159.5	-	161.0	3.2	±	0.6	2.8	-	3.6
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Little Bear Creek Reservoir												
1976 (n = 2)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	281.0	±	207.8	134.1	-	427.9	7.6	±	7.2	2.5	-	12.8
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	901.8	±	995.7	197.7	-	1605.9	17.7	±	14.9	7.1	-	28.2
Lepomis megalotis	485.0	±	611.9	52.3	-	917.6	9.0	±	10.5	1.6	-	16.5
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
1977 (n = 2)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	98.3	±	58.6	56.8	-	139.7	1.7	±	1.3	0.8	-	2.6
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	65.1	±	53.5	27.3	-	102.9	2.8	±	1.2	2.0	-	3.7
Lepomis megalotis	294.5	±	130.5	202.3	-	386.8	6.8	±	4.8	3.5	-	10.2
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
1978 (n = 4)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	114.5	±	110.4	29.5	-	276.0	1.7	±	1.3	0.5	-	3.5
Lepomis gulosus	0.8	±	1.5	0.0	-	3.1	72.5	±	67.4	10.8	-	162.0
Lepomis macrochirus	72.5	±	67.4	10.8	-	162.0	2.4	±	2.0	0.3	-	5.1
Lepomis megalotis	157.7	±	76.4	79.5	-	262.0	3.5	±	1.6	1.6	-	5.4
Lepomis microlophus	0.5	±	1.0	0.0	-	2.0	0.0	±	0.1	0.0	-	0.1

Appendix D.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						1979 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	266.1	±	168.6	104.5	-	440.0	3.7	±	2.2	1.5	-	5.9
Lepomis gulosus	1.4	±	1.9	0.0	-	4.0	0.1	±	0.2	0.0	-	0.4
Lepomis macrochirus	388.6	±	220.7	132.4	-	621.5	9.4	±	4.1	4.5	-	14.0
Lepomis megalotis	611.3	±	359.4	263.2	-	1075.4	9.5	±	5.5	4.0	-	16.8
Lepomis microlophus	1.0	±	2.0	0.0	-	4.0	0.3	±	0.7	0.0	-	1.3
						Bear Creek Reservoir						
						1974 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	7.7	±	0.0	7.7	-	7.7	0.1	±	0.0	0.1	-	0.1
Lepomis gulosus	2.8	±	0.0	2.8	-	2.8	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	166.2	±	0.0	166.2	-	166.2	5.7	±	0.0	5.7	-	5.7
Lepomis megalotis	33.1	±	0.0	33.1	-	33.1	0.5	±	0.0	0.5	-	0.5
Lepomis microlophus	1.4	±	0.0	1.4	-	1.4	0.1	±	0.0	0.1	-	0.1
						1976 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	16.9	±	15.9	5.6	-	28.1	0.3	±	0.3	0.1	-	0.5
Lepomis gulosus	39.4	±	23.8	22.5	-	56.3	1.1	±	0.7	0.6	-	1.6
Lepomis macrochirus	476.7	±	19.8	462.7	-	490.6	11.9	±	0.9	11.2	-	12.5
Lepomis megalotis	41.1	±	30.3	19.7	-	62.5	1.1	±	0.9	0.4	-	1.8
Lepomis microlophus	2.8	±	4.0	0.0	-	5.6	0.1	±	0.2	0.0	-	0.3
						1977 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	42.1	±	15.7	31.0	-	53.1	0.7	±	0.1	0.6	-	0.8
Lepomis gulosus	12.8	±	4.8	9.4	-	16.2	0.5	±	0.1	0.5	-	0.6
Lepomis macrochirus	282.9	±	161.1	169.0	-	396.9	8.1	±	1.9	6.8	-	9.5
Lepomis megalotis	114.7	±	58.7	73.2	-	156.3	1.7	±	0.9	1.1	-	2.4
Lepomis microlophus	1.6	±	2.2	0.0	-	3.1	0.2	±	0.2	0.0	-	0.3
						1978 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	17.1	±	20.7	0.0	-	41.9	0.4	±	0.4	0.0	-	0.9
Lepomis gulosus	56.8	±	62.6	0.0	-	128.1	1.1	±	1.3	0.0	-	2.8
Lepomis macrochirus	373.6	±	146.7	222.0	-	559.6	7.7	±	1.8	5.7	-	9.6
Lepomis megalotis	154.6	±	147.0	26.8	-	338.7	2.8	±	2.9	0.4	-	6.8
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1979 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	27.2	±	11.5	13.3	-	39.0	0.5	±	0.3	0.2	-	0.8
Lepomis gulosus	7.3	±	9.4	0.0	-	20.8	0.1	±	0.2	0.0	-	0.4
Lepomis macrochirus	333.1	±	78.6	239.6	-	403.3	7.0	±	3.1	4.8	-	11.5
Lepomis megalotis	45.5	±	10.1	34.0	-	54.2	1.0	±	0.1	0.9	-	1.2
Lepomis microlophus	0.4	±	0.8	0.0	-	1.7	0.0	±	0.0	0.0	-	0.1

Appendix D.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						1980 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	12.4	±	9.3	0.0	-	22.6	0.2	±	0.1	0.0	-	0.3
Lepomis gulosus	7.4	±	4.8	2.4	-	14.0	0.3	±	0.2	0.1	-	0.5
Lepomis macrochirus	481.5	±	220.3	297.6	-	767.7	10.6	±	2.6	8.7	-	14.2
Lepomis megalotis	42.6	±	49.9	0.0	-	109.7	0.9	±	0.9	0.0	-	1.9
Lepomis microlophus	1.6	±	3.2	0.0	-	6.5	0.2	±	0.3	0.0	-	0.6
						1981 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	25.0	±	35.4	0.0	-	50.0	0.5	±	0.7	0.0	-	1.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	329.4	±	46.0	296.9	-	361.9	6.7	±	0.0	6.6	-	6.7
Lepomis megalotis	49.6	±	9.5	42.9	-	56.3	1.1	±	0.5	0.7	-	1.5
Lepomis microlophus	1.6	±	2.2	0.0	-	3.1	0.0	±	0.1	0.0	-	0.1
						Upper Bear Creek Reservoir						
						(1979 n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	423.3	±	113.0	305.0	-	547.1	7.7	±	2.6	5.6	-	11.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	394.8	±	277.3	107.8	-	742.5	14.4	±	10.3	4.5	-	24.4
Lepomis megalotis	91.5	±	28.6	62.7	-	127.5	3.3	±	1.6	1.9	-	5.5
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix D.2 Percent abundance of *Lepomis* spp. collected from TVA cove-rotenone samples (1949-1987) in Pickwick Reservoir and tributary reservoirs in the Tennessee River drainage in Pickwick reservoir and tributary reservoirs, 1949-1987.

Year	Percent Abundance						
	Lepomis auritus	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
Pickwick Reservoir							
1949	0.00	22.58	1.21	47.58	23.79	2.42	248
1950	0.00	12.79	1.64	52.79	32.79	0.00	305
1951	0.00	5.21	0.18	74.43	18.56	0.12	1670
1952	0.00	20.94	3.45	53.64	21.90	0.07	1361
1953	0.00	7.67	1.26	84.35	6.01	0.32	1265
1954	0.00	18.48	3.55	56.16	13.11	0.39	1266
1955	0.00	3.68	0.42	81.15	14.38	0.15	2636
1956	0.00	6.97	1.33	75.44	10.95	0.22	904
1957	0.00	1.41	2.81	73.26	22.45	0.00	1421
1958	0.00	11.80	1.18	63.38	23.16	0.05	1865
1959	0.00	3.15	0.59	67.40	18.47	5.68	4439
1960	0.00	3.76	0.72	75.06	17.56	2.85	5153
1961	0.00	12.40	0.26	74.05	13.29	0.00	1919
1962	0.00	10.38	0.27	56.39	30.83	1.13	2206
1971	0.00	3.31	0.47	79.66	13.72	1.66	1932
1974	0.00	5.16	1.18	25.66	60.91	5.60	678
1975	0.00	0.13	0.97	46.35	50.71	0.82	3189
1976	0.00	0.15	0.19	74.42	24.25	0.30	7290
1977	0.00	1.13	0.26	73.89	20.96	0.87	2658
1978	0.00	1.46	0.73	62.07	24.41	10.24	1094
1979	0.00	6.43	0.09	37.23	42.94	6.26	4700
1980	0.00	3.59	0.81	55.38	24.92	5.42	3339
1987	0.00	0.51	0.26	74.23	13.08	10.26	780
Cedar Creek Reservoir							
1979	0.00	30.12	1.86	2.80	65.22	0.00	644
1984	0.00	2.25	0.00	70.99	26.76	0.00	1465
Little Bear Creek Reservoir							
1976	0.00	16.08	0.00	54.18	29.73	0.00	2176
1977	0.00	21.66	0.00	14.80	63.54	0.00	554
1978	0.00	32.60	0.26	20.70	46.31	0.13	773
1979	0.00	20.99	0.10	30.27	48.57	0.07	2897

Appendix D.2 Continued.

Year	*Lepomis auritus*	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
			Percent Abundance				
			Bear Creek Reservoir				
1974	0.00	3.67	1.33	78.67	15.67	0.67	300
1976	0.00	1.81	5.34	86.87	5.12	0.85	937
1977	0.00	10.02	4.27	60.26	25.29	0.16	609
1978	0.00	2.63	9.87	63.53	23.97	0.00	1064
1979	0.00	7.07	1.90	79.46	11.43	0.14	735
1980	0.00	2.35	1.56	88.38	7.49	0.22	895
1981	0.00	7.44	0.00	79.53	12.56	0.47	215
			Upper Bear Creek Reservoir				
1979	0.00	48.09	0.00	41.92	9.99	0.00	1541

Appendix D.3 Summary statistics for relative density (CPUE) of *Lepomis* spp. collected from TVA electrofishing samples (1993-2011) in Pickwick Reservoir and tributary reservoirs in the Tennessee River drainage.

Species	Mean	±	SD	Min	-	Max	% Abundance
			Pickwick Reservoir				
			1993 (n = 4)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.03	±	0.05	0.00	-	0.10	0.45
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.82	±	0.24	0.54	-	1.06	29.69
Lepomis megalotis	2.23	±	1.50	0.27	-	3.52	54.05
Lepomis microlophus	0.54	±	0.16	0.33	-	0.71	15.81
			1994 (n = 4)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.23	±	0.46	0.00	-	0.92	1.87
Lepomis gulosus	0.12	±	0.25	0.00	-	0.49	0.64
Lepomis macrochirus	2.57	±	1.44	1.28	-	4.58	22.33
Lepomis megalotis	9.90	±	4.98	4.39	-	16.48	65.98
Lepomis microlophus	0.93	±	0.12	0.84	-	1.11	9.17
			1996 (n = 4)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.30	±	0.22	0.00	-	0.54	3.08
Lepomis gulosus	0.08	±	0.11	0.00	-	0.23	0.76
Lepomis macrochirus	3.36	±	0.62	2.85	-	4.17	34.94
Lepomis megalotis	5.67	±	2.66	2.60	-	8.49	51.85
Lepomis microlophus	0.91	±	0.32	0.59	-	1.19	9.38
			1998 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.16	±	0.14	0.00	-	0.26	3.87
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.85	±	0.82	0.91	-	2.42	50.64
Lepomis megalotis	1.03	±	0.59	0.37	-	1.46	31.29
Lepomis microlophus	0.52	±	0.21	0.27	-	0.66	14.20
			2000 (n = 6)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.14	±	0.19	0.00	-	0.41	1.68

Appendix D.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis gulosus	0.03	±	0.06	0.00	-	0.16	0.38
Lepomis macrochirus	1.00	±	0.61	0.50	-	2.18	25.66
Lepomis megalotis	4.24	±	5.47	0.08	-	14.84	53.18
Lepomis microlophus	0.96	±	1.10	0.20	-	3.17	19.09
			2001 (n = 2)				
Lepomis auritus	0.05	±	0.07	0.00	-	0.09	0.49
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.95	±	0.07	0.90	-	1.00	14.28
Lepomis megalotis	5.52	±	3.21	3.25	-	7.79	73.23
Lepomis microlophus	0.78	±	0.03	0.76	-	0.80	12.01
			2002 (n = 8)				
Lepomis auritus	0.05	±	0.09	0.00	-	0.21	0.99
Lepomis cyanellus	0.27	±	0.43	0.00	-	1.24	4.84
Lepomis gulosus	0.08	±	0.14	0.00	-	0.36	2.49
Lepomis macrochirus	1.11	±	0.44	0.63	-	2.05	29.55
Lepomis megalotis	2.77	±	2.55	0.33	-	7.59	48.94
Lepomis microlophus	0.53	±	0.21	0.20	-	0.74	13.18
			2003 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.15	±	0.18	0.02	-	0.27	3.35
Lepomis gulosus	2.26	±	2.65	0.38	-	4.14	29.17
Lepomis macrochirus	1.44	±	0.29	1.24	-	1.64	28.77
Lepomis megalotis	1.30	±	0.55	0.91	-	1.69	21.06
Lepomis microlophus	0.94	±	0.13	0.85	-	1.04	17.64
			2004 (n = 4)				
Lepomis auritus	0.08	±	0.16	0.00	-	0.33	0.93
Lepomis cyanellus	0.29	±	0.31	0.00	-	0.65	4.79
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.30	±	0.85	0.70	-	2.55	21.70
Lepomis megalotis	3.79	±	2.07	1.50	-	6.10	61.95
Lepomis microlophus	0.48	±	0.31	0.13	-	0.88	10.62
			2005 (n = 2)				
Lepomis auritus	0.18	±	0.26	0.00	-	0.37	2.44
Lepomis cyanellus	0.34	±	0.35	0.09	-	0.58	5.49
Lepomis gulosus	0.25	±	0.14	0.15	-	0.35	4.52
Lepomis macrochirus	1.02	±	0.33	0.79	-	1.26	20.35
Lepomis megalotis	2.94	±	1.75	1.70	-	4.17	52.96
Lepomis microlophus	0.75	±	0.33	0.52	-	0.98	14.23

Appendix D.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2006 (n = 8)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.34	±	0.39	0.00	-	1.26	8.50
Lepomis gulosus	0.04	±	0.04	0.00	-	0.09	1.13
Lepomis macrochirus	1.05	±	0.37	0.60	-	1.68	31.45
Lepomis megalotis	1.38	±	0.57	0.57	-	2.09	38.44
Lepomis microlophus	0.70	±	0.21	0.40	-	1.00	20.49
			2007 (n = 4)				
Lepomis auritus	0.04	±	0.07	0.00	-	0.15	0.71
Lepomis cyanellus	0.21	±	0.25	0.00	-	0.56	4.17
Lepomis gulosus	0.08	±	0.10	0.00	-	0.21	1.65
Lepomis macrochirus	1.61	±	0.92	0.95	-	2.91	35.92
Lepomis megalotis	1.75	±	0.83	1.11	-	2.92	39.98
Lepomis microlophus	0.76	±	0.20	0.59	-	1.03	17.57
			2008 (n = 8)				
Lepomis auritus	0.14	±	0.36	0.00	-	1.03	1.12
Lepomis cyanellus	0.51	±	0.41	0.00	-	1.16	4.51
Lepomis gulosus	0.28	±	0.23	0.00	-	0.64	3.30
Lepomis macrochirus	2.93	±	2.95	0.95	-	9.84	28.46
Lepomis megalotis	5.64	±	3.22	0.62	-	10.61	53.11
Lepomis microlophus	0.70	±	0.23	0.36	-	1.00	9.35
			2009 (n = 6)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.15	±	0.20	0.01	-	0.52	1.41
Lepomis gulosus	0.22	±	0.23	0.00	-	0.52	2.46
Lepomis macrochirus	5.63	±	4.11	1.16	-	13.31	44.30
Lepomis megalotis	5.54	±	3.98	0.98	-	12.13	42.60
Lepomis microlophus	0.93	±	0.06	0.83	-	1.00	8.60
			2010 (n = 6)				
Lepomis auritus	0.02	±	0.05	0.00	-	0.12	0.14
Lepomis cyanellus	2.03	±	2.54	0.27	-	6.91	17.35
Lepomis gulosus	0.38	±	0.35	0.00	-	0.82	3.29
Lepomis macrochirus	4.15	±	4.67	0.98	-	13.50	31.64
Lepomis megalotis	5.16	±	4.49	0.54	-	12.73	35.73
Lepomis microlophus	1.04	±	0.62	0.60	-	2.23	11.84
			2011 (n = 2)				
Lepomis auritus	0.02	±	0.03	0.00	-	0.04	0.33
Lepomis cyanellus	0.23	±	0.32	0.00	-	0.46	3.39
Lepomis gulosus	0.09	±	0.04	0.06	-	0.11	2.72
Lepomis macrochirus	1.59	±	1.32	0.66	-	2.52	31.66
Lepomis megalotis	1.72	±	1.30	0.80	-	2.64	35.36

Appendix D.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis microlophus	0.99	±	0.02	0.97	-	1.00	26.54
			Little Bear Creek Reservoir				
			1993 (n = 1)				
Lepomis auritus	0.18	±	0.00	0.18	-	0.18	1.12
Lepomis cyanellus	6.70	±	0.00	6.70	-	6.70	42.20
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	6.38	±	0.00	6.38	-	6.38	39.84
Lepomis megalotis	1.82	±	0.00	1.82	-	1.82	11.67
Lepomis microlophus	0.80	±	0.00	0.80	-	0.80	5.16
			1994 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.27	±	0.00	2.27	-	2.27	13.66
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	13.63	±	0.00	13.63	-	13.63	62.66
Lepomis megalotis	6.02	±	0.00	6.02	-	6.02	18.04
Lepomis microlophus	0.96	±	0.00	0.96	-	0.96	5.64
			1995 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.07	±	0.00	0.07	-	0.07	20.69
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.43	±	0.00	0.43	-	0.43	24.14
Lepomis megalotis	0.21	±	0.00	0.21	-	0.21	17.24
Lepomis microlophus	0.79	±	0.00	0.79	-	0.79	37.93
			1996 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.48	±	0.00	0.48	-	0.48	16.15
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.92	±	0.00	0.92	-	0.92	32.31
Lepomis megalotis	0.56	±	0.00	0.56	-	0.56	41.54
Lepomis microlophus	0.44	±	0.00	0.44	-	0.44	10.00
			1997 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.13	±	0.00	0.13	-	0.13	4.49
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.78	±	0.00	0.78	-	0.78	29.21
Lepomis megalotis	0.91	±	0.00	0.91	-	0.91	32.58
Lepomis microlophus	0.94	±	0.00	0.94	-	0.94	33.71
			1999 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix D.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis cyanellus	0.20	±	0.00	0.20	-	0.20	6.82
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.80	±	0.00	0.80	-	0.80	27.27
Lepomis megalotis	1.87	±	0.00	1.87	-	1.87	63.64
Lepomis microlophus	0.07	±	0.00	0.07	-	0.07	2.27
			2001 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.13	±	0.00	1.13	-	1.13	18.18
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.70	±	0.00	2.70	-	2.70	15.94
Lepomis megalotis	4.71	±	0.00	4.71	-	4.71	62.38
Lepomis microlophus	0.10	±	0.00	0.10	-	0.10	3.50
			2003 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	3.02	±	0.00	3.02	-	3.02	14.57
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	3.21	±	0.00	3.21	-	3.21	15.51
Lepomis megalotis	13.55	±	0.00	13.55	-	13.55	66.68
Lepomis microlophus	0.67	±	0.00	0.67	-	0.68	3.25
			2005 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.58	±	0.00	0.58	-	0.58	5.67
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	5.76	±	0.00	5.76	-	5.76	55.99
Lepomis megalotis	3.58	±	0.00	3.58	-	3.58	34.79
Lepomis microlophus	0.37	±	0.00	0.37	-	0.37	3.55
			2007 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.43	±	0.00	0.43	-	0.43	17.36
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.41
Lepomis macrochirus	3.59	±	0.00	3.59	-	3.59	9.90
Lepomis megalotis	3.91	±	0.00	3.91	-	3.91	69.82
Lepomis microlophus	0.07	±	0.00	0.07	-	0.07	2.51
			2009 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.59	±	0.00	2.59	-	2.59	8.71
Lepomis gulosus	0.06	±	0.00	0.06	-	0.06	0.00
Lepomis macrochirus	1.48	±	0.00	1.48	-	1.48	21.77
Lepomis megalotis	10.41	±	0.00	10.41	-	10.41	60.68
Lepomis microlophus	0.37	±	0.00	0.37	-	0.37	8.84

Appendix D.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2011 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.51	±	0.00	0.51	-	0.51	76.77
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.28	±	0.00	1.28	-	1.28	23.23
Lepomis megalotis	3.57	±	0.00	3.57	-	3.57	0.00
Lepomis microlophus	0.52	±	0.00	0.52	-	0.52	0.00
			Cedar Creek Reservoir				
			1993 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.00	±	0.00	1.00	-	1.00	78.95
Lepomis megalotis	0.27	±	0.00	0.27	-	0.27	21.05
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1995 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.70	±	0.00	0.70	-	0.70	17.44
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.33	±	0.00	2.33	-	2.33	57.75
Lepomis megalotis	0.88	±	0.00	0.88	-	0.88	21.71
Lepomis microlophus	0.13	±	0.00	0.13	-	0.13	3.10
			1996 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.12	±	0.00	1.12	-	1.12	24.08
Lepomis gulosus	0.09	±	0.00	0.09	-	0.09	1.98
Lepomis macrochirus	2.21	±	0.00	2.21	-	2.21	47.59
Lepomis megalotis	1.12	±	0.00	1.12	-	1.12	24.08
Lepomis microlophus	0.11	±	0.00	0.11	-	0.11	2.27
			1997 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.22	±	0.00	0.22	-	0.22	15.22
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.94	±	0.00	0.94	-	0.94	65.22
Lepomis megalotis	0.28	±	0.00	0.28	-	0.28	19.57
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1999 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.78	±	0.00	0.78	-	0.78	12.67
Lepomis gulosus	0.75	±	0.00	0.75	-	0.75	12.22

Appendix D.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	0.89	±	0.00	0.89	-	0.89	14.48
Lepomis megalotis	3.69	±	0.00	3.69	-	3.69	60.18
Lepomis microlophus	0.03	±	0.00	0.03	-	0.03	0.45
			2001 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.17	±	0.00	2.17	-	2.17	11.71
Lepomis gulosus	0.46	±	0.00	0.46	-	0.46	5.47
Lepomis macrochirus	0.99	±	0.00	0.99	-	0.99	12.00
Lepomis megalotis	6.20	±	0.00	6.20	-	6.20	68.81
Lepomis microlophus	0.18	±	0.00	0.18	-	0.18	2.02
			2003 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.56	±	0.00	0.56	-	0.56	20.17
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.02	±	0.00	1.02	-	1.02	36.98
Lepomis megalotis	1.19	±	0.00	1.19	-	1.19	42.86
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2005 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.00	±	0.00	1.00	-	1.00	9.73
Lepomis gulosus	0.06	±	0.00	0.06	-	0.06	0.55
Lepomis macrochirus	1.22	±	0.00	1.22	-	1.22	11.88
Lepomis megalotis	7.95	±	0.00	7.95	-	7.95	77.34
Lepomis microlophus	0.05	±	0.00	0.05	-	0.05	0.49
			2007 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.40	±	0.00	0.40	-	0.40	14.58
Lepomis gulosus	0.06	±	0.00	0.06	-	0.06	2.08
Lepomis macrochirus	0.91	±	0.00	0.91	-	0.91	33.33
Lepomis megalotis	1.29	±	0.00	1.29	-	1.29	46.88
Lepomis microlophus	0.09	±	0.00	0.09	-	0.09	3.13
			2009 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.06	±	0.00	2.06	-	2.06	21.44
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.13	±	0.00	1.13	-	1.13	11.71
Lepomis megalotis	6.24	±	0.00	6.24	-	6.24	64.78
Lepomis microlophus	0.20	±	0.00	0.20	-	0.20	2.08
			2011 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix D.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis cyanellus	6.42	±	0.00	6.42	-	6.42	57.41
Lepomis gulosus	0.60	±	0.00	0.60	-	0.60	5.41
Lepomis macrochirus	1.58	±	0.00	1.58	-	1.58	14.13
Lepomis megalotis	2.54	±	0.00	2.54	-	2.54	22.70
Lepomis microlophus	0.04	±	0.00	0.04	-	0.04	0.36
			Bear Creek Reservoir				
			1993 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	3.61	±	0.00	3.61	-	3.61	38.42
Lepomis gulosus	0.16	±	0.00	0.16	-	0.16	1.64
Lepomis macrochirus	3.66	±	0.00	3.66	-	3.66	38.42
Lepomis megalotis	1.84	±	0.00	1.84	-	1.84	19.43
Lepomis microlophus	0.20	±	0.00	0.20	-	0.20	2.09
			1994 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	3.30	±	0.00	3.30	-	3.30	54.38
Lepomis gulosus	0.23	±	0.00	0.23	-	0.23	3.71
Lepomis macrochirus	1.50	±	0.00	1.50	-	1.50	24.40
Lepomis megalotis	0.80	±	0.00	0.80	-	0.80	13.79
Lepomis microlophus	0.22	±	0.00	0.22	-	0.22	3.71
			1995 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.59	±	0.00	0.59	-	0.59	36.14
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.02	±	0.00	1.02	-	1.02	62.65
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.02	±	0.00	0.02	-	0.02	1.20
			1996 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	4.14	±	0.00	4.14	-	4.14	41.00
Lepomis gulosus	0.38	±	0.00	0.38	-	0.38	3.73
Lepomis macrochirus	4.44	±	0.00	4.44	-	4.44	46.33
Lepomis megalotis	0.59	±	0.00	0.59	-	0.59	5.86
Lepomis microlophus	0.31	±	0.00	0.31	-	0.31	3.09
			1997 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.15	±	0.00	0.15	-	0.15	7.62
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.02	±	0.00	1.02	-	1.02	50.48

Appendix D.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis megalotis	0.54	±	0.00	0.54	-	0.54	26.67
Lepomis microlophus	0.31	±	0.00	0.31	-	0.31	15.24
			1999 (n = 1)				
Lepomis auritus	0.05	±	0.00	0.05	-	0.05	0.82
Lepomis cyanellus	3.14	±	0.00	3.14	-	3.14	48.43
Lepomis gulosus	0.11	±	0.00	0.11	-	0.11	1.81
Lepomis macrochirus	1.00	±	0.00	1.00	-	1.00	15.49
Lepomis megalotis	1.84	±	0.00	1.84	-	1.84	28.17
Lepomis microlophus	0.35	±	0.00	0.35	-	0.35	5.27
			2001 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.86	±	0.00	1.86	-	1.86	21.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.62	±	0.00	1.62	-	1.62	42.00
Lepomis megalotis	0.73	±	0.00	0.73	-	0.73	22.40
Lepomis microlophus	0.50	±	0.00	0.50	-	0.50	14.60
			2003 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	20.76	±	0.00	20.76	-	20.76	71.66
Lepomis gulosus	0.53	±	0.00	0.53	-	0.53	1.83
Lepomis macrochirus	3.74	±	0.00	3.74	-	3.74	12.91
Lepomis megalotis	3.01	±	0.00	3.01	-	3.01	10.39
Lepomis microlophus	0.93	±	0.00	0.93	-	0.93	3.22
			2005 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.38	±	0.00	1.38	-	1.38	19.04
Lepomis gulosus	0.12	±	0.00	0.12	-	0.12	1.55
Lepomis macrochirus	2.11	±	0.00	2.11	-	2.11	28.35
Lepomis megalotis	3.07	±	0.00	3.07	-	3.07	47.11
Lepomis microlophus	0.30	±	0.00	0.30	-	0.30	3.95
			2007 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.75	±	0.00	1.75	-	1.75	31.10
Lepomis gulosus	0.37	±	0.00	0.37	-	0.37	6.61
Lepomis macrochirus	1.06	±	0.00	1.06	-	1.06	18.81
Lepomis megalotis	1.53	±	0.00	1.53	-	1.53	27.16
Lepomis microlophus	0.92	±	0.00	0.92	-	0.92	16.33
			2009 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.98	±	0.00	0.98	-	0.98	32.49

Appendix D.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis gulosus	0.25	±	0.00	0.25	-	0.25	8.20
Lepomis macrochirus	1.05	±	0.00	1.05	-	1.05	34.70
Lepomis megalotis	0.16	±	0.00	0.16	-	0.16	5.36
Lepomis microlophus	0.58	±	0.00	0.58	-	0.58	19.24
			2011 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	4.24	±	0.00	4.24	-	4.24	33.84
Lepomis gulosus	0.38	±	0.00	0.38	-	0.38	3.04
Lepomis macrochirus	3.67	±	0.00	3.67	-	3.67	29.28
Lepomis megalotis	3.74	±	0.00	3.74	-	3.74	29.88
Lepomis microlophus	0.50	±	0.00	0.50	-	0.50	3.97

APPENDIX E

SUMMARY STATISTICS OF POPULATION PARAMETERS FOR *LEPOMIS* SPECIES COLLECTED FROM TVA COVE-ROTENONE SAMPLES (1949-1983) AND ELECTROFISHING SAMPLES (1993-2011) IN WILSON RESERVOIR

Appendix E.1 Summary statistics for density (fish/ha) of *Lepomis* spp. collected from TVA cove-rotenone samples (1960-1983) in Wilson Reservoir and tributary reservoirs in the Tennessee River drainage.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						Wilson Reservoir						
						1960 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	60.7	±	0.0	60.7	-	60.7	2.1	±	0.0	2.1	-	2.1
Lepomis gulosus	32.1	±	0.0	32.1	-		1.1	±	0.0	1.1	-	1.1
Lepomis macrochirus	660.7	±	0.0	660.7	-	660.7	18.5	±	0.0	18.5	-	18.5
Lepomis megalotis	482.1	±	0.0	482.1	-	482.1	11.8	±	0.0	11.8	-	11.8
Lepomis microlophus	64.3	±	0.0	64.3	-	64.3	3.3	±	0.0	3.3	-	3.3
						1962 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	166.7	±	0.0	166.7	-	166.7	4.4	±	0.0	4.4	-	4.4
Lepomis gulosus	52.8	±	0.0	52.8	-	52.8	2.2	±	0.0	2.2	-	2.2
Lepomis macrochirus	500.0	±	0.0	500.0	-	500.0	27.7	±	0.0	27.7	-	27.7
Lepomis megalotis	641.7	±	0.0	641.7	-	641.7	19.0	±	0.0	19.0	-	19.0
Lepomis microlophus	69.4	±	0.0	69.4	-	69.4	13.0	±	0.0	13.0	-	13.0
						1976 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	42.8	±	2.3	40.8	-	45.3	1.0	±	0.1	0.9	-	1.0
Lepomis gulosus	82.1	±	76.2	2.8	-	154.7	2.4	±	2.4	0.2	-	5.0
Lepomis macrochirus	1378.3	±	914.3	536.6	-	2351.1	32.4	±	15.1	18.6	-	48.5
Lepomis megalotis	1172.7	±	502.6	628.2	-	1618.9	24.1	±	9.3	15.8	-	34.2
Lepomis microlophus	186.7	±	176.4	64.2	-	388.9	6.4	±	4.7	1.9	-	11.3
						1977 (n = 7)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	79.9	±	38.6	56.0	-	124.4	1.6	±	0.5	1.1	-	2.1
Lepomis gulosus	35.7	±	33.3	1.4	-	68.0	0.8	±	0.6	0.3	-	1.5
Lepomis macrochirus	868.8	±	292.0	568.0	-	1151.1	30.3	±	8.4	22.1	-	38.8
Lepomis megalotis	1095.2	±	448.3	743.7	-	1600.0	24.4	±	4.5	19.4	-	28.0
Lepomis microlophus	106.7	±	79.4	52.0	-	197.8	6.2	±	3.4	2.8	-	9.6
						1983 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	38.0	±	50.2	2.6	-	73.5	1.0	±	1.1	0.2	-	1.8
Lepomis gulosus	25.9	±	25.8	7.7	-	44.1	0.9	±	1.0	0.2	-	1.5
Lepomis macrochirus	429.8	±	303.2	215.4	-	644.1	20.2	±	9.9	13.2	-	27.1
Lepomis megalotis	203.2	±	178.5	76.9	-	329.4	6.3	±	5.3	2.5	-	10.0
Lepomis microlophus	42.9	±	10.0	35.9	-	50.0	8.6	±	1.0	7.9	-	9.4

Appendix E.2 Percent abundance of *Lepomis* spp. collected from TVA cove-rotenone samples (1949-1983) in Wilson Reservoir and tributary reservoirs in the Tennessee River drainage.

Year	Percent Abundance						Total Number
	Lepomis auritus	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	
				Wilson Reservoir			
1949	0.00	8.90	2.97	74.48	8.61	0.00	337
1950	10.27	5.37	5.48	62.21	10.50	0.00	876
1951	0.00	17.12	5.71	54.62	16.30	1.90	368
1952	0.00	8.68	5.58	60.00	10.70	1.55	645
1953	0.00	5.18	5.83	72.49	12.62	3.56	309
1954	0.00	5.49	1.50	72.55	14.81	3.49	601
1955	0.00	4.62	3.16	70.07	18.73	3.41	411
1956	0.00	0.50	2.97	82.18	10.40	3.22	404
1957	0.00	2.80	3.20	65.20	10.80	12.00	250
1958	0.00	2.37	3.10	67.58	22.04	4.92	549
1959	0.00	6.64	2.37	71.77	15.30	3.80	843
1960	0.00	4.67	2.47	50.82	37.09	4.95	364
1962	0.00	11.65	3.69	34.95	44.85	4.85	515
1976	0.00	1.62	2.78	47.11	42.08	6.39	4458
1977	0.00	3.59	1.48	40.82	49.00	4.70	3508
1983	0.00	5.00	3.46	58.27	27.31	5.96	520

Appendix E.3 Summary statistics for relative density (CPUE) of *Lepomis* spp. collected from TVA electrofishing samples (1993-2011) in Wilson Reservoir in the Tennessee River drainage.

Species	Mean ± SD	Min - Max	% Abundance
	Wilson Reservoir		
	1993 (n = 2)		
Lepomis auritus	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.02 ± 0.03	0.00 - 0.05	0.44
Lepomis gulosus	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis macrochirus	2.88 ± 0.42	2.58 - 3.18	53.50
Lepomis megalotis	1.83 ± 0.20	1.69 - 1.97	32.85
Lepomis microlophus	0.71 ± 0.13	0.62 - 0.80	13.21
	1994 (n = 2)		
Lepomis auritus	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.78 ± 0.16	0.67 - 0.89	6.10
Lepomis gulosus	0.34 ± 0.49	0.00 - 0.69	2.69
Lepomis macrochirus	8.85 ± 0.68	8.37 - 9.33	60.02
Lepomis megalotis	3.23 ± 0.69	2.74 - 3.72	24.37
Lepomis microlophus	0.91 ± 0.07	0.86 - 0.96	6.83
	1996 (n = 2)		
Lepomis auritus	0.14 ± 0.20	0.00 - 0.29	2.56
Lepomis cyanellus	0.75 ± 0.23	0.59 - 0.92	9.16
Lepomis gulosus	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis macrochirus	4.42 ± 2.51	2.64 - 6.20	51.83
Lepomis megalotis	2.43 ± 0.40	2.15 - 2.72	30.33
Lepomis microlophus	0.44 ± 0.11	0.37 - 0.52	6.13
	1998 (n = 2)		
Lepomis auritus	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.13 ± 0.03	0.11 - 0.14	4.49
Lepomis gulosus	0.15 ± 0.21	0.00 - 0.30	5.11
Lepomis macrochirus	1.68 ± 0.22	1.53 - 1.84	60.70
Lepomis megalotis	0.42 ± 0.15	0.32 - 0.53	15.54
Lepomis microlophus	0.39 ± 0.05	0.36 - 0.42	14.16
	2000 (n = 2)		
Lepomis auritus	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.10 ± 0.14	0.00 - 0.20	4.65
Lepomis gulosus	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis macrochirus	0.91 ± 0.10	0.84 - 0.98	37.74
Lepomis megalotis	0.95 ± 0.72	0.44 - 1.46	35.70

Appendix E.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis microlophus	0.54	±	0.08	0.49	-	0.60	21.91
			2002 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.52	±	0.74	0.00	-	1.05	13.08
Lepomis gulosus	0.09	±	0.13	0.00	-	0.18	2.18
Lepomis macrochirus	1.30	±	0.10	1.23	-	1.37	54.30
Lepomis megalotis	1.21	±	1.24	0.33	-	2.08	25.66
Lepomis microlophus	0.15	±	0.11	0.07	-	0.23	4.79
			2004 (n = 2)				
Lepomis auritus	0.01	±	0.02	0.00	-	0.03	0.46
Lepomis cyanellus	0.35	±	0.21	0.20	-	0.50	9.98
Lepomis gulosus	0.10	±	0.11	0.03	-	0.18	3.58
Lepomis macrochirus	1.40	±	0.52	1.03	-	1.77	41.29
Lepomis megalotis	1.33	±	0.30	1.11	-	1.54	39.88
Lepomis microlophus	0.15	±	0.05	0.12	-	0.18	4.81
			2006 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.78	±	0.02	0.77	-	0.79	14.43
Lepomis gulosus	0.34	±	0.39	0.06	-	0.62	6.12
Lepomis macrochirus	1.93	±	0.97	1.25	-	2.62	36.37
Lepomis megalotis	1.55	±	0.37	1.29	-	1.81	32.19
Lepomis microlophus	0.59	±	0.08	0.53	-	0.65	10.89
			2008 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.15	±	0.38	0.88	-	1.42	10.44
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	3.29	±	0.84	2.69	-	3.88	30.37
Lepomis megalotis	6.38	±	3.10	4.18	-	8.57	56.34
Lepomis microlophus	0.24	±	0.30	0.03	-	0.45	2.85
			2010 (n = 2)				
Lepomis auritus	0.04	±	0.06	0.00	-	0.08	0.64
Lepomis cyanellus	1.89	±	0.29	1.68	-	2.10	26.01
Lepomis gulosus	0.19	±	0.26	0.00	-	0.37	2.06
Lepomis macrochirus	3.04	±	0.51	2.67	-	3.40	40.06
Lepomis megalotis	1.84	±	1.17	1.01	-	2.67	22.78
Lepomis microlophus	0.68	±	0.38	0.41	-	0.94	8.46

APPENDIX F

SUMMARY STATISTICS OF POPULATION PARAMETERS FOR *LEPOMIS* SPECIES COLLECTED FROM TVA COVE-ROTENONESAMPLES (1949-1997) AND ELECTROFISHING SAMPLES (1993-2011) IN WHEELER RESERVOIR AND TRIBUTARY RESERVOIR

Appendix F.1 Summary statistics for density (fish/ha) of *Lepomis* spp. collected from TVA cove-rotenone samples (1960-1997) in Wheeler mainstem reservoir and Tims Ford tributary reservoir in the Tennessee River drainage.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Wheeler Reservoir												
1960 (n = 2)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	134.9	±	43.7	104.0	-	165.9	3.6	±	1.8	2.3	-	4.9
Lepomis gulosus	166.9	±	29.6	146.0	-	187.8	4.9	±	2.6	3.0	-	6.7
Lepomis macrochirus	2864.9	±	1022.3	2142.0	-	3587.8	134.7	±	55.9	95.2	-	174.2
Lepomis megalotis	28.1	±	22.5	12.2	-	44.0	1.3	±	1.1	0.4	-	2.1
Lepomis microlophus	92.0	±	50.8	56.1	-	128.0	7.4	±	4.3	4.4	-	10.5
1961 (n = 3)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	120.1	±	129.6	0.0	-	257.4	2.5	±	2.4	0.0	-	4.9
Lepomis gulosus	40.0	±	32.7	3.0	-	65.0	1.8	±	1.4	0.2	-	3.0
Lepomis macrochirus	1389.2	±	1455.6	460.0	-	3066.7	51.4	±	52.3	19.9	-	111.8
Lepomis megalotis	234.1	±	190.2	15.0	-	357.6	6.8	±	5.8	0.5	-	11.8
Lepomis microlophus	125.8	±	125.0	22.7	-	264.8	7.7	±	5.6	2.6	-	13.7
1969 (n = 3)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	130.0	±	99.5	15.1	-	189.8	3.6	±	3.0	0.5	-	6.6
Lepomis gulosus	367.6	±	380.1	7.6	-	765.0	11.5	±	11.8	0.7	-	24.1
Lepomis macrochirus	1400.6	±	981.5	500.8	-	2447.3	50.2	±	35.2	17.7	-	87.6
Lepomis megalotis	1043.1	±	640.5	586.6	-	1775.3	30.5	±	22.8	15.4	-	56.7
Lepomis microlophus	767.7	±	604.6	210.9	-	1410.8	30.5	±	24.4	5.4	-	54.3
1970 (n = 2)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	87.4	±	71.1	37.1	-	137.7	2.0	±	1.6	0.8	-	3.1
Lepomis gulosus	117.9	±	159.8	4.9	-	230.9	4.2	±	5.7	0.2	-	8.2
Lepomis macrochirus	1688.3	±	1462.9	653.8	-	2722.7	117.9	±	148.2	13.2	-	222.7
Lepomis megalotis	778.0	±	763.0	238.5	-	1317.5	19.0	±	21.3	3.9	-	34.1
Lepomis microlophus	167.7	±	63.2	123.1	-	212.4	11.2	±	9.2	4.7	-	17.6
1971 (n = 2)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	70.9	±	63.7	25.9	-	116.0	1.6	±	1.4	0.6	-	2.6
Lepomis gulosus	63.1	±	86.3	2.1	-	124.2	2.8	±	3.9	0.1	-	5.6
Lepomis macrochirus	1263.7	±	854.6	659.4	-	1868.0	43.1	±	34.3	18.8	-	67.4
Lepomis megalotis	549.9	±	465.2	221.0	-	878.9	12.4	±	13.2	3.1	-	21.8
Lepomis microlophus	74.5	±	73.8	22.4	-	126.7	8.7	±	9.4	2.0	-	15.3
1972 (n = 2)												
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	44.4	±	49.0	9.8	-	79.1	1.3	±	1.3	0.4	-	2.2
Lepomis gulosus	71.8	±	92.7	6.3	-	137.4	2.1	±	2.5	0.3	-	3.9

Appendix F.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis macrochirus	1558.3	±	1550.0	462.2	-	2654.3	49.9	±	52.3	13.0	-	86.9
Lepomis megalotis	566.3	±	366.7	307.0	-	825.6	13.8	±	11.7	5.5	-	22.1
Lepomis microlophus	66.2	±	42.2	36.4	-	96.0	7.0	±	6.1	2.7	-	11.3
						1973 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	54.4	±	54.3	0.0	-	127.3	1.2	±	1.1	0.0	-	2.5
Lepomis gulosus	48.7	±	67.3	0.0	-	146.1	1.5	±	2.4	0.0	-	5.1
Lepomis macrochirus	604.9	±	700.3	0.0	-	1583.9	21.6	±	23.3	0.0	-	49.6
Lepomis megalotis	313.7	±	348.8	19.0	-	813.4	7.0	±	7.3	0.9	-	17.5
Lepomis microlophus	69.8	±	66.6	0.0	-	156.2	4.2	±	4.2	0.0	-	8.7
						1974 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	10.4	±	1.4	9.4	-	11.4	0.2	±	0.1	0.1	-	0.3
Lepomis gulosus	96.3	±	136.1	0.0	-	192.5	2.6	±	3.6	0.0	-	5.1
Lepomis macrochirus	977.3	±	1149.4	164.6	-	1790.1	22.4	±	26.8	3.5	-	41.4
Lepomis megalotis	597.5	±	610.5	165.8	-	1029.2	9.8	±	10.6	2.3	-	17.2
Lepomis microlophus	112.9	±	89.9	49.4	-	176.5	4.8	±	4.4	1.7	-	7.9
						1975 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	28.8	±	0.2	28.7	-	29.0	0.7	±	0.2	0.5	-	0.8
Lepomis gulosus	114.9	±	148.6	9.8	-	220.0	3.8	±	4.8	0.4	-	7.2
Lepomis macrochirus	1957.4	±	1968.1	565.7	-	3349.0	43.7	±	45.6	11.4	-	75.9
Lepomis megalotis	924.1	±	706.6	424.5	-	1423.8	16.7	±	14.0	6.8	-	26.6
Lepomis microlophus	126.2	±	74.6	73.4	-	178.9	9.6	±	9.7	2.8	-	16.5
						1976 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	35.5	±	20.6	16.9	-	57.7	0.8	±	0.5	0.3	-	1.3
Lepomis gulosus	121.9	±	196.1	5.0	-	348.3	3.0	±	4.7	0.1	-	8.4
Lepomis macrochirus	2974.9	±	2374.3	1310.8	-	5693.8	75.2	±	51.9	38.9	-	134.7
Lepomis megalotis	1616.0	±	668.6	855.5	-	2111.1	29.3	±	12.9	14.4	-	37.2
Lepomis microlophus	353.4	±	245.6	115.4	-	605.9	16.6	±	9.9	7.6	-	27.3
						1977 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	70.9	±	26.0	51.4	-	100.4	1.4	±	0.5	0.9	-	2.0
Lepomis gulosus	84.9	±	140.8	1.6	-	247.4	2.4	±	4.1	0.0	-	7.2
Lepomis macrochirus	2065.0	±	1868.5	620.0	-	4175.0	55.4	±	48.0	23.0	-	110.5
Lepomis megalotis	1488.4	±	1248.7	752.1	-	2930.1	24.1	±	19.1	11.2	-	46.0
Lepomis microlophus	211.1	±	132.2	62.5	-	315.7	12.1	±	6.8	4.2	-	16.4
						1978 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	88.2	±	70.5	27.3	-	165.4	1.9	±	1.6	0.6	-	3.7
Lepomis gulosus	75.1	±	118.9	3.5	-	212.4	2.0	±	3.2	0.1	-	5.8
Lepomis macrochirus	2131.2	±	2291.7	468.5	-	4745.3	56.5	±	58.3	10.8	-	122.2
Lepomis megalotis	1269.6	±	1028.9	452.4	-	2425.0	24.1	±	19.6	8.5	-	46.1

Appendix F.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis microlophus	127.5	±	66.8	71.9	-	201.6	14.6	±	7.8	6.9	-	22.5
						1979 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	119.3	±	87.8	37.9	-	223.3	2.3	±	2.1	0.7	-	5.3
Lepomis gulosus	57.4	±	100.2	0.0	-	206.9	1.6	±	2.9	0.0	-	5.9
Lepomis macrochirus	1585.4	±	2716.7	0.0	-	5640.0	42.2	±	72.3	0.0	-	149.9
Lepomis megalotis	868.3	±	1494.4	0.0	-	3093.8	16.2	±	27.1	0.0	-	56.4
Lepomis microlophus	124.8	±	167.8	0.0	-	367.5	9.9	±	12.4	0.0	-	26.8
						1980 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	96.0	±	56.9	55.7	-	136.3	3.0	±	2.1	1.5	-	4.4
Lepomis gulosus	90.7	±	112.1	11.4	-	170.0	2.8	±	3.4	0.4	-	5.2
Lepomis macrochirus	1789.8	±	1283.7	882.1	-	2697.5	68.1	±	34.9	43.4	-	92.8
Lepomis megalotis	730.5	±	759.4	193.6	-	1267.5	18.5	±	18.1	5.7	-	31.2
Lepomis microlophus	180.3	±	45.0	148.5	-	212.1	17.8	±	2.8	15.8	-	19.7
						1981 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	31.7	±	34.5	7.3	-	56.1	0.9	±	0.9	0.2	-	1.5
Lepomis gulosus	19.2	±	21.5	4.0	-	34.4	0.5	±	0.5	0.2	-	0.9
Lepomis macrochirus	3997.6	±	4015.7	1158.1	-	6837.1	83.9	±	80.1	27.3	-	140.6
Lepomis megalotis	1679.6	±	1831.3	384.7	-	2974.5	29.8	±	30.4	8.3	-	51.4
Lepomis microlophus	273.4	±	127.7	183.1	-	363.7	16.6	±	0.4	16.3	-	16.9
						1982 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	78.9	±	97.8	9.7	-	148.0	2.4	±	3.1	0.2	-	4.7
Lepomis gulosus	95.1	±	102.6	22.6	-	167.6	3.0	±	3.5	0.5	-	5.5
Lepomis macrochirus	4084.2	±	4188.3	1122.6	-	7045.7	99.9	±	99.9	29.2	-	170.6
Lepomis megalotis	2045.7	±	2118.7	547.6	-	3543.8	42.0	±	42.1	12.2	-	71.8
Lepomis microlophus	423.1	±	75.7	369.6	-	476.6	28.9	±	8.1	23.1	-	34.6
						1983 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	128.6	±	170.0	8.4	-	248.8	4.1	±	5.5	0.2	-	8.0
Lepomis gulosus	103.6	±	139.4	5.0	-	202.2	3.5	±	4.6	0.3	-	6.8
Lepomis macrochirus	2547.8	±	1521.0	1472.3	-	3623.4	62.7	±	45.1	30.8	-	94.6
Lepomis megalotis	1340.7	±	1462.2	306.7	-	2374.6	31.9	±	31.3	9.8	-	54.0
Lepomis microlophus	539.0	±	428.4	236.1	-	841.9	29.7	±	22.0	14.2	-	45.3
						1984 (n = 2)						
Lepomis auritus	0.4	±	0.6	0.0	-	0.8	0.0	±	0.0	0.0	-	0.1
Lepomis cyanellus	41.0	±	33.4	17.4	-	64.6	0.8	±	0.6	0.3	-	1.2
Lepomis gulosus	241.2	±	331.7	6.6	-	475.8	7.7	±	10.6	0.2	-	15.1
Lepomis macrochirus	1471.2	±	1694.9	272.7	-	2669.7	43.6	±	53.2	6.0	-	81.2
Lepomis megalotis	688.5	±	704.8	190.1	-	1186.9	16.5	±	17.8	3.9	-	29.1

Appendix F.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis microlophus	235.7	±	248.0	60.3	-	411.1	15.9	±	18.4	2.9	-	28.9
						1985 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	56.4	±	69.9	7.0	-	105.8	1.5	±	1.9	0.2	-	2.9
Lepomis gulosus	48.7	±	60.2	6.1	-	91.3	1.8	±	2.1	0.3	-	3.2
Lepomis macrochirus	1690.4	±	1710.7	480.7	-	2900.0	48.7	±	55.0	9.8	-	87.6
Lepomis megalotis	854.2	±	791.2	294.7	-	1413.6	16.6	±	16.2	5.2	-	28.1
Lepomis microlophus	115.4	±	82.6	57.0	-	173.8	10.7	±	12.0	2.2	-	19.1
						1986 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	62.1	±	66.2	15.3	-	108.9	1.9	±	2.0	0.5	-	3.3
Lepomis gulosus	83.4	±	118.0	0.0	-	166.8	3.0	±	4.3	0.0	-	6.0
Lepomis macrochirus	3028.4	±	2802.7	1046.6	-	5010.3	83.6	±	79.5	27.4	-	139.8
Lepomis megalotis	799.0	±	845.9	200.8	-	1397.2	19.7	±	19.2	6.1	-	33.3
Lepomis microlophus	174.3	±	9.2	167.8	-	180.8	13.3	±	10.3	6.1	-	20.6
						1987 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	47.3	±	25.3	29.4	-	65.1	1.4	±	1.2	0.5	-	2.2
Lepomis gulosus	56.7	±	76.6	2.5	-	110.8	2.9	±	3.9	0.1	-	5.6
Lepomis macrochirus	3379.9	±	4003.8	548.7	-	6211.0	83.3	±	100.9	12.0	-	154.6
Lepomis megalotis	1448.1	±	1851.9	138.7	-	2757.6	32.6	±	42.0	2.9	-	62.3
Lepomis microlophus	1368.9	±	1635.3	212.6	-	2525.2	38.0	±	45.3	6.0	-	70.1
						1988 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	122.4	±	136.0	26.2	-	218.6	3.8	±	3.0	1.7	-	5.9
Lepomis gulosus	52.8	±	51.5	16.4	-	89.2	1.9	±	1.8	0.6	-	3.2
Lepomis macrochirus	7525.7	±	8477.5	1531.2	-	13520.2	154.4	±	176.3	29.7	-	279.0
Lepomis megalotis	1187.4	±	1563.3	82.0	-	2292.9	23.7	±	31.0	1.7	-	45.6
Lepomis microlophus	833.7	±	523.0	463.9	-	1203.5	32.4	±	24.8	14.9	-	50.0
						1989 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	49.4	±	61.9	5.6	-	93.1	1.6	±	2.0	0.2	-	3.0
Lepomis gulosus	77.3	±	76.3	23.4	-	131.2	3.4	±	2.8	1.5	-	5.4
Lepomis macrochirus	3855.9	±	2922.3	1789.5	-	5922.3	109.7	±	89.4	46.5	-	172.9
Lepomis megalotis	596.5	±	405.6	309.7	-	883.3	13.2	±	8.6	7.1	-	19.3
Lepomis microlophus	501.4	±	165.1	384.7	-	618.1	24.9	±	11.8	16.5	-	33.2
						1990 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	47.3	±	19.7	33.3	-	61.2	1.4	±	1.2	0.5	-	2.3
Lepomis gulosus	66.8	±	59.7	24.6	-	109.0	3.1	±	3.2	0.8	-	5.3
Lepomis macrochirus	2255.9	±	2250.9	664.3	-	3847.5	61.0	±	58.4	19.7	-	102.3
Lepomis megalotis	585.8	±	195.5	447.6	-	724.1	11.4	±	6.8	6.6	-	16.2
Lepomis microlophus	326.2	±	309.9	107.1	-	545.4	20.2	±	19.5	6.4	-	34.0

Appendix F.1 Continued.

Species	fish/ha							kg/ha					
	Mean	±	SD	(min	-	max)		Mean	±	SD	(min	-	max)
						1991 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	61.5	±	55.3	22.4	-	100.7		1.8	±	2.0	0.3	-	3.2
Lepomis gulosus	64.4	±	82.1	6.4	-	122.5		1.9	±	2.5	0.1	-	3.6
Lepomis macrochirus	5585.4	±	7303.9	420.8	-	10750.0		187.9	±	253.3	8.8	-	367.0
Lepomis megalotis	679.6	±	567.5	278.4	-	1080.9		13.7	±	11.8	5.4	-	22.0
Lepomis microlophus	185.3	±	70.9	135.2	-	235.4		13.7	±	7.1	8.7	-	18.7
						1992 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	48.2	±	63.8	3.1	-	93.3		0.9	±	1.2	0.1	-	1.8
Lepomis gulosus	70.9	±	95.9	3.1	-	138.8		2.5	±	3.4	0.1	-	4.8
Lepomis macrochirus	10404.2	±	14106.4	429.5	-	20378.9		306.5	±	421.5	8.4	-	604.5
Lepomis megalotis	542.3	±	523.5	172.1	-	912.5		11.6	±	12.0	3.1	-	20.1
Lepomis microlophus	365.0	±	254.2	185.3	-	544.7		20.5	±	21.6	5.2	-	35.7
						1993 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	19.8	±	28.0	0.0	-	39.7		0.5	±	0.7	0.0	-	1.1
Lepomis gulosus	46.9	±	57.4	6.3	-	87.5		1.5	±	1.8	0.2	-	2.8
Lepomis macrochirus	2363.2	±	2992.9	246.8	-	4479.5		73.4	±	98.1	4.0	-	142.8
Lepomis megalotis	487.8	±	368.9	227.0	-	748.7		9.6	±	7.0	4.7	-	14.5
Lepomis microlophus	207.5	±	40.9	178.6	-	236.3		20.0	±	12.1	11.4	-	28.6
						1994 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	21.9	±	30.9	0.0	-	43.7		0.9	±	1.3	0.0	-	1.9
Lepomis gulosus	42.0	±	52.6	4.8	-	79.2		1.7	±	2.2	0.2	-	3.3
Lepomis macrochirus	2461.8	±	2929.5	390.3	-	4533.3		69.8	±	87.8	7.7	-	131.9
Lepomis megalotis	568.6	±	651.2	108.1	-	1029.1		11.9	±	14.3	1.8	-	22.0
Lepomis microlophus	157.3	±	138.1	59.7	-	254.9		12.9	±	14.6	2.6	-	23.3
						1995 (n = 2)							
Lepomis auritus	0.5	±	0.6	0.0	-	0.9		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	36.3	±	49.1	1.6	-	71.1		1.1	±	1.5	0.0	-	2.2
Lepomis gulosus	76.9	±	108.8	0.0	-	153.9		2.1	±	3.0	0.0	-	4.2
Lepomis macrochirus	2021.1	±	2478.5	268.5	-	3773.6		72.8	±	89.8	9.3	-	136.4
Lepomis megalotis	347.3	±	435.3	39.5	-	655.1		8.6	±	10.7	1.0	-	16.1
Lepomis microlophus	193.3	±	129.7	101.6	-	285.0		15.2	±	12.4	6.5	-	23.9
						1996 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	13.4	±	15.5	2.4	-	24.3		0.5	±	0.6	0.0	-	0.9
Lepomis gulosus	37.1	±	46.8	4.0	-	70.2		1.5	±	1.5	0.4	-	2.5
Lepomis macrochirus	1110.3	±	1419.7	106.3	-	2114.2		44.0	±	53.6	6.1	-	81.9
Lepomis megalotis	432.2	±	533.7	54.8	-	809.6		8.8	±	10.4	1.4	-	16.1
Lepomis microlophus	78.3	±	81.5	20.6	-	135.9		11.4	±	12.7	2.5	-	20.4
						1997 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0

Appendix F.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis cyanellus	8.1	±	9.2	1.6	-	14.7	0.2	±	0.3	0.0	-	0.5
Lepomis gulosus	39.6	±	40.0	11.3	-	67.9	1.3	±	1.0	0.6	-	2.0
Lepomis macrochirus	1355.8	±	1423.6	349.2	-	2362.4	40.0	±	40.2	11.6	-	68.4
Lepomis megalotis	266.1	±	247.4	91.1	-	441.0	5.8	±	5.1	2.2	-	9.4
Lepomis microlophus	100.1	±	98.2	30.6	-	169.5	8.5	±	7.0	3.5	-	13.5
						Tims Ford						
						1974 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	10.7	±	18.8	0.0	-	32.6	0.1	±	0.2	0.0	-	0.3
Lepomis gulosus	2.1	±	3.7	0.0	-	6.4	0.0	±	0.1	0.0	-	0.1
Lepomis macrochirus	137.3	±	124.6	52.8	-	280.4	2.4	±	1.4	1.3	-	4.0
Lepomis megalotis	85.8	±	15.2	72.2	-	102.2	1.6	±	0.2	1.4	-	1.8
Lepomis microlophus	1.4	±	1.2	0.0	-	2.2	0.1	±	0.2	0.0	-	0.4
						1976 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	84.8	±	91.7	8.8	-	209.3	1.1	±	1.1	0.1	-	2.5
Lepomis gulosus	26.3	±	17.0	8.8	-	48.9	0.4	±	0.2	0.1	-	0.6
Lepomis macrochirus	1559.2	±	424.4	1008.5	-	1925.6	24.2	±	6.6	15.8	-	30.4
Lepomis megalotis	323.8	±	68.9	246.8	-	402.3	5.3	±	1.4	4.2	-	7.3
Lepomis microlophus	7.1	±	10.0	0.0	-	21.3	0.4	±	0.6	0.0	-	1.3
						1984 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	49.5	±	37.8	22.7	-	76.2	0.6	±	0.6	0.2	-	1.0
Lepomis gulosus	21.4	±	27.0	2.3	-	40.5	0.4	±	0.6	0.0	-	0.9
Lepomis macrochirus	1031.4	±	529.3	657.1	-	1405.7	20.5	±	8.0	14.9	-	26.1
Lepomis megalotis	138.1	±	2.3	136.5	-	139.8	2.7	±	0.6	2.2	-	3.1
Lepomis microlophus	2.8	±	4.0	0.0	-	5.6	0.1	±	0.1	0.0	-	0.2

Appendix F.2 Percent abundance of *Lepomis* spp. collected from TVA cove-rotenone samples (1949-1997) in Wheeler mainstem reservoir in the Tennessee River drainage.

Year	*Lepomis auritus*	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
			Percent Abundance				
			Wheeler Reservoir				
1949	0.00	2.95	1.64	75.74	15.08	0.00	305
1950	2.99	0.66	6.31	35.55	13.29	29.90	301
1951	0.00	3.91	1.07	72.24	12.10	0.71	281
1952	0.00	3.50	1.56	79.18	10.70	0.00	514
1953	0.00	1.75	1.36	83.62	12.63	0.51	808
1954	0.00	3.08	0.19	72.80	23.93	0.00	1070
1955	0.00	3.08	1.97	90.28	0.16	0.98	2439
1956	0.00	2.32	4.98	83.58	4.81	3.81	603
1957	0.00	1.01	2.09	91.87	1.01	2.09	1291
1958	0.00	1.79	11.59	46.48	1.94	7.05	1958
1959	0.00	5.42	2.57	78.50	0.56	3.88	2140
1960	0.00	4.02	5.03	85.24	0.91	2.92	2982
1961	0.00	5.99	1.62	65.50	12.16	5.62	3445
1969	0.00	3.36	9.20	36.97	29.38	21.08	10084
1970	0.00	3.04	3.70	59.50	26.80	6.73	5486
1971	0.00	3.36	2.63	61.94	28.50	3.57	3807
1972	0.00	1.70	2.65	67.03	25.20	3.00	4531
1973	0.00	3.54	4.02	54.20	31.93	6.14	3583
1974	0.00	0.48	5.22	56.00	32.24	6.06	3102
1975	0.00	1.03	3.15	61.30	30.02	4.10	6705
1976	0.00	0.71	2.08	58.68	30.06	8.19	13145
1977	0.00	1.88	1.92	48.45	36.58	6.59	10534
1978	0.00	2.36	1.95	57.07	33.75	3.88	10005
1979	0.00	2.95	2.04	57.49	32.09	4.75	9368
1980	0.00	3.01	2.41	54.62	20.69	6.71	6212
1981	0.00	0.52	0.32	66.58	27.81	4.74	12577
1982	0.00	1.13	1.38	59.21	29.64	6.42	15620
1983	0.00	2.62	2.10	55.30	27.85	11.50	9367
1984	0.02	1.53	8.63	53.57	25.32	8.65	5550
1985	0.00	2.02	1.74	60.91	30.88	4.20	5804
1986	0.00	1.47	1.95	72.33	18.96	4.35	8836
1987	0.00	0.76	0.89	53.26	22.71	21.46	13772
1988	0.00	1.25	0.56	76.88	12.38	8.65	22417
1989	0.00	0.95	1.51	75.64	11.67	9.87	12224
1990	0.00	1.31	1.86	61.90	16.21	8.92	8635
1991	0.00	0.92	0.98	84.68	10.47	2.92	14636
1992	0.00	0.42	0.61	90.75	4.81	3.29	25863
1993	0.00	0.62	1.51	75.25	15.47	6.76	7413
1994	0.00	0.65	1.28	75.17	17.48	4.87	7656
1995	0.02	1.33	2.87	74.81	13.04	7.33	6313

Appendix F.2 Continued.

Year	Percent Abundance						Total Number
	Lepomis auritus	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	
1996	0.00	0.79	2.22	65.92	25.55	4.73	3914
1997	0.00	0.43	2.20	75.47	14.89	5.68	4224

Appendix F.3 Summary statistics for relative density (CPUE) of *Lepomis* spp. collected from TVA electrofishing samples (1993-2011) in Wheeler mainstem reservoir and Tims Ford tributary reservoir in the Tennessee River drainage.

Species	Mean	±	SD	Min	-	Max	% Abundance
			Wheeler Reservoir				
			1993 (n = 4)				
Lepomis auritus	0.14	±	0.21	0.00	-	0.44	2.10
Lepomis cyanellus	0.00	±	0.01	0.00	-	0.01	0.05
Lepomis gulosus	0.30	±	0.30	0.00	-	0.66	3.90
Lepomis macrochirus	4.07	±	3.14	1.26	-	6.94	43.69
Lepomis megalotis	2.27	±	1.14	1.22	-	3.86	36.85
Lepomis microlophus	0.81	±	0.19	0.54	-	1.00	13.42
			1994 (n = 4)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.07	±	1.33	0.00	-	2.76	3.04
Lepomis gulosus	1.00	±	1.41	0.00	-	2.99	10.43
Lepomis macrochirus	10.00	±	9.07	2.64	-	23.02	47.60
Lepomis megalotis	6.85	±	8.29	1.23	-	19.17	30.29
Lepomis microlophus	0.77	±	0.34	0.27	-	0.97	8.64
			1995 (n = 4)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.03	±	0.03	0.00	-	0.06	0.38
Lepomis gulosus	0.13	±	0.26	0.00	-	0.52	0.86
Lepomis macrochirus	5.30	±	4.54	0.83	-	11.63	72.13
Lepomis megalotis	0.51	±	0.15	0.29	-	0.63	10.73
Lepomis microlophus	0.71	±	0.34	0.31	-	1.13	15.90
			1997 (n = 4)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.03	±	0.06	0.00	-	0.11	0.62
Lepomis gulosus	0.10	±	0.14	0.00	-	0.30	1.77
Lepomis macrochirus	2.36	±	1.25	1.14	-	4.07	58.09
Lepomis megalotis	0.96	±	0.94	0.10	-	1.87	24.34
Lepomis microlophus	0.52	±	0.29	0.21	-	0.90	15.19
			1999 (n = 4)				
Lepomis auritus	0.07	±	0.13	0.00	-	0.27	2.53
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.03	±	0.05	0.00	-	0.10	0.95
Lepomis macrochirus	0.65	±	0.44	0.00	-	1.00	33.17

Appendix F.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis megalotis	0.34	±	0.27	0.00	-	0.63	16.92
Lepomis microlophus	0.71	±	0.33	0.25	-	1.00	46.43
			2000 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.02	±	0.03	0.00	-	0.04	1.52
Lepomis macrochirus	0.35	±	0.21	0.20	-	0.50	24.43
Lepomis megalotis	0.50	±	0.71	0.00	-	1.00	31.25
Lepomis microlophus	0.62	±	0.31	0.40	-	0.83	42.80
			2001 (n = 5)				
Lepomis auritus	0.38	±	0.84	0.00	-	1.88	4.91
Lepomis cyanellus	0.18	±	0.11	0.03	-	0.33	5.85
Lepomis gulosus	0.17	±	0.22	0.00	-	0.55	2.62
Lepomis macrochirus	1.57	±	0.59	0.94	-	2.19	30.77
Lepomis megalotis	2.80	±	1.73	0.72	-	5.14	41.27
Lepomis microlophus	0.63	±	0.24	0.32	-	0.96	14.58
			2002 (n = 4)				
Lepomis auritus	0.20	±	0.40	0.00	-	0.79	4.95
Lepomis cyanellus	0.19	±	0.09	0.11	-	0.27	4.16
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	3.18	±	3.57	0.99	-	8.47	40.15
Lepomis megalotis	2.08	±	2.08	0.24	-	4.94	37.05
Lepomis microlophus	0.86	±	0.58	0.31	-	1.65	13.69
			2003 (n = 5)				
Lepomis auritus	0.13	±	0.28	0.00	-	0.63	3.84
Lepomis cyanellus	1.28	±	1.86	0.00	-	4.53	9.46
Lepomis gulosus	0.49	±	0.78	0.00	-	1.82	3.65
Lepomis macrochirus	1.90	±	1.52	0.98	-	4.50	23.56
Lepomis megalotis	6.40	±	9.68	0.70	-	23.64	47.59
Lepomis microlophus	0.51	±	0.38	0.04	-	0.95	11.89
			2004 (n = 5)				
Lepomis auritus	0.08	±	0.11	0.00	-	0.21	2.48
Lepomis cyanellus	0.76	±	1.38	0.00	-	3.22	7.39
Lepomis gulosus	0.15	±	0.20	0.00	-	0.38	2.41
Lepomis macrochirus	1.36	±	0.68	0.97	-	2.55	29.66
Lepomis megalotis	2.75	±	2.41	0.14	-	6.54	45.05
Lepomis microlophus	0.51	±	0.23	0.21	-	0.75	13.02
			2005 (n = 5)				
Lepomis auritus	0.05	±	0.12	0.00	-	0.26	0.80
Lepomis cyanellus	1.92	±	2.00	0.25	-	5.00	21.17

Appendix F.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis gulosus	0.20	±	0.25	0.00	-	0.58	4.20
Lepomis macrochirus	2.84	±	2.22	0.85	-	6.29	37.09
Lepomis megalotis	1.99	±	0.88	0.82	-	3.15	26.95
Lepomis microlophus	0.66	±	0.19	0.43	-	0.91	9.79
			2006 (n = 4)				
Lepomis auritus	0.01	±	0.02	0.00	-	0.04	0.31
Lepomis cyanellus	0.47	±	0.34	0.00	-	0.79	10.16
Lepomis gulosus	0.18	±	0.22	0.00	-	0.42	4.66
Lepomis macrochirus	1.86	±	1.56	0.88	-	4.16	37.51
Lepomis megalotis	1.34	±	0.60	0.73	-	2.04	29.46
Lepomis microlophus	0.70	±	0.25	0.46	-	0.98	17.89
			2007 (n = 5)				
Lepomis auritus	0.23	±	0.39	0.00	-	0.90	5.10
Lepomis cyanellus	0.57	±	0.37	0.00	-	0.84	8.27
Lepomis gulosus	0.25	±	0.23	0.00	-	0.61	3.31
Lepomis macrochirus	2.36	±	1.35	1.46	-	4.71	35.24
Lepomis megalotis	2.33	±	1.28	1.13	-	4.27	34.67
Lepomis microlophus	0.78	±	0.21	0.44	-	0.95	13.41
			2008 (n = 4)				
Lepomis auritus	0.21	±	0.43	0.00	-	0.85	4.60
Lepomis cyanellus	0.27	±	0.23	0.00	-	0.51	4.99
Lepomis gulosus	0.09	±	0.09	0.01	-	0.17	1.70
Lepomis macrochirus	2.41	±	1.88	0.94	-	5.14	36.59
Lepomis megalotis	2.35	±	1.66	0.69	-	4.40	36.25
Lepomis microlophus	0.86	±	0.13	0.70	-	0.98	15.87
			2009 (n = 5)				
Lepomis auritus	0.17	±	0.35	0.00	-	0.79	1.79
Lepomis cyanellus	1.22	±	0.77	0.43	-	2.10	15.06
Lepomis gulosus	0.33	±	0.35	0.00	-	0.91	4.15
Lepomis macrochirus	3.03	±	2.22	0.92	-	5.65	32.70
Lepomis megalotis	2.81	±	0.53	2.32	-	3.65	35.56
Lepomis microlophus	0.85	±	0.11	0.73	-	0.98	10.68
			2010 (n = 4)				
Lepomis auritus	0.26	±	0.47	0.00	-	0.96	2.97
Lepomis cyanellus	1.39	±	0.94	0.64	-	2.76	15.98
Lepomis gulosus	0.17	±	0.10	0.04	-	0.29	2.05
Lepomis macrochirus	2.42	±	1.78	0.95	-	4.63	28.31
Lepomis megalotis	3.41	±	1.15	1.95	-	4.71	41.56
Lepomis microlophus	0.70	±	0.30	0.29	-	0.97	9.12

Appendix F.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2011 (n = 5)				
Lepomis auritus	0.03	±	0.06	0.00	-	0.13	1.49
Lepomis cyanellus	1.65	±	1.58	0.00	-	4.16	19.63
Lepomis gulosus	0.64	±	0.83	0.01	-	2.06	6.82
Lepomis macrochirus	3.37	±	2.78	0.97	-	6.61	41.02
Lepomis megalotis	1.87	±	1.13	0.15	-	2.98	21.07
Lepomis microlophus	0.50	±	0.22	0.26	-	0.81	9.97
			Tims Ford Reservoir				
			1993 (n = 2)				
Lepomis auritus	0.50	±	0.67	0.03	-	0.97	1.38
Lepomis cyanellus	6.41	±	6.92	1.52	-	11.31	20.44
Lepomis gulosus	0.35	±	0.49	0.00	-	0.70	4.20
Lepomis macrochirus	17.07	±	15.78	5.91	-	28.22	65.82
Lepomis megalotis	2.99	±	4.02	0.15	-	5.83	8.17
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1994 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	3.47	±	1.65	2.31	-	4.64	24.03
Lepomis gulosus	0.02	±	0.03	0.00	-	0.04	0.10
Lepomis macrochirus	11.43	±	6.90	6.55	-	16.30	73.93
Lepomis megalotis	0.41	±	0.57	0.00	-	0.81	1.94
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1995 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	6.68	±	0.00	6.68	-	6.68	49.29
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	7.38	±	0.00	7.38	-	7.38	49.20
Lepomis megalotis	0.03	±	0.00	0.03	-	0.03	1.51
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1996 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	3.82	±	0.79	3.26	-	4.38	42.09
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	4.00	±	0.98	3.30	-	4.69	49.53
Lepomis megalotis	0.40	±	0.57	0.00	-	0.81	8.38
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1998 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.69	±	0.36	0.43	-	0.94	22.38

Appendix F.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	3.94	±	3.56	1.42	-	6.46	56.24
Lepomis megalotis	1.49	±	1.41	0.49	-	2.49	21.38
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2000 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.17	±	1.57	0.06	-	2.28	18.10
Lepomis gulosus	0.26	±	0.36	0.00	-	0.52	3.35
Lepomis macrochirus	2.08	±	1.53	1.00	-	3.16	67.77
Lepomis megalotis	0.81	±	1.14	0.00	-	1.62	10.78
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2002 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.64	±	1.73	0.42	-	2.86	22.72
Lepomis gulosus	0.17	±	0.08	0.12	-	0.23	4.95
Lepomis macrochirus	1.30	±	0.12	1.22	-	1.39	32.57
Lepomis megalotis	3.04	±	3.43	0.61	-	5.46	39.76
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2004 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	4.23	±	2.05	2.78	-	5.68	26.44
Lepomis gulosus	0.09	±	0.10	0.02	-	0.15	0.63
Lepomis macrochirus	4.75	±	0.50	4.40	-	5.10	31.74
Lepomis megalotis	6.44	±	1.97	5.05	-	7.83	41.12
Lepomis microlophus	0.01	±	0.01	0.00	-	0.02	0.07
			2006 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	3.51	±	0.17	3.39	-	3.63	37.32
Lepomis gulosus	0.66	±	0.26	0.47	-	0.84	8.08
Lepomis macrochirus	1.86	±	0.87	1.25	-	2.48	16.95
Lepomis megalotis	5.97	±	7.44	0.70	-	11.23	37.17
Lepomis microlophus	0.03	±	0.04	0.00	-	0.06	0.48
			2008 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	9.25	±	11.04	1.44	-	17.06	50.81
Lepomis gulosus	0.38	±	0.24	0.21	-	0.55	4.55
Lepomis macrochirus	2.72	±	1.44	1.70	-	3.73	21.48
Lepomis megalotis	1.66	±	1.91	0.30	-	3.01	23.16
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix F.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2010 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.93	±	1.70	1.72	-	4.13	33.37
Lepomis gulosus	0.27	±	0.01	0.26	-	0.27	3.41
Lepomis macrochirus	3.24	±	0.86	2.63	-	3.84	39.43
Lepomis megalotis	1.85	±	0.90	1.21	-	2.48	21.51
Lepomis microlophus	0.14	±	0.20	0.00	-	0.28	2.27

APPENDIX G

SUMMARY STATISTICS OF POPULATION PARAMETERS FOR *LEPOMIS* SPECIES COLLECTED FROM TVA COVE-ROTENONE SAMPLES (1949-1993) AND ELECTROFISHING SAMPLES (1993-2011) IN GUNTERSVILLE RESERVOIR

Appendix G.1 Summary statistics for density (fish/ha) of *Lepomis* spp. collected from TVA cove-rotenone samples (1960-1993) in Guntersville mainstem reservoir in the Tennessee River drainage.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						Guntersville Reservoir						
						1960 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	21.6	±	21.2	6.6	-	36.6	0.5	±	0.5	0.2	-	0.9
Lepomis gulosus	4.1	±	5.8	0.0	-	8.2	0.4	±	0.6	0.0	-	0.8
Lepomis macrochirus	309.0	±	142.5	208.2	-	409.8	8.7	±	1.3	7.7	-	9.6
Lepomis megalotis	164.0	±	30.2	142.6	-	185.4	3.2	±	0.3	3.0	-	3.5
Lepomis microlophus	3.3	±	4.6	0.0	-	6.6	0.2	±	0.3	0.0	-	0.5
						1961 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	5.3	±	0.0	5.3	-	5.3	0.1	±	0.0	0.1	-	0.1
Lepomis gulosus	31.6	±	0.0	31.6	-	31.6	1.4	±	0.0	1.4	-	1.4
Lepomis macrochirus	208.4	±	0.0	208.4	-	208.4	7.5	±	0.0	7.5	-	7.5
Lepomis megalotis	1.8	±	0.0	1.8	-	1.8	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	55.4	±	0.0	55.4	-	55.4	2.6	±	0.0	2.6	-	2.6
						1971 (n = 12)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	6.7	±	14.8	0.0	-	53.3	0.2	±	0.5	0.0	-	1.8
Lepomis gulosus	13.5	±	40.6	0.0	-	142.2	0.7	±	2.1	0.0	-	7.4
Lepomis macrochirus	538.3	±	706.0	50.8	-	2564.4	25.6	±	38.0	1.8	-	137.9
Lepomis megalotis	49.8	±	72.0	0.0	-	212.9	1.4	±	1.9	0.0	-	5.6
Lepomis microlophus	172.0	±	103.6	5.5	-	411.1	14.4	±	9.2	0.4	-	30.9
						1972 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	10.9	±	5.9	4.3	-	15.7	0.4	±	0.3	0.1	-	0.6
Lepomis gulosus	17.5	±	13.0	3.2	-	28.7	1.0	±	0.8	0.1	-	1.7
Lepomis macrochirus	534.9	±	397.0	231.9	-	984.3	21.4	±	21.8	7.8	-	46.6
Lepomis megalotis	2.5	±	4.3	0.0	-	7.4	0.0	±	0.1	0.0	-	0.1
Lepomis microlophus	480.3	±	201.8	350.0	-	712.8	27.1	±	17.0	11.6	-	45.2
						1974 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	15.1	±	21.9	1.5	-	40.4	0.2	±	0.4	0.0	-	0.6
Lepomis gulosus	45.3	±	37.1	18.5	-	87.7	1.4	±	1.7	0.4	-	3.3
Lepomis macrochirus	1339.4	±	1502.4	395.4	-	3071.9	33.9	±	39.7	9.0	-	79.6
Lepomis megalotis	8.2	±	14.2	0.0	-	24.6	0.1	±	0.2	0.0	-	0.4
Lepomis microlophus	543.2	±	26.4	513.8	-	564.9	22.2	±	6.8	14.8	-	28.1
						1975 (n = 8)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	3.1	±	5.2	0.0	-	14.8	0.1	±	0.2	0.0	-	0.5
Lepomis gulosus	28.5	±	14.7	1.4	-	47.1	1.6	±	1.0	0.0	-	3.3

Appendix G.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis macrochirus	1156.8	±	763.1	293.1	-	2542.9	36.8	±	19.0	10.9	-	72.2
Lepomis megalotis	95.3	±	65.9	0.0	-	180.0	2.5	±	1.8	0.0	-	5.0
Lepomis microlophus	384.6	±	287.2	90.9	-	844.6	21.5	±	8.7	9.8	-	36.2
						1976 (n=5)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	1.4	±	2.5	0.0	-	5.7	0.0	±	0.1	0.0	-	0.2
Lepomis gulosus	36.6	±	32.0	8.8	-	88.2	1.3	±	0.8	0.2	-	2.4
Lepomis macrochirus	1420.8	±	588.6	676.5	-	2162.1	34.3	±	24.3	11.2	-	72.6
Lepomis megalotis	78.4	±	76.7	0.0	-	160.6	1.3	±	1.4	0.0	-	3.2
Lepomis microlophus	644.9	±	408.7	287.9	-	1250.8	18.1	±	8.0	7.9	-	26.9
						1977 (n=3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	4.8	±	2.5	2.0	-	6.7	0.1	±	0.0	0.0	-	0.1
Lepomis gulosus	69.7	±	73.5	5.7	-	150.0	2.2	±	2.4	0.1	-	4.8
Lepomis macrochirus	1150.4	±	678.6	368.6	-	1586.7	28.5	±	18.0	7.8	-	40.7
Lepomis megalotis	17.8	±	30.8	0.0	-	53.3	0.2	±	0.4	0.0	-	0.7
Lepomis microlophus	954.9	±	630.6	300.0	-	1558.0	33.4	±	24.3	7.1	-	55.0
						1979 (n=2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	2.5	±	3.5	0.0	-	5.0	0.0	±	0.1	0.0	-	0.1
Lepomis gulosus	128.0	±	124.5	40.0	-	216.0	3.2	±	2.9	1.2	-	5.3
Lepomis macrochirus	1103.8	±	364.6	846.0	-	1361.7	26.1	±	9.8	19.2	-	33.1
Lepomis megalotis	13.7	±	0.5	13.3	-	14.0	0.2	±	0.0	0.2	-	0.2
Lepomis microlophus	743.3	±	122.6	656.7	-	830.0	21.6	±	5.3	17.8	-	25.3
						1980 (n=3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	13.4	±	18.1	1.5	-	34.3	0.2	±	0.3	0.0	-	0.6
Lepomis gulosus	100.9	±	112.8	35.2	-	231.1	4.4	±	3.0	1.5	-	7.5
Lepomis macrochirus	722.3	±	656.7	231.1	-	1468.2	26.8	±	27.3	3.2	-	56.7
Lepomis megalotis	4.7	±	6.5	0.0	-	12.1	0.1	±	0.1	0.0	-	0.2
Lepomis microlophus	440.1	±	232.1	174.3	-	602.2	21.3	±	9.9	13.0	-	32.3
						1981 (n=3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.5	±	0.9	0.0	-	1.6	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	12.5	±	11.4	0.0	-	22.2	0.3	±	0.3	0.0	-	0.6
Lepomis macrochirus	316.0	±	295.6	51.1	-	634.8	7.1	±	5.9	0.8	-	12.7
Lepomis megalotis	0.5	±	0.9	0.0	-	1.5	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	378.5	±	131.6	250.8	-	513.6	16.3	±	4.5	11.5	-	20.5
						1982 (n=7)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.7	±	1.9	0.0	-	5.1	0.0	±	0.0	0.0	-	0.1
Lepomis gulosus	9.4	±	11.0	0.0	-	22.2	0.5	±	0.7	0.0	-	1.7
Lepomis macrochirus	903.7	±	1846.6	44.4	-	5077.4	27.0	±	54.2	0.7	-	148.3
Lepomis megalotis	2.6	±	4.4	0.0	-	9.7	0.1	±	0.1	0.0	-	0.2

Appendix G.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis microlophus	290.7	±	479.7	11.1	-	1204.8	7.1	±	13.7	0.2	-	37.5
						1983 (n=4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	158.9	±	308.5	0.0	-	621.5	2.1	±	3.8	0.0	-	7.8
Lepomis gulosus	72.1	±	97.3	8.3	-	216.9	3.0	±	3.9	0.4	-	8.8
Lepomis macrochirus	920.8	±	716.4	329.2	-	1961.7	24.9	±	17.0	12.6	-	49.8
Lepomis megalotis	1.3	±	2.6	0.0	-	5.2	0.0	±	0.0	0.0	-	0.1
Lepomis microlophus	1536.2	±	1399.7	162.5	-	3205.6	49.7	±	43.7	9.9	-	100.2
						1984 (n=4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	5.9	±	11.8	0.0	-	23.5	0.1	±	0.2	0.0	-	0.4
Lepomis gulosus	134.2	±	158.9	0.0	-	311.8	3.5	±	4.1	0.0	-	7.7
Lepomis macrochirus	1066.4	±	688.6	157.9	-	1675.0	28.8	±	19.4	1.7	-	44.2
Lepomis megalotis	6.3	±	12.5	0.0	-	25.0	0.1	±	0.2	0.0	-	0.3
Lepomis microlophus	440.7	±	426.8	52.6	-	1020.0	14.9	±	13.7	0.9	-	33.2
						1985 (n=7)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	1.8	±	4.2	0.0	-	11.4	0.0	±	0.1	0.0	-	0.3
Lepomis gulosus	48.3	±	45.7	0.0	-	131.8	2.2	±	3.2	0.0	-	9.2
Lepomis macrochirus	1415.9	±	1077.5	120.5	-	3279.0	47.0	±	29.1	5.2	-	85.9
Lepomis megalotis	17.0	±	34.2	0.0	-	92.7	0.3	±	0.6	0.0	-	1.6
Lepomis microlophus	690.4	±	840.3	170.5	-	2569.4	28.9	±	27.9	7.0	-	87.8
						1986 (n=5)						
Lepomis auritus	0.6	±	1.4	0.0	-	3.2	0.1	±	0.2	0.0	-	0.4
Lepomis cyanellus	7.8	±	9.6	0.0	-	19.3	0.1	±	0.1	0.0	-	0.3
Lepomis gulosus	173.2	±	226.1	51.2	-	573.4	3.8	±	4.1	1.3	-	11.0
Lepomis macrochirus	2686.3	±	2006.5	985.4	-	6099.6	62.7	±	37.0	19.3	-	121.0
Lepomis megalotis	4.1	±	7.3	0.0	-	17.1	0.1	±	0.1	0.0	-	0.2
Lepomis microlophus	1348.1	±	1770.2	431.7	-	4511.2	38.9	±	44.7	14.2	-	118.4
						1988 (n=1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	12.1	±	0.0	12.1	-	12.1	0.2	±	0.0	0.2	-	0.2
Lepomis gulosus	21.1	±	0.0	21.1	-	21.1	0.5	±	0.0	0.5	-	0.5
Lepomis macrochirus	1805.4	±	0.0	1805.4	-	1805.4	30.2	±	0.0	30.2	-	30.2
Lepomis megalotis	1.1	±	0.0	1.1	-	1.1	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	752.8	±	0.0	752.8	-	752.8	23.1	±	0.0	23.1	-	23.1
						1990 (n=5)						
Lepomis auritus	7.1	±	14.1	0.0	-	32.2	0.8	±	1.7	0.0	-	3.8
Lepomis cyanellus	0.5	±	0.8	0.0	-	1.7	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	78.5	±	122.5	12.5	-	296.7	3.4	±	4.6	0.8	-	11.7
Lepomis macrochirus	829.5	±	421.2	466.9	-	1371.9	33.5	±	11.6	18.5	-	42.5
Lepomis megalotis	9.6	±	19.3	0.0	-	44.1	0.3	±	0.6	0.0	-	1.4
Lepomis microlophus	569.4	±	712.3	165.3	-	1835.5	32.6	±	22.1	18.4	-	69.1

Appendix G.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						1991 (n=5)						
Lepomis auritus	17.7	±	22.6	0.0	-	55.1	0.8	±	1.1	0.0	-	2.7
Lepomis cyanellus	1.8	±	1.0	0.8	-	3.4	0.0	±	0.0	0.0	-	0.1
Lepomis gulosus	41.1	±	67.3	2.3	-	161.2	1.3	±	1.3	0.2	-	3.3
Lepomis macrochirus	886.5	±	646.7	403.0	-	2022.3	33.3	±	12.9	19.2	-	48.5
Lepomis megalotis	30.8	±	66.2	0.0	-	149.2	0.7	±	1.5	0.0	-	3.3
Lepomis microlophus	488.3	±	587.1	160.5	-	1529.8	26.0	±	11.4	20.1	-	46.3
						1992 (n=5)						
Lepomis auritus	6.9	±	9.8	0.0	-	21.0	0.2	±	0.3	0.0	-	0.8
Lepomis cyanellus	1.8	±	2.5	0.0	-	5.0	0.2	±	0.3	0.0	-	0.8
Lepomis gulosus	21.5	±	28.4	1.7	-	70.2	1.0	±	0.9	0.1	-	2.4
Lepomis macrochirus	1421.2	±	1768.4	287.2	-	4518.2	39.5	±	31.2	8.3	-	83.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	451.9	±	628.1	76.7	-	1569.4	25.0	±	14.5	8.1	-	47.5
						1993 (n=5)						
Lepomis auritus	22.1	±	27.5	0.0	-	66.1	0.5	±	0.7	0.0	-	1.7
Lepomis cyanellus	0.2	±	0.4	0.0	-	0.8	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	3.6	±	2.7	0.0	-	5.9	0.2	±	0.1	0.0	-	0.4
Lepomis macrochirus	961.2	±	1265.8	302.5	-	3219.8	27.1	±	28.6	9.7	-	77.4
Lepomis megalotis	43.2	±	91.5	0.0	-	206.8	0.9	±	2.0	0.0	-	4.4
Lepomis microlophus	317.8	±	348.4	64.7	-	926.4	20.3	±	15.0	5.0	-	42.8

Appendix G.2 Percent abundance of *Lepomis* spp. collected from TVA cove-rotenone samples (1949-1993) in Guntersville mainstem reservoir in the Tennessee River drainage.

Year	*Lepomis auritus*	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
			Percent Abundance				
			Guntersville Reservoir				
1949	0.00	4.55	0.00	85.61	6.82	0.00	132
1950	4.35	0.00	6.52	82.61	6.52	0.00	46
1951	0.00	3.98	1.99	72.14	10.45	6.97	201
1952	0.00	4.73	0.00	68.92	0.00	4.73	296
1953	0.00	13.66	4.64	57.99	7.47	14.95	388
1954	0.00	5.74	0.62	70.91	21.35	0.87	801
1955	0.00	3.00	2.70	74.77	17.72	0.00	333
1956	0.00	2.89	1.45	68.50	23.99	0.87	346
1957	0.00	1.27	2.18	77.68	13.61	3.81	551
1958	0.00	3.05	3.29	73.24	18.31	2.11	426
1959	0.00	4.80	0.71	81.78	11.86	0.71	708
1960	0.00	3.89	1.02	60.45	33.40	0.82	488
1961	0.00	1.47	8.82	57.84	0.49	15.20	204
1971	0.00	0.71	1.22	64.04	6.81	23.31	6577
1972	0.00	1.02	1.65	51.46	0.22	43.77	3146
1974	0.00	0.76	2.31	67.86	0.41	28.35	3422
1975	0.00	0.19	1.67	68.65	5.71	23.66	8393
1976	0.00	0.08	1.69	65.22	3.31	29.55	7164
1977	0.00	0.24	2.99	52.73	0.86	42.90	3173
1979	0.00	0.14	6.00	56.39	0.68	36.79	2199
1980	0.00	1.50	6.36	60.27	0.39	31.33	2595
1981	0.00	0.08	1.55	46.95	0.08	51.35	1293
1982	0.00	0.06	0.59	76.34	0.23	22.77	4716
1983	0.00	9.80	3.47	32.12	0.08	52.86	70717
1984	0.00	0.32	7.77	63.92	0.40	27.44	1261
1985	0.00	0.07	2.03	64.96	1.02	31.92	8607
1986	0.03	0.17	5.04	55.09	0.01	39.65	120504
1988	0.00	0.46	0.80	68.95	0.04	28.75	29353
1990	0.46	0.03	5.24	55.57	0.63	38.06	9092
1991	1.21	0.12	2.79	60.50	2.04	33.34	8930
1992	0.38	0.10	1.14	74.67	0.00	23.71	11551
1993	1.70	0.01	0.27	71.34	3.12	23.55	8199

Appendix G.3 Summary statistics for relative density (CPUE) of *Lepomis* spp. collected from TVA electrofishing samples (1993-2011) in Guntersville mainstem reservoir in the Tennessee River drainage.

Species	Mean	± SD	Min - Max	% Abundance
		Guntersville Reservoir		
		1993 (n = 3)		
Lepomis auritus	3.19	± 4.78	0.00 - 8.69	28.41
Lepomis cyanellus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis gulosus	0.05	± 0.08	0.00 - 0.14	2.01
Lepomis macrochirus	2.03	± 1.24	0.80 - 3.28	40.42
Lepomis megalotis	0.46	± 0.25	0.17 - 0.62	8.74
Lepomis microlophus	0.77	± 0.11	0.67 - 0.89	20.43
		1994 (n = 3)		
Lepomis auritus	0.49	± 0.38	0.11 - 0.87	10.10
Lepomis cyanellus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis gulosus	0.00	± 0.01	0.00 - 0.01	0.13
Lepomis macrochirus	3.64	± 4.05	1.08 - 8.31	59.13
Lepomis megalotis	0.32	± 0.33	0.11 - 0.70	5.91
Lepomis microlophus	0.87	± 0.11	0.76 - 0.98	24.73
		1996 (n = 3)		
Lepomis auritus	1.54	± 0.71	0.78 - 2.20	16.30
Lepomis cyanellus	0.05	± 0.07	0.00 - 0.13	0.58
Lepomis gulosus	0.00	± 0.01	0.00 - 0.01	0.03
Lepomis macrochirus	4.60	± 4.11	1.42 - 9.24	52.23
Lepomis megalotis	1.66	± 1.07	0.48 - 2.56	17.89
Lepomis microlophus	0.86	± 0.19	0.63 - 0.98	12.97
		1998 (n = 3)		
Lepomis auritus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis gulosus	0.02	± 0.03	0.00 - 0.06	0.58
Lepomis macrochirus	1.32	± 0.45	1.00 - 1.83	61.34
Lepomis megalotis	0.31	± 0.16	0.21 - 0.50	14.45
Lepomis microlophus	0.50	± 0.10	0.41 - 0.61	23.63
		2000 (n = 5)		
Lepomis auritus	0.75	± 1.01	0.00 - 2.44	15.82
Lepomis cyanellus	0.32	± 0.72	0.00 - 1.61	3.67
Lepomis gulosus	0.00	± 0.00	0.00 - 0.00	0.00
Lepomis macrochirus	1.12	± 0.32	0.90 - 1.69	41.80
Lepomis megalotis	0.75	± 1.15	0.00 - 2.78	14.26

Appendix G.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis microlophus	0.75	±	0.33	0.37	-	1.28	24.44
			2001 (n = 2)				
Lepomis auritus	0.66	±	0.36	0.41	-	0.91	19.19
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.12	±	0.01	0.11	-	0.13	3.28
Lepomis macrochirus	2.23	±	1.74	1.00	-	3.46	56.99
Lepomis megalotis	0.22	±	0.31	0.00	-	0.44	6.85
Lepomis microlophus	0.46	±	0.39	0.19	-	0.73	13.70
			2002 (n = 5)				
Lepomis auritus	0.86	±	0.51	0.13	-	1.45	19.76
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.05	±	0.08	0.00	-	0.19	1.40
Lepomis macrochirus	2.05	±	1.06	1.04	-	3.55	52.81
Lepomis megalotis	0.26	±	0.26	0.00	-	0.60	5.39
Lepomis microlophus	0.88	±	0.42	0.17	-	1.30	20.63
			2004 (n = 3)				
Lepomis auritus	1.25	±	0.62	0.83	-	1.96	28.06
Lepomis cyanellus	0.03	±	0.05	0.00	-	0.08	0.43
Lepomis gulosus	0.01	±	0.02	0.00	-	0.03	0.18
Lepomis macrochirus	2.27	±	1.28	1.00	-	3.55	46.01
Lepomis megalotis	0.39	±	0.36	0.00	-	0.71	6.69
Lepomis microlophus	0.75	±	0.20	0.52	-	0.87	18.63
			2005 (n = 2)				
Lepomis auritus	0.21	±	0.20	0.07	-	0.35	2.19
Lepomis cyanellus	0.05	±	0.07	0.00	-	0.10	0.36
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	6.71	±	6.34	2.22	-	11.19	72.19
Lepomis megalotis	0.67	±	0.52	0.30	-	1.04	8.06
Lepomis microlophus	0.97	±	0.01	0.96	-	0.98	17.21
			2006 (n = 5)				
Lepomis auritus	1.07	±	0.63	0.47	-	2.12	11.86
Lepomis cyanellus	0.28	±	0.39	0.00	-	0.95	2.68
Lepomis gulosus	0.32	±	0.34	0.00	-	0.81	3.36
Lepomis macrochirus	5.48	±	1.79	3.53	-	8.44	57.29
Lepomis megalotis	1.17	±	1.79	0.00	-	4.32	9.31
Lepomis microlophus	1.26	±	0.36	0.95	-	1.66	15.50
			2007 (n = 2)				
Lepomis auritus	0.79	±	0.52	0.42	-	1.15	13.95
Lepomis cyanellus	0.03	±	0.05	0.00	-	0.07	0.65
Lepomis gulosus	0.05	±	0.01	0.04	-	0.05	0.82

Appendix G.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	3.68	±	2.15	2.16	-	5.20	56.58
Lepomis megalotis	0.79	±	0.28	0.59	-	0.98	13.50
Lepomis microlophus	0.90	±	0.15	0.79	-	1.00	14.49
			2008 (n = 5)				
Lepomis auritus	1.22	±	0.40	0.69	-	1.72	13.83
Lepomis cyanellus	0.29	±	0.33	0.00	-	0.84	3.20
Lepomis gulosus	0.48	±	0.43	0.00	-	1.01	4.20
Lepomis macrochirus	6.96	±	3.62	2.53	-	12.38	64.75
Lepomis megalotis	0.74	±	0.90	0.00	-	2.20	5.76
Lepomis microlophus	0.86	±	0.34	0.28	-	1.11	8.27
			2009 (n = 7)				
Lepomis auritus	0.44	±	0.54	0.00	-	1.52	4.74
Lepomis cyanellus	0.04	±	0.07	0.00	-	0.18	0.60
Lepomis gulosus	0.42	±	0.66	0.00	-	1.79	6.00
Lepomis macrochirus	4.66	±	4.05	1.36	-	12.10	43.71
Lepomis megalotis	0.65	±	0.38	0.01	-	1.18	8.18
Lepomis microlophus	3.59	±	3.52	0.98	-	10.48	36.77
			2010 (n = 5)				
Lepomis auritus	0.79	±	1.16	0.00	-	2.70	6.91
Lepomis cyanellus	0.16	±	0.36	0.00	-	0.80	1.88
Lepomis gulosus	0.80	±	1.00	0.00	-	2.52	10.36
Lepomis macrochirus	4.39	±	4.39	0.98	-	11.96	50.07
Lepomis megalotis	1.32	±	1.66	0.00	-	4.06	10.11
Lepomis microlophus	0.97	±	0.04	0.90	-	0.99	20.66
			2011 (n = 4)				
Lepomis auritus	0.23	±	0.19	0.06	-	0.46	5.35
Lepomis cyanellus	0.02	±	0.03	0.00	-	0.06	0.23
Lepomis gulosus	0.29	±	0.37	0.00	-	0.80	3.21
Lepomis macrochirus	4.86	±	4.11	1.23	-	10.76	67.40
Lepomis megalotis	0.23	±	0.36	0.00	-	0.76	2.52
Lepomis microlophus	1.02	±	0.45	0.69	-	1.68	21.29

APPENDIX H

SUMMARY STATISTICS OF POPULATION PARAMETERS FOR *LEPOMIS* SPECIES COLLECTED FROM TVA COVE-ROTENONE SAMPLES (1949-1981) AND ELECTROFISHING SAMPLES (1993-2011) IN NICKAJACK RESERVOIR

Appendix H.1 Summary statistics for density (fish/ha) of *Lepomis* spp. collected from TVA cove-rotenone samples (1960-1981) in Nickajack mainstem reservoir in the Tennessee River drainage.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						Hales Bar/ Nickajack Reservoir						
						1960 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	12.9	±	0.0	12.9	-	12.9	0.2	±	0.0	0.2	-	0.2
Lepomis gulosus	17.2	±	0.0	17.2	-	17.2	0.7	±	0.0	0.7	-	0.7
Lepomis macrochirus	319.4	±	0.0	319.4	-	319.4	9.5	±	0.0	9.5	-	9.5
Lepomis megalotis	350.5	±	0.0	350.5	-	350.5	7.4	±	0.0	7.4	-	7.4
Lepomis microlophus	255.9	±	0.0	255.9	-	255.9	8.4	±	0.0	8.4	-	8.4
						1964 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	1.3	±	1.8	0.0	-	2.5	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	313.1	±	83.5	254.0	-	372.2	10.3	±	4.0	7.5	-	13.1
Lepomis megalotis	35.0	±	30.5	13.4	-	56.6	0.8	±	0.5	0.5	-	1.2
Lepomis microlophus	112.6	±	84.2	53.0	-	172.2	9.7	±	3.5	7.2	-	12.1
						1972 (n = 4)						
Lepomis auritus	42.0	±	71.9	0.0	-	149.0	3.8	±	7.2	0.0	-	14.5
Lepomis cyanellus	12.4	±	5.6	9.2	-	20.8	0.3	±	0.2	0.2	-	0.6
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	1181.8	±	595.6	484.9	-	1851.0	38.8	±	24.5	17.3	-	72.6
Lepomis megalotis	37.5	±	29.1	15.3	-	79.4	0.8	±	0.5	0.4	-	1.5
Lepomis microlophus	185.7	±	34.8	152.0	-	230.9	8.5	±	2.0	5.6	-	9.8
						1977 (n = 4)						
Lepomis auritus	42.8	±	41.6	6.1	-	90.2	2.4	±	2.3	0.4	-	5.2
Lepomis cyanellus	17.6	±	17.8	2.0	-	43.1	0.4	±	0.4	0.0	-	0.9
Lepomis gulosus	27.6	±	32.6	4.1	-	75.8	0.9	±	1.0	0.2	-	2.5
Lepomis macrochirus	1059.2	±	385.1	603.2	-	1536.4	50.3	±	20.6	28.0	-	71.7
Lepomis megalotis	113.0	±	164.5	6.1	-	353.1	3.1	±	4.3	0.2	-	9.4
Lepomis microlophus	353.4	±	191.0	206.5	-	627.3	23.6	±	10.6	14.7	-	37.4
						1979 (n = 4)						
Lepomis auritus	81.4	±	28.8	55.6	-	120.8	2.0	±	0.3	1.7	-	2.4
Lepomis cyanellus	28.5	±	25.5	8.3	-	65.2	0.5	±	0.5	0.1	-	1.3
Lepomis gulosus	48.3	±	18.5	30.4	-	74.2	2.0	±	1.2	0.5	-	3.1
Lepomis macrochirus	1181.7	±	440.3	569.6	-	1613.0	26.4	±	9.1	17.0	-	34.8
Lepomis megalotis	80.7	±	102.1	21.7	-	233.3	1.7	±	2.5	0.4	-	5.5
Lepomis microlophus	406.5	±	275.1	104.3	-	741.9	15.5	±	10.0	4.9	-	26.8
						1980 (n = 6)						
Lepomis auritus	37.5	±	8.5	28.9	-	50.0	1.6	±	0.8	0.7	-	3.1
Lepomis cyanellus	11.3	±	7.2	3.0	-	20.0	0.3	±	0.3	0.1	-	0.7

Appendix H.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis gulosus	26.0	±	17.9	4.4	-	54.0	1.9	±	1.6	0.1	-	4.2
Lepomis macrochirus	420.4	±	264.2	118.9	-	824.0	23.2	±	11.8	8.0	-	37.5
Lepomis megalotis	22.5	±	38.2	2.6	-	100.0	0.6	±	1.0	0.1	-	2.6
Lepomis microlophus	90.8	±	47.8	35.0	-	151.5	8.4	±	6.1	2.4	-	14.6
						1981 (n = 4)						
Lepomis auritus	244.6	±	141.9	147.8	-	455.6	7.8	±	4.2	2.9	-	13.2
Lepomis cyanellus	34.8	±	42.6	3.8	-	96.3	0.8	±	0.9	0.2	-	2.1
Lepomis gulosus	21.4	±	18.2	8.7	-	48.1	1.1	±	1.0	0.1	-	2.5
Lepomis macrochirus	505.3	±	313.2	213.0	-	851.9	18.0	±	14.1	7.1	-	37.8
Lepomis megalotis	15.1	±	24.8	0.0	-	51.9	0.4	±	0.6	0.0	-	1.3
Lepomis microlophus	176.3	±	150.5	34.6	-	369.6	9.8	±	7.2	2.3	-	16.6

Appendix H.2 Percent abundance of *Lepomis* spp. collected from TVA cove-rotenone samples (1949-1981) in Hales Bar/Nickajack mainstem reservoir in the Tennessee River drainage.

Year	Percent Abundance						Total Number
	Lepomis auritus	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	
	Hales Bar/Nickajack Reservoir						
1949	0.00	0.00	0.00	92.82	5.74	1.44	209
1950	0.00	0.00	0.00	0.00	0.00	86.54	52
1951	0.00	2.50	0.00	65.00	0.00	7.50	40
1953	0.00	0.94	1.26	66.67	12.89	18.24	318
1958	0.00	0.00	0.00	80.20	0.99	16.17	303
1960	0.00	1.25	1.66	30.84	33.85	24.71	963
1964	0.00	0.00	0.39	68.25	9.87	21.49	1266
1972	3.42	0.75	0.00	80.97	2.63	12.19	4562
1977	3.10	1.16	1.49	65.05	8.24	20.96	2681
1979	3.88	1.28	2.48	66.09	3.41	22.87	2580
1980	5.75	1.77	3.49	67.67	3.19	16.22	2035
1981	24.85	3.59	2.20	50.60	1.60	17.17	1002

Appendix H.3 Summary statistics for relative density (CPUE) of *Lepomis* spp. collected from TVA cove-rotenone samples (1993-2011) in Nickajack mainstem reservoir in the Tennessee River drainage.

Species	Mean	±	SD	Min	-	Max	% Abundance
			Nickajack Reservoir				
			1993 (n = 2)				
Lepomis auritus	1.40	±	0.97	0.72	-	2.09	11.41
Lepomis cyanellus	0.10	±	0.14	0.00	-	0.20	1.08
Lepomis gulosus	1.07	±	1.35	0.11	-	2.02	11.63
Lepomis macrochirus	9.71	±	6.38	5.20	-	14.22	64.90
Lepomis megalotis	0.36	±	0.08	0.31	-	0.42	2.83
Lepomis microlophus	0.91	±	0.03	0.89	-	0.93	8.15
			1994 (n = 2)				
Lepomis auritus	4.68	±	5.72	0.63	-	8.72	33.48
Lepomis cyanellus	0.10	±	0.14	0.00	-	0.20	0.72
Lepomis gulosus	0.43	±	0.41	0.14	-	0.72	3.18
Lepomis macrochirus	6.07	±	5.55	2.15	-	9.99	49.25
Lepomis megalotis	0.96	±	1.04	0.22	-	1.69	6.99
Lepomis microlophus	0.80	±	0.17	0.68	-	0.91	6.39
			1995 (n = 2)				
Lepomis auritus	2.24	±	2.24	0.65	-	3.83	11.44
Lepomis cyanellus	0.43	±	0.13	0.34	-	0.53	1.73
Lepomis gulosus	0.30	±	0.42	0.00	-	0.60	1.21
Lepomis macrochirus	14.04	±	5.67	10.04	-	18.05	59.57
Lepomis megalotis	0.75	±	0.84	0.16	-	1.34	2.79
Lepomis microlophus	1.75	±	1.14	0.94	-	2.55	23.26
			1997 (n = 2)				
Lepomis auritus	2.40	±	2.60	0.55	-	4.24	38.87
Lepomis cyanellus	0.17	±	0.24	0.00	-	0.34	5.50
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.53	±	0.72	1.02	-	2.04	31.50
Lepomis megalotis	0.31	±	0.21	0.16	-	0.46	8.65
Lepomis microlophus	0.64	±	0.10	0.56	-	0.71	15.47
			1999 (n = 2)				
Lepomis auritus	1.24	±	0.33	1.00	-	1.47	36.94
Lepomis cyanellus	0.16	±	0.23	0.00	-	0.32	3.93
Lepomis gulosus	0.16	±	0.06	0.12	-	0.20	6.16
Lepomis macrochirus	0.82	±	0.17	0.70	-	0.95	27.96
Lepomis megalotis	0.19	±	0.27	0.00	-	0.38	4.44
Lepomis microlophus	0.66	±	0.37	0.40	-	0.93	20.56

Appendix H.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2001 (n = 2)				
Lepomis auritus	33.60	±	36.15	8.04	-	59.17	42.59
Lepomis cyanellus	0.91	±	0.31	0.69	-	1.13	1.90
Lepomis gulosus	21.45	±	29.64	0.49	-	42.41	19.85
Lepomis macrochirus	8.12	±	1.21	7.27	-	8.98	21.41
Lepomis megalotis	3.60	±	3.01	1.47	-	5.73	12.26
Lepomis microlophus	0.89	±	0.17	0.76	-	1.01	1.99
			2003 (n = 2)				
Lepomis auritus	4.05	±	2.77	2.09	-	6.00	27.92
Lepomis cyanellus	1.16	±	1.60	0.03	-	2.29	8.23
Lepomis gulosus	1.64	±	2.18	0.10	-	3.17	11.56
Lepomis macrochirus	5.65	±	5.99	1.42	-	9.89	36.41
Lepomis megalotis	1.76	±	1.86	0.45	-	3.08	11.36
Lepomis microlophus	0.67	±	0.13	0.57	-	0.76	4.51
			2005 (n = 2)				
Lepomis auritus	5.20	±	5.23	1.50	-	8.90	44.76
Lepomis cyanellus	0.90	±	0.06	0.86	-	0.94	9.26
Lepomis gulosus	0.39	±	0.47	0.06	-	0.72	3.28
Lepomis macrochirus	1.98	±	1.40	0.99	-	2.97	22.26
Lepomis megalotis	1.05	±	1.06	0.30	-	1.79	12.26
Lepomis microlophus	0.80	±	0.04	0.77	-	0.83	8.18
			2007 (n = 2)				
Lepomis auritus	2.33	±	0.76	1.80	-	2.87	18.48
Lepomis cyanellus	1.34	±	0.44	1.03	-	1.64	10.58
Lepomis gulosus	0.68	±	0.45	0.36	-	0.99	5.77
Lepomis macrochirus	8.67	±	7.49	3.38	-	13.96	50.17
Lepomis megalotis	1.12	±	1.13	0.32	-	1.92	6.20
Lepomis microlophus	1.35	±	0.60	0.92	-	1.77	8.81
			2009 (n = 2)				
Lepomis auritus	7.87	±	3.89	5.12	-	10.62	41.30
Lepomis cyanellus	0.99	±	0.43	0.68	-	1.29	6.04
Lepomis gulosus	0.93	±	0.92	0.28	-	1.58	6.19
Lepomis macrochirus	6.69	±	2.14	5.18	-	8.21	36.22
Lepomis megalotis	1.09	±	1.54	0.00	-	2.18	4.77
Lepomis microlophus	0.96	±	0.01	0.95	-	0.97	5.48
			2011 (n = 2)				
Lepomis auritus	7.88	±	9.21	1.36	-	14.39	35.45
Lepomis cyanellus	1.17	±	0.14	1.07	-	1.27	8.02
Lepomis gulosus	0.42	±	0.51	0.06	-	0.78	1.86
Lepomis macrochirus	6.35	±	1.23	5.48	-	7.23	42.42
Lepomis megalotis	0.83	±	0.14	0.73	-	0.94	6.25
Lepomis microlophus	0.86	±	0.05	0.83	-	0.89	6.01

APPENDIX I

SUMMARY STATISTICS OF POPULATION PARAMETERS FOR *LEPOMIS* SPECIES COLLECTED FROM TVA COVE-ROTENONE SAMPLES (1947-1997) AND ELECTROFISHING SAMPLES (1993-2011) IN CHICKAMAUGA RESERVOIR AND TRIBUTARY RESERVOIRS

Appendix I.1 Summary statistics for density (fish/ha) of *Lepomis* spp. collected from TVA cove-rotenone samples (1961-1997) in Chickamauga mainstem and tributary reservoirs in the Tennessee River drainage.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						Chickamauga Reservoir						
						1970 (n = 12)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	5.3	±	8.1	0.0	-	25.0	0.1	±	0.2	0.0	-	0.5
Lepomis gulosus	6.7	±	5.3	0.0	-	14.8	0.3	±	0.3	0.0	-	1.0
Lepomis macrochirus	263.3	±	164.4	91.8	-	625.9	10.5	±	7.6	2.8	-	25.3
Lepomis megalotis	27.1	±	30.3	0.0	-	79.8	0.7	±	0.9	0.0	-	2.2
Lepomis microlophus	31.9	±	18.2	2.0	-	66.7	2.1	±	1.0	0.1	-	4.3
						1971 (n = 5)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	5.5	±	6.7	0.0	-	16.3	0.1	±	0.1	0.0	-	0.2
Lepomis gulosus	8.6	±	8.0	0.3	-	18.6	0.2	±	0.2	0.0	-	0.5
Lepomis macrochirus	470.4	±	211.7	188.2	-	749.5	18.5	±	9.8	3.8	-	30.7
Lepomis megalotis	51.4	±	49.8	0.0	-	122.2	1.3	±	1.5	0.0	-	3.9
Lepomis microlophus	58.5	±	31.8	24.7	-	91.8	4.9	±	3.8	1.3	-	11.5
						1972 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	3.0	±	3.2	0.0	-	7.0	0.1	±	0.1	0.0	-	0.2
Lepomis gulosus	16.1	±	17.8	4.0	-	41.9	0.5	±	0.7	0.1	-	1.5
Lepomis macrochirus	666.5	±	477.9	244.1	-	1323.3	21.3	±	15.2	8.1	-	42.7
Lepomis megalotis	82.8	±	58.4	9.3	-	148.5	2.0	±	0.7	1.4	-	2.6
Lepomis microlophus	103.1	±	77.0	38.9	-	209.3	8.0	±	2.6	5.4	-	10.6
						1973 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	2.2	±	1.5	0.0	-	3.2	0.1	±	0.0	0.0	-	0.1
Lepomis gulosus	17.6	±	24.0	3.2	-	53.5	0.9	±	1.3	0.1	-	2.8
Lepomis macrochirus	561.1	±	316.9	275.3	-	1014.0	19.9	±	12.4	9.2	-	37.8
Lepomis megalotis	62.5	±	44.0	2.3	-	101.1	1.4	±	1.0	0.0	-	2.1
Lepomis microlophus	80.2	±	60.5	27.0	-	165.1	6.2	±	1.4	4.3	-	7.7
						1974 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	1.6	±	2.7	0.0	-	5.6	0.0	±	0.0	0.0	-	0.1
Lepomis gulosus	4.8	±	2.7	1.1	-	7.1	0.1	±	0.1	0.0	-	0.2
Lepomis macrochirus	402.4	±	185.3	126.9	-	523.0	10.6	±	4.9	3.4	-	13.8
Lepomis megalotis	77.2	±	59.3	0.0	-	144.4	1.4	±	1.2	0.0	-	2.9
Lepomis microlophus	124.7	±	78.0	63.5	-	237.2	8.2	±	1.3	6.5	-	9.4
						1975 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	7.5	±	7.5	2.2	-	18.6	0.4	±	0.2	0.0	-	0.5
Lepomis macrochirus	346.2	±	274.6	50.5	-	684.5	10.1	±	7.4	1.6	-	19.1

Appendix I.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis megalotis	48.9	±	52.9	0.0	-	107.5	0.9	±	1.0	0.0	-	2.1
Lepomis microlophus	79.9	±	52.4	31.6	-	128.6	7.3	±	4.0	3.4	-	12.5
						1976 (n = 5)						
Lepomis auritus	2.3	±	4.0	0.0	-	9.3	0.0	±	0.0	0.0	-	0.1
Lepomis cyanellus	0.8	±	1.1	0.0	-	2.3	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	18.0	±	11.4	3.0	-	32.6	0.7	±	0.4	0.1	-	1.2
Lepomis macrochirus	861.5	±	524.9	157.6	-	1437.6	21.4	±	9.0	9.0	-	30.9
Lepomis megalotis	193.6	±	189.4	0.0	-	414.9	3.1	±	2.9	0.0	-	6.0
Lepomis microlophus	156.6	±	128.9	0.0	-	341.9	10.7	±	7.1	0.0	-	18.0
						1977 (n = 5)						
Lepomis auritus	1.2	±	2.7	0.0	-	6.1	0.0	±	0.1	0.0	-	0.2
Lepomis cyanellus	4.7	±	5.6	0.0	-	14.3	0.1	±	0.1	0.0	-	0.2
Lepomis gulosus	16.0	±	14.6	0.0	-	34.3	0.6	±	0.7	0.0	-	1.6
Lepomis macrochirus	704.9	±	392.9	54.5	-	1018.6	19.2	±	12.3	3.5	-	34.9
Lepomis megalotis	196.2	±	201.5	0.0	-	434.3	3.0	±	3.1	0.0	-	6.6
Lepomis microlophus	127.1	±	103.3	0.0	-	269.2	9.7	±	8.6	0.0	-	22.9
						1978 (n = 5)						
Lepomis auritus	2.0	±	2.9	0.0	-	6.5	0.1	±	0.1	0.0	-	0.2
Lepomis cyanellus	1.6	±	2.8	0.0	-	6.5	0.0	±	0.1	0.0	-	0.2
Lepomis gulosus	35.2	±	40.4	3.4	-	80.7	1.3	±	1.4	0.2	-	3.2
Lepomis macrochirus	672.1	±	375.5	10.3	-	920.7	14.9	±	8.5	0.9	-	22.5
Lepomis megalotis	83.3	±	76.0	0.0	-	151.7	1.5	±	1.4	0.0	-	2.9
Lepomis microlophus	103.7	±	98.1	0.0	-	243.5	7.0	±	8.1	0.0	-	20.2
						1979 (n = 5)						
Lepomis auritus	0.5	±	1.0	0.0	-	2.3	0.0	±	0.0	0.0	-	0.1
Lepomis cyanellus	12.8	±	12.5	0.0	-	32.6	0.2	±	0.3	0.0	-	0.7
Lepomis gulosus	52.5	±	37.5	0.0	-	101.9	2.2	±	1.7	0.0	-	4.0
Lepomis macrochirus	1166.5	±	1073.1	78.9	-	2875.7	25.7	±	21.2	2.5	-	58.8
Lepomis megalotis	117.2	±	131.1	0.0	-	317.6	2.0	±	2.5	0.0	-	6.0
Lepomis microlophus	142.7	±	88.3	10.5	-	253.5	6.7	±	3.0	1.7	-	8.8
						1980 (n = 8)						
Lepomis auritus	0.3	±	0.8	0.0	-	2.4	0.0	±	0.0	0.0	-	0.1
Lepomis cyanellus	6.8	±	8.9	0.0	-	25.0	0.3	±	0.3	0.0	-	0.8
Lepomis gulosus	21.2	±	27.0	0.0	-	70.7	0.8	±	1.0	0.0	-	3.2
Lepomis macrochirus	532.6	±	403.0	63.4	-	1116.7	22.1	±	19.4	2.7	-	53.8
Lepomis megalotis	51.1	±	62.8	0.0	-	178.6	1.3	±	1.7	0.0	-	4.8
Lepomis microlophus	73.7	±	56.6	8.3	-	190.9	6.9	±	4.1	0.9	-	12.0
						1981 (n = 5)						
Lepomis auritus	13.7	±	16.2	0.0	-	34.8	0.3	±	0.2	0.0	-	0.5
Lepomis cyanellus	4.1	±	3.2	0.0	-	6.6	0.1	±	0.1	0.0	-	0.2
Lepomis gulosus	89.1	±	61.6	0.0	-	163.0	3.3	±	2.0	0.0	-	5.5
Lepomis macrochirus	1257.6	±	1239.4	34.4	-	3263.9	34.5	±	36.8	1.9	-	96.4
Lepomis megalotis	73.2	±	69.6	0.0	-	153.3	1.6	±	1.6	0.0	-	3.3
Lepomis microlophus	103.0	±	71.1	28.1	-	216.7	6.4	±	3.2	3.7	-	11.7

Appendix I.1 Continued.

Species	fish/ha							kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						1982 (n = 5)						
Lepomis auritus	29.1	±	59.2	0.0	-	134.8	0.6	±	1.1	0.0	-	2.6
Lepomis cyanellus	8.8	±	9.7	2.2	-	25.6	0.2	±	0.1	0.0	-	0.4
Lepomis gulosus	56.0	±	42.6	4.5	-	108.7	1.5	±	1.1	0.4	-	2.8
Lepomis macrochirus	592.2	±	241.6	204.5	-	802.2	12.9	±	4.5	6.5	-	17.8
Lepomis megalotis	48.0	±	69.0	0.0	-	167.4	1.0	±	1.4	0.0	-	3.3
Lepomis microlophus	153.9	±	211.5	32.6	-	528.3	4.2	±	2.5	1.1	-	7.7
						1983 (n = 5)						
Lepomis auritus	6.8	±	8.0	0.0	-	19.5	0.1	±	0.1	0.0	-	0.4
Lepomis cyanellus	13.2	±	8.6	4.7	-	26.8	0.3	±	0.3	0.1	-	0.8
Lepomis gulosus	63.1	±	61.2	18.6	-	168.3	1.6	±	1.0	0.5	-	3.3
Lepomis macrochirus	782.8	±	307.9	434.9	-	1053.5	17.4	±	7.1	9.0	-	25.4
Lepomis megalotis	10.6	±	16.8	0.0	-	39.5	0.2	±	0.3	0.0	-	0.8
Lepomis microlophus	320.6	±	329.6	100.0	-	900.0	12.1	±	8.9	4.9	-	23.9
						1984 (n = 5)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	28.4	±	44.3	4.4	-	107.3	0.5	±	0.8	0.1	-	1.9
Lepomis gulosus	80.9	±	85.6	0.0	-	197.6	1.4	±	1.3	0.0	-	2.8
Lepomis macrochirus	549.2	±	463.2	197.8	-	1231.7	15.4	±	15.7	3.5	-	40.5
Lepomis megalotis	44.6	±	46.5	0.0	-	116.7	0.8	±	0.9	0.0	-	2.0
Lepomis microlophus	219.4	±	154.2	48.9	-	429.3	7.3	±	5.8	2.2	-	14.7
						1985 (n = 5)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	1.3	±	1.2	0.0	-	2.4	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	25.0	±	35.6	0.0	-	86.4	0.4	±	0.5	0.0	-	1.3
Lepomis macrochirus	530.2	±	377.8	21.3	-	1009.1	14.1	±	10.8	1.2	-	26.5
Lepomis megalotis	53.5	±	30.6	0.0	-	75.0	0.9	±	0.5	0.0	-	1.1
Lepomis microlophus	198.0	±	277.8	6.4	-	688.6	6.7	±	8.1	0.8	-	21.0
	1986 (n = 5)											
Lepomis auritus	39.7	±	43.7	0.0	-	109.1	0.9	±	0.8	0.0	-	1.8
Lepomis cyanellus	2.7	±	4.8	0.0	-	11.1	0.0	±	0.1	0.0	-	0.2
Lepomis gulosus	33.5	±	25.2	0.0	-	63.6	1.0	±	0.8	0.0	-	2.1
Lepomis macrochirus	450.4	±	302.9	53.3	-	863.6	15.5	±	12.2	2.0	-	30.4
Lepomis megalotis	13.6	±	12.0	0.0	-	25.6	0.2	±	0.2	0.0	-	0.4
Lepomis microlophus	159.9	±	207.8	0.0	-	522.7	4.9	±	4.2	0.0	-	11.1
						1987 (n = 5)						
Lepomis auritus	16.8	±	36.3	0.0	-	81.8	0.3	±	0.7	0.0	-	1.5
Lepomis cyanellus	16.7	±	20.4	0.0	-	47.6	0.3	±	0.5	0.0	-	1.1
Lepomis gulosus	103.2	±	81.6	0.0	-	204.8	3.8	±	3.1	0.0	-	7.2
Lepomis macrochirus	957.1	±	757.6	63.6	-	1881.8	22.2	±	14.5	2.2	-	41.7
Lepomis megalotis	24.1	±	42.6	0.0	-	100.0	0.5	±	0.9	0.0	-	2.1
Lepomis microlophus	247.9	±	382.6	4.5	-	915.9	6.0	±	7.5	0.7	-	19.1
						1988 (n = 5)						
Lepomis auritus	49.6	±	59.2	0.0	-	134.9	2.2	±	3.1	0.0	-	7.3
Lepomis cyanellus	6.4	±	5.0	0.0	-	11.1	0.1	±	0.1	0.0	-	0.2

Appendix I.1 Continued.

Species	fish/ha							kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis gulosus	87.2	±	59.7	7.4	-	156.5	4.8	±	4.3	0.1	-	11.4
Lepomis macrochirus	771.4	±	544.1	166.7	-	1619.6	23.6	±	15.7	7.4	-	44.5
Lepomis megalotis	5.2	±	11.7	0.0	-	26.1	0.1	±	0.2	0.0	-	0.4
Lepomis microlophus	307.4	±	260.6	1.9	-	576.2	8.8	±	6.0	0.2	-	14.4
						1989 (n = 5)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	3.7	±	6.2	0.0	-	14.3	0.1	±	0.1	0.0	-	0.3
Lepomis gulosus	123.4	±	71.1	18.4	-	200.0	4.0	±	2.7	1.0	-	8.3
Lepomis macrochirus	1311.5	±	773.3	432.7	-	1995.9	28.5	±	13.2	10.2	-	42.3
Lepomis megalotis	88.6	±	83.1	0.0	-	219.6	1.9	±	1.7	0.0	-	4.0
Lepomis microlophus	645.8	±	362.9	20.4	-	908.7	13.2	±	7.4	0.9	-	19.4
						1990 (n = 5)						
Lepomis auritus	30.1	±	19.9	0.0	-	56.1	1.1	±	0.8	0.0	-	2.1
Lepomis cyanellus	4.3	±	4.7	0.0	-	12.2	0.1	±	0.1	0.0	-	0.2
Lepomis gulosus	69.2	±	55.3	5.6	-	155.1	2.9	±	2.5	0.5	-	7.0
Lepomis macrochirus	1166.5	±	600.7	455.6	-	1991.8	38.6	±	16.3	20.6	-	63.6
Lepomis megalotis	2.2	±	2.8	0.0	-	6.9	0.0	±	0.0	0.0	-	0.1
Lepomis microlophus	294.8	±	300.7	95.9	-	824.5	11.5	±	8.3	5.3	-	25.8
						1991 (n = 5)						
Lepomis auritus	33.9	±	23.6	3.2	-	54.5	0.9	±	0.7	0.1	-	2.0
Lepomis cyanellus	2.1	±	3.3	0.0	-	7.4	0.0	±	0.1	0.0	-	0.1
Lepomis gulosus	66.1	±	45.1	16.1	-	127.9	2.0	±	1.4	1.0	-	4.2
Lepomis macrochirus	1060.0	±	515.1	458.1	-	1883.7	27.1	±	13.8	15.2	-	50.3
Lepomis megalotis	6.6	±	9.0	0.0	-	16.7	0.1	±	0.2	0.0	-	0.3
Lepomis microlophus	349.2	±	315.8	87.1	-	893.0	12.5	±	6.7	6.9	-	23.9
						1992 (n = 5)						
Lepomis auritus	35.9	±	27.0	0.0	-	69.0	1.0	±	0.8	0.0	-	2.0
Lepomis cyanellus	0.8	±	1.2	0.0	-	2.6	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	33.7	±	37.4	2.2	-	92.1	1.0	±	1.2	0.0	-	2.8
Lepomis macrochirus	994.5	±	652.6	265.2	-	2036.8	22.5	±	16.4	6.7	-	49.9
Lepomis megalotis	11.2	±	14.7	0.0	-	31.3	0.2	±	0.3	0.0	-	0.6
Lepomis microlophus	241.7	±	279.6	48.3	-	728.9	12.1	±	10.4	2.0	-	29.1
						1993 (n = 5)						
Lepomis auritus	38.5	±	37.7	0.0	-	85.1	1.0	±	1.0	0.0	-	2.3
Lepomis cyanellus	10.4	±	9.9	0.0	-	23.4	0.2	±	0.2	0.0	-	0.4
Lepomis gulosus	35.3	±	48.7	0.0	-	117.4	1.6	±	2.2	0.0	-	5.1
Lepomis macrochirus	721.7	±	591.4	106.4	-	1617.4	14.9	±	11.0	5.3	-	32.4
Lepomis megalotis	9.5	±	12.6	0.0	-	29.8	0.2	±	0.2	0.0	-	0.6
Lepomis microlophus	182.6	±	228.0	23.4	-	573.9	9.8	±	7.6	2.2	-	21.1
						1995 (n = 5)						
Lepomis auritus	9.7	±	12.8	0.0	-	32.1	0.4	±	0.6	0.0	-	1.4
Lepomis cyanellus	3.4	±	2.3	0.0	-	5.2	0.1	±	0.1	0.0	-	0.1
Lepomis gulosus	25.3	±	31.4	0.0	-	78.6	0.7	±	1.0	0.0	-	2.3
Lepomis macrochirus	727.3	±	535.4	74.5	-	1473.8	20.2	±	10.3	4.3	-	28.2
Lepomis megalotis	10.8	±	17.3	0.0	-	39.7	0.3	±	0.4	0.0	-	1.0

Appendix I.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis microlophus	180.9	±	264.1	6.4	-	640.5	6.9	±	7.9	0.9	-	18.1
						1997 (n = 5)						
Lepomis auritus	18.4	±	22.4	0.0	-	56.3	0.8	±	0.9	0.0	-	2.3
Lepomis cyanellus	7.6	±	5.8	0.0	-	14.6	0.1	±	0.1	0.0	-	0.2
Lepomis gulosus	40.2	±	51.7	1.5	-	117.0	1.6	±	2.0	0.1	-	3.8
Lepomis macrochirus	1090.6	±	558.3	356.4	-	1678.1	23.7	±	11.4	12.0	-	41.4
Lepomis megalotis	25.1	±	42.7	0.0	-	98.5	0.6	±	0.8	0.0	-	1.9
Lepomis microlophus	381.7	±	427.4	41.8	-	1104.3	13.6	±	10.5	2.1	-	30.3
						Appalachia Reservoir						
						1965 (n=1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	50.0	±	0.0	50.0	-	50.0	1.7	±	0.0	1.7	-	1.7
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	525.0	±	0.0	525.0	-	525.0	21.5	±	0.0	21.5	-	21.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1983 (n=2)						
Lepomis auritus	85.3	±	82.6	26.9	-	143.6	1.5	±	1.4	0.5	-	2.6
Lepomis cyanellus	31.0	±	10.1	23.9	-	38.2	0.5	±	0.1	0.4	-	0.6
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	77.1	±	11.3	69.1	-	85.1	2.7	±	0.1	2.6	-	2.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						Blue Ridge Reservoir						
						1961 (n=2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	16.6	±	3.8	13.9	-	19.3	1.4	±	0.4	1.2	-	1.7
Lepomis macrochirus	251.4	±	199.9	110.1	-	392.8	8.3	±	6.7	3.6	-	13.1
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	12.2	±	3.0	10.1	-	14.3	2.6	±	0.5	2.2	-	2.9
						1962 (n=2)						
Lepomis auritus	4.9	±	0.0	4.9	-	4.9	0.5	±	0.1	0.4	-	0.6
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	52.4	±	50.0	17.1	-	87.8	2.3	±	2.5	0.6	-	4.1
Lepomis macrochirus	1668.3	±	369.1	1407.3	-	1929.3	39.3	±	10.8	31.7	-	46.9
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	42.7	±	43.1	12.2	-	73.2	8.0	±	10.2	0.8	-	15.3

Appendix I.1 Continued.

Species	fish/ha							kg/ha					
	Mean	±	SD	(min	-	max)		Mean	±	SD	(min	-	max)
						1963 (n=2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	16.3	±	4.5	13.1	-	19.5		0.7	±	0.2	0.6	-	0.9
Lepomis macrochirus	375.8	±	259.0	192.7	-	559.0		12.2	±	0.1	12.1	-	12.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	7.3	±	10.3	0.0	-	14.6		0.8	±	1.2	0.0	-	1.7
						Chatuge Reservoir							
						1965 (n=1)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
						1973 (n=6)							
Lepomis auritus	193.8	±	141.4	54.1	-	428.1		4.5	±	3.3	0.6	-	8.9
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	126.9	±	52.2	51.5	-	189.9		3.7	±	2.7	1.2	-	9.0
Lepomis macrochirus	540.4	±	190.6	218.2	-	729.7		18.0	±	8.8	7.3	-	27.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	2.5	±	3.3	0.0	-	8.8		0.5	±	0.6	0.0	-	1.4
						1980 (n=3)							
Lepomis auritus	89.8	±	43.6	56.8	-	139.2		2.1	±	0.8	1.7	-	3.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	27.0	±	38.0	3.3	-	70.8		0.5	±	0.7	0.1	-	1.4
Lepomis macrochirus	666.0	±	530.7	276.7	-	1270.5		16.8	±	13.9	7.9	-	32.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	1.5	±	2.7	0.0	-	4.6		0.1	±	0.1	0.0	-	0.2
						Nottely Reservoir							
						1961 (n=1)							
Lepomis auritus	107.9	±	0.0	107.9	-	107.9		2.2	±	0.0	2.2	-	2.2
Lepomis cyanellus	4.8	±	0.0	4.8	-	4.8		0.1	±	0.0	0.1	-	0.1
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	462.7	±	0.0	462.7	-	462.7		7.7	±	0.0	7.7	-	7.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
						1964 (n=1)							
Lepomis auritus	45.7	±	0.0	45.7	-	45.7		1.5	±	0.0	1.5	-	1.5
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0

Appendix I.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis gulosus	7.4	±	0.0	7.4	-	7.4	0.2	±	0.0	0.2	-	0.2
Lepomis macrochirus	143.2	±	0.0	143.2	-	143.2	3.1	±	0.0	3.1	-	3.1
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1965 (n=1)						
Lepomis auritus	102.5	±	0.0	102.5	-	102.5	2.4	±	0.0	2.4	-	2.4
Lepomis cyanellus	182.7	±	0.0	182.7	-	182.7	1.3	±	0.0	1.3	-	1.3
Lepomis gulosus	19.8	±	0.0	19.8	-	19.8	0.2	±	0.0	0.2	-	0.2
Lepomis macrochirus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1966 (n=2)						
Lepomis auritus	155.6	±	162.4	40.7	-	270.4	5.2	±	5.4	1.3	-	9.0
Lepomis cyanellus	153.1	±	211.3	3.7	-	302.5	1.6	±	2.2	0.1	-	3.1
Lepomis gulosus	108.6	±	137.9	11.1	-	206.2	0.6	±	0.6	0.2	-	1.0
Lepomis macrochirus	2011.7	±	2342.2	355.6	-	3667.9	30.2	±	35.5	5.0	-	55.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1967 (n=2)						
Lepomis auritus	273.5	±	182.5	144.4	-	402.5	11.2	±	10.3	3.9	-	18.4
Lepomis cyanellus	127.8	±	105.6	53.1	-	202.5	1.4	±	1.5	0.3	-	2.5
Lepomis gulosus	66.0	±	75.9	12.3	-	119.8	0.9	±	1.0	0.2	-	1.6
Lepomis macrochirus	2662.4	±	2504.6	891.4	-	4433.3	44.8	±	41.3	15.6	-	74.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1970 (n=2)						
Lepomis auritus	103.1	±	2.6	101.2	-	104.9	3.5	±	0.1	3.5	-	3.6
Lepomis cyanellus	40.1	±	51.5	3.7	-	76.5	2.1	±	2.9	0.1	-	4.2
Lepomis gulosus	6.8	±	7.9	1.2	-	12.3	0.2	±	0.3	0.0	-	0.4
Lepomis macrochirus	0.2	±	0.3	0.0	-	0.4	14.0	±	11.1	6.1	-	21.9
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						Parksville Reservoir						
						1970 (n=4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.3	±	0.7	0.0	-	1.4	0.0	±	0.1	0.0	-	0.2
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	0.6	±	1.1	0.0	-	2.2	0.1	±	0.2	0.0	-	0.4
Lepomis megalotis	94.6	±	71.2	44.4	-	200.0	3.0	±	2.0	1.4	-	5.9
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix I.2 Percent abundance of *Lepomis* spp. collected from TVA cove-rotenone samples (1947-1997) in Chickamauga mainstem and tributary reservoirs in the Tennessee River drainage.

Year	Percent Abundance						Total Number
	Lepomis auritus	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	
				Chickamauga Reservoir			
1947	0.0	0.0	0.0	100.0	0.0	0.0	56
1949	0.0	0.0	0.0	96.6	3.4	0.0	30
1950	0.0	0.0	0.7	98.2	0.9	0.2	453
1951	0.0	0.0	3.3	93.4	3.3	0.0	30
1952	0.0	0.0	6.3	72.9	8.3	12.5	48
1954	0.0	0.6	0.9	78.8	17.6	2.1	340
1955	0.0	0.0	0.0	78.4	0.0	21.6	222
1956	0.0	0.0	0.0	88.7	0.0	11.3	433
1957	0.0	0.7	0.0	87.5	0.0	11.8	407
1958	0.0	0.7	1.4	70.0	23.5	4.3	277
1959	0.0	0.0	14.1	76.5	5.6	3.8	213
1970	0.0	1.7	2.0	75.9	10.8	9.6	1835
1971	0.0	0.2	0.4	85.6	4.9	8.9	8853
1972	0.0	0.3	1.5	74.2	12.9	11.1	2664
1973	0.0	0.3	1.8	76.9	11.1	9.9	2292
1974	0.0	0.4	0.8	66.5	15.4	16.9	2193
1975	0.0	0.0	1.5	73.2	12.1	13.2	1883
1976	0.2	0.1	1.3	71.1	16.6	10.8	3775
1977	0.1	0.4	1.4	67.2	18.8	12.0	2139
1978	0.2	0.2	4.1	74.8	8.6	12.1	2170
1979	0.02	0.8	3.1	79.3	8.3	8.5	4344
1980	0.03	0.9	3.1	77.5	7.3	11.2	2941
1981	0.7	0.2	5.4	82.5	5.0	6.1	4593
1982	3.4	1.0	6.3	66.2	5.5	17.7	1976
1983	0.6	1.1	5.2	65.9	0.9	26.4	2538
1984	0.0	3.1	8.7	59.5	4.9	23.8	1921
1985	0.0	0.2	3.1	65.7	6.6	24.5	1775
1986	5.6	0.4	4.8	64.4	1.9	22.8	1543
1987	1.3	1.2	7.5	70.0	1.7	18.3	2960
1988	4.0	0.6	7.1	63.2	0.4	24.7	2720
1989	0.0	0.2	5.6	60.5	4.0	29.6	5074
1990	1.9	0.3	4.4	74.3	0.2	18.9	3872
1991	2.4	0.2	4.4	70.6	0.5	22.0	3944
1992	3.1	0.1	2.4	76.4	1.1	17.0	3307
1993	4.4	1.0	3.4	72.5	1.0	17.6	2494
1995	0.8	0.4	2.6	75.6	1.3	19.3	2070
1997	1.2	0.5	2.3	70.2	2.1	23.6	3895

Appendix I.2 Continued.

Year	*Lepomis auritus*	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
			Percent Abundance				
			Appalachia Reservoir				
1952	0.0	15.2	0.0	84.8	0.0	0.0	46
1958	0.0	7.8	0.0	92.2	0.0	0.0	90
1959	0.0	0.0	0.0	0.0	0.0	0.0	21
1965	0.0	8.7	0.0	91.3	0.0	0.0	46
1983	48.0	15.8	0.0	36.2	0.0	0.0	367
			Blue Ridge Reservoir				
1958	0.0	0.0	0.6	97.5	0.0	1.9	161
1961	0.0	0.0	5.9	89.8	0.0	4.3	460
1962	0.3	0.0	3.0	94.3	0.0	2.4	1450
1963	0.0	0.0	3.6	95.0	0.0	1.4	442
			Chatuge Reservoir				
1953	1.4	0.0	0.9	96.9	0.0	0.9	923
1954	18.8	0.0	2.2	78.7	0.0	0.3	314
1958	6.7	0.0	6.3	84.2	0.0	2.8	253
1973	22.9	0.0	15.1	61.6	0.0	0.3	2552
1980	14.6	0.0	6.2	78.8	0.0	0.4	1558
			Nottely Reservoir				
1958	15.8	0.0	0.0	84.2	0.0	0.0	562
1961	18.8	0.8	0.0	80.4	0.0	0.0	725
1964	23.3	0.0	3.8	73.0	0.0	0.0	159
1965	33.6	59.9	6.5	0.0	0.0	0.0	247
1966	6.4	6.3	4.5	82.8	0.0	0.0	3935
1967	8.7	4.1	2.1	85.1	0.0	0.0	5070
1970	11.2	4.4	0.7	83.7	0.0	0.0	1487
			Parksville Reservoir				
1952	0.0	0.0	6.7	0.0	93.3	0.0	30
1953	0.0	0.0	2.5	6.2	91.3	0.0	182
1954	0.0	0.0	0.0	0.3	99.7	0.0	361
1959	0.0	0.0	0.0	6.6	93.4	0.0	351
1970	0.0	0.5	0.0	0.5	98.9	0.0	186

Appendix I.3 Summary statistics for relative density (CPUE) of *Lepomis* spp. collected from TVA cove-rotenone samples (1993-2011) in Chickamauga mainstem and tributary reservoirs in the Tennessee River drainage.

Species	Mean	±	SD	Min	-	Max	% Abundance
			Chickamauga Reservoir				
			1993 (n = 4)				
Lepomis auritus	0.50	±	0.52	0.00	-	1.07	6.89
Lepomis cyanellus	0.10	±	0.13	0.00	-	0.28	1.57
Lepomis gulosus	1.28	±	1.68	0.16	-	3.75	6.64
Lepomis macrochirus	10.85	±	9.70	1.83	-	22.71	61.86
Lepomis megalotis	0.39	±	0.37	0.00	-	0.89	2.92
Lepomis microlophus	1.96	±	1.37	0.96	-	3.94	20.12
			1994 (n = 4)				
Lepomis auritus	0.76	±	0.67	0.10	-	1.69	6.65
Lepomis cyanellus	0.45	±	0.51	0.00	-	1.16	3.38
Lepomis gulosus	0.08	±	0.08	0.00	-	0.18	0.81
Lepomis macrochirus	6.85	±	2.10	4.36	-	8.78	65.85
Lepomis megalotis	0.32	±	0.49	0.00	-	1.05	2.71
Lepomis microlophus	2.18	±	1.57	1.18	-	4.49	20.60
			1995 (n = 4)				
Lepomis auritus	0.17	±	0.22	0.00	-	0.49	1.87
Lepomis cyanellus	0.11	±	0.14	0.00	-	0.29	1.20
Lepomis gulosus	0.15	±	0.29	0.00	-	0.59	1.55
Lepomis macrochirus	5.46	±	1.93	3.17	-	7.09	74.18
Lepomis megalotis	0.38	±	0.54	0.00	-	1.15	3.87
Lepomis microlophus	1.14	±	0.51	0.85	-	1.91	17.32
			1996 (n = 3)				
Lepomis auritus	6.53	±	7.40	1.33	-	15.00	3.07
Lepomis cyanellus	2.67	±	3.79	0.00	-	7.00	0.52
Lepomis gulosus	0.53	±	0.41	0.25	-	1.00	0.27
Lepomis macrochirus	212.50	±	206.29	42.50	-	442.00	76.13
Lepomis megalotis	4.67	±	6.35	1.00	-	12.00	1.41
Lepomis microlophus	82.61	±	113.66	4.50	-	213.00	18.61
			1997 (n = 4)				
Lepomis auritus	0.23	±	0.26	0.00	-	0.60	9.53
Lepomis cyanellus	0.06	±	0.09	0.00	-	0.20	0.44
Lepomis gulosus	0.07	±	0.14	0.00	-	0.27	2.15
Lepomis macrochirus	1.11	±	0.83	0.00	-	1.93	41.09

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis megalotis	0.05	±	0.07	0.00	-	0.14	1.98
Lepomis microlophus	2.56	±	3.41	0.60	-	7.67	44.81
			1999 (n = 5)				
Lepomis auritus	0.67	±	0.54	0.02	-	1.33	21.22
Lepomis cyanellus	0.13	±	0.11	0.00	-	0.27	4.59
Lepomis gulosus	0.10	±	0.14	0.00	-	0.30	2.65
Lepomis macrochirus	1.20	±	0.93	0.47	-	2.81	32.74
Lepomis megalotis	0.42	±	0.92	0.00	-	2.06	7.68
Lepomis microlophus	1.09	±	0.61	0.53	-	2.13	31.12
			2000 (n = 5)				
Lepomis auritus	1.52	±	1.38	0.26	-	3.38	13.98
Lepomis cyanellus	0.40	±	0.61	0.00	-	1.47	4.22
Lepomis gulosus	0.45	±	0.16	0.31	-	0.72	5.22
Lepomis macrochirus	3.75	±	1.02	2.40	-	4.56	44.84
Lepomis megalotis	1.64	±	2.31	0.00	-	5.69	13.19
Lepomis microlophus	1.79	±	0.97	0.86	-	3.42	18.55
			2001 (n = 5)				
Lepomis auritus	0.99	±	0.50	0.47	-	1.65	21.20
Lepomis cyanellus	0.52	±	0.59	0.05	-	1.35	10.64
Lepomis gulosus	0.27	±	0.44	0.00	-	1.03	7.83
Lepomis macrochirus	1.69	±	1.08	0.76	-	3.47	31.51
Lepomis megalotis	0.63	±	1.05	0.10	-	2.51	6.94
Lepomis microlophus	1.07	±	0.24	0.91	-	1.49	21.87
			2002 (n = 4)				
Lepomis auritus	3.56	±	2.91	1.01	-	7.64	35.05
Lepomis cyanellus	0.38	±	0.28	0.00	-	0.67	4.94
Lepomis gulosus	0.71	±	0.44	0.27	-	1.30	8.19
Lepomis macrochirus	2.43	±	1.12	1.60	-	4.06	25.35
Lepomis megalotis	1.00	±	0.66	0.19	-	1.67	9.77
Lepomis microlophus	1.37	±	0.44	0.98	-	1.90	16.70
			2003 (n = 5)				
Lepomis auritus	2.16	±	1.66	0.65	-	4.38	26.51
Lepomis cyanellus	0.20	±	0.12	0.00	-	0.30	2.43
Lepomis gulosus	0.62	±	0.73	0.00	-	1.58	6.41
Lepomis macrochirus	2.09	±	1.06	1.00	-	3.31	26.79
Lepomis megalotis	1.06	±	0.96	0.36	-	2.72	13.00
Lepomis microlophus	1.81	±	1.11	0.99	-	3.04	24.86
			2004 (n = 5)				
Lepomis auritus	1.66	±	1.07	0.39	-	3.14	23.53
Lepomis cyanellus	0.27	±	0.19	0.00	-	0.44	4.24

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis gulosus	0.29	±	0.29	0.00	-	0.66	3.96
Lepomis macrochirus	3.67	±	2.55	0.89	-	6.38	43.73
Lepomis megalotis	0.70	±	0.71	0.27	-	1.96	11.61
Lepomis microlophus	0.93	±	0.10	0.80	-	1.00	12.93
			2005 (n = 5)				
Lepomis auritus	4.41	±	4.17	0.79	-	11.08	36.91
Lepomis cyanellus	0.69	±	1.10	0.00	-	2.60	6.44
Lepomis gulosus	0.41	±	0.71	0.00	-	1.66	6.36
Lepomis macrochirus	2.52	±	1.17	1.25	-	4.36	25.52
Lepomis megalotis	1.57	±	1.04	0.00	-	2.58	15.23
Lepomis microlophus	0.89	±	0.17	0.63	-	1.00	9.55
			2006 (n = 4)				
Lepomis auritus	3.25	±	3.25	1.00	-	8.06	31.17
Lepomis cyanellus	0.22	±	0.19	0.05	-	0.48	2.37
Lepomis gulosus	0.08	±	0.10	0.00	-	0.21	0.88
Lepomis macrochirus	3.86	±	1.97	1.56	-	6.19	42.75
Lepomis megalotis	0.89	±	0.21	0.70	-	1.17	11.84
Lepomis microlophus	0.89	±	0.15	0.69	-	1.00	10.99
			2007 (n = 5)				
Lepomis auritus	2.02	±	1.69	0.05	-	4.36	25.10
Lepomis cyanellus	0.39	±	0.32	0.00	-	0.86	4.91
Lepomis gulosus	0.20	±	0.15	0.00	-	0.40	2.95
Lepomis macrochirus	3.08	±	0.95	1.86	-	4.25	46.35
Lepomis megalotis	0.50	±	0.29	0.02	-	0.76	7.15
Lepomis microlophus	0.85	±	0.20	0.50	-	1.00	13.53
			2008 (n = 4)				
Lepomis auritus	3.14	±	2.08	1.10	-	4.98	18.08
Lepomis cyanellus	1.15	±	1.73	0.00	-	3.68	4.91
Lepomis gulosus	0.41	±	0.57	0.01	-	1.23	1.91
Lepomis macrochirus	10.50	±	5.47	4.22	-	17.18	61.02
Lepomis megalotis	1.23	±	1.13	0.45	-	2.85	6.74
Lepomis microlophus	1.00	±	0.00	0.99	-	1.00	7.34
			2009 (n = 5)				
Lepomis auritus	1.60	±	1.22	0.35	-	3.14	15.08
Lepomis cyanellus	0.38	±	0.42	0.00	-	0.88	4.24
Lepomis gulosus	0.42	±	0.38	0.00	-	0.89	5.72
Lepomis macrochirus	5.32	±	3.69	2.50	-	11.69	52.61
Lepomis megalotis	1.03	±	1.23	0.09	-	3.13	9.93
Lepomis microlophus	1.01	±	0.05	0.96	-	1.09	12.40

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2010 (n = 4)				
Lepomis auritus	1.02	±	0.56	0.49	-	1.55	15.86
Lepomis cyanellus	0.45	±	0.39	0.05	-	0.90	6.11
Lepomis gulosus	0.56	±	0.81	0.05	-	1.77	6.07
Lepomis macrochirus	3.33	±	1.36	2.19	-	5.12	48.90
Lepomis megalotis	0.52	±	0.36	0.14	-	0.91	7.33
Lepomis microlophus	0.96	±	0.04	0.92	-	1.00	15.72
			2011 (n = 6)				
Lepomis auritus	1.20	±	0.76	0.44	-	2.08	15.58
Lepomis cyanellus	0.45	±	0.33	0.05	-	0.90	5.76
Lepomis gulosus	0.53	±	0.37	0.06	-	0.91	7.00
Lepomis macrochirus	4.31	±	2.07	2.05	-	7.48	53.88
Lepomis megalotis	0.31	±	0.35	0.00	-	0.81	3.61
Lepomis microlophus	1.00	±	0.15	0.84	-	1.27	14.17
			2012 (n = 1)				
Lepomis auritus	0.01	±	0.00	0.01	-	0.01	0.20
Lepomis cyanellus	0.77	±	0.00	0.77	-	0.77	16.37
Lepomis gulosus	0.09	±	0.00	0.09	-	0.09	1.97
Lepomis macrochirus	1.64	±	0.00	1.64	-	1.64	36.29
Lepomis megalotis	1.25	±	0.00	1.25	-	1.25	26.63
Lepomis microlophus	0.86	±	0.00	0.86	-	0.86	18.54
			Nottely Reservoir				
			1993 (n = 2)				
Lepomis auritus	0.53	±	0.71	0.02	-	1.03	14.38
Lepomis cyanellus	1.10	±	0.93	0.45	-	1.76	10.76
Lepomis gulosus	0.36	±	0.36	0.11	-	0.62	3.64
Lepomis macrochirus	7.26	±	0.46	6.93	-	7.58	71.23
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1994 (n = 2)				
Lepomis auritus	0.83	±	1.08	0.06	-	1.59	5.03
Lepomis cyanellus	3.41	±	3.83	0.71	-	6.12	22.64
Lepomis gulosus	0.33	±	0.47	0.00	-	0.66	1.33
Lepomis macrochirus	7.18	±	2.08	5.71	-	8.65	71.01
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1995 (n = 2)				
Lepomis auritus	1.27	±	0.18	1.15	-	1.40	5.68
Lepomis cyanellus	16.45	±	18.15	3.62	-	29.29	63.56

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis gulosus	0.05	±	0.01	0.04	-	0.06	0.20
Lepomis macrochirus	7.58	±	1.36	6.62	-	8.54	30.55
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1997 (n = 2)				
Lepomis auritus	3.01	±	3.97	0.20	-	5.81	34.41
Lepomis cyanellus	1.46	±	1.15	0.64	-	2.27	10.56
Lepomis gulosus	0.02	±	0.02	0.01	-	0.03	0.16
Lepomis macrochirus	8.04	±	8.38	2.12	-	13.97	54.31
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.09	±	0.11	0.01	-	0.17	0.56
			1999 (n = 2)				
Lepomis auritus	0.45	±	0.20	0.31	-	0.58	5.55
Lepomis cyanellus	0.96	±	0.06	0.92	-	1.00	13.51
Lepomis gulosus	0.21	±	0.30	0.00	-	0.42	3.86
Lepomis macrochirus	6.39	±	4.05	3.52	-	9.25	75.56
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.08	±	0.12	0.00	-	0.17	1.53
			2001 (n = 2)				
Lepomis auritus	2.01	±	2.51	0.24	-	3.79	25.48
Lepomis cyanellus	1.03	±	0.08	0.97	-	1.08	21.21
Lepomis gulosus	0.39	±	0.55	0.00	-	0.78	4.54
Lepomis macrochirus	2.54	±	0.60	2.11	-	2.96	47.94
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.03	±	0.04	0.00	-	0.06	0.83
			2002 (n = 2)				
Lepomis auritus	0.44	±	0.58	0.04	-	0.85	16.78
Lepomis cyanellus	0.46	±	0.44	0.15	-	0.77	12.10
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.42	±	1.17	1.60	-	3.25	69.59
Lepomis megalotis	0.06	±	0.08	0.00	-	0.12	1.43
Lepomis microlophus	0.00	±	0.01	0.00	-	0.01	0.11
			2003 (n = 2)				
Lepomis auritus	0.43	±	0.00	0.43	-	0.43	3.13
Lepomis cyanellus	14.21	±	13.63	4.57	-	23.85	67.32
Lepomis gulosus	0.46	±	0.65	0.00	-	0.93	1.62
Lepomis macrochirus	3.43	±	0.12	3.34	-	3.52	25.51
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.22	±	0.31	0.00	-	0.43	2.41

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2005 (n = 2)				
Lepomis auritus	1.00	±	1.42	0.00	-	2.00	13.83
Lepomis cyanellus	2.85	±	0.95	2.18	-	3.52	35.84
Lepomis gulosus	0.12	±	0.17	0.00	-	0.24	1.41
Lepomis macrochirus	3.76	±	0.99	3.06	-	4.46	47.50
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.12	±	0.17	0.00	-	0.24	1.41
			2007 (n = 2)				
Lepomis auritus	0.40	±	0.57	0.00	-	0.81	13.31
Lepomis cyanellus	0.47	±	0.49	0.13	-	0.82	13.43
Lepomis gulosus	0.04	±	0.05	0.00	-	0.07	1.16
Lepomis macrochirus	2.17	±	0.19	2.04	-	2.30	65.15
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.25	±	0.36	0.00	-	0.50	6.95
			2009 (n = 2)				
Lepomis auritus	1.00	±	0.81	0.42	-	1.57	16.27
Lepomis cyanellus	7.42	±	8.46	1.44	-	13.40	52.06
Lepomis gulosus	0.49	±	0.05	0.45	-	0.52	6.32
Lepomis macrochirus	2.42	±	1.16	1.60	-	3.23	24.60
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.04	±	0.05	0.01	-	0.08	0.76
			2011 (n = 2)				
Lepomis auritus	0.72	±	0.12	0.64	-	0.80	6.75
Lepomis cyanellus	7.27	±	3.82	4.57	-	9.97	61.72
Lepomis gulosus	0.76	±	0.33	0.53	-	0.99	7.37
Lepomis macrochirus	2.47	±	0.37	2.21	-	2.73	23.09
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.14	±	0.15	0.03	-	0.24	1.07
			Blue Ridge Reservoir				
			1993 (n = 1)				
Lepomis auritus	2.29	±	0.00	2.29	-	2.29	7.90
Lepomis cyanellus	1.50	±	0.00	1.50	-	1.50	5.56
Lepomis gulosus	1.11	±	0.00	1.11	-	1.11	3.83
Lepomis macrochirus	23.39	±	0.00	23.39	-	23.39	82.72
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1994 (n = 1)				
Lepomis auritus	1.44	±	0.00	1.44	-	1.44	69.14
Lepomis cyanellus	0.47	±	0.00	0.47	-	0.47	5.86
Lepomis gulosus	0.04	±	0.00	0.04	-	0.04	0.59

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	2.19	±	0.00	2.19	-	2.19	24.41
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1995 (n = 1)				
Lepomis auritus	1.77	±	0.00	1.77	-	1.77	27.80
Lepomis cyanellus	1.27	±	0.00	1.27	-	1.27	17.43
Lepomis gulosus	0.72	±	0.00	0.72	-	0.72	9.54
Lepomis macrochirus	3.41	±	0.00	3.41	-	3.41	45.23
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1997 (n = 1)				
Lepomis auritus	2.10	±	0.00	2.10	-	2.10	43.57
Lepomis cyanellus	0.48	±	0.00	0.48	-	0.48	10.00
Lepomis gulosus	0.41	±	0.00	0.41	-	0.41	8.57
Lepomis macrochirus	1.83	±	0.00	1.83	-	1.83	37.86
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1999 (n = 1)				
Lepomis auritus	0.46	±	0.00	0.46	-	0.46	23.08
Lepomis cyanellus	0.19	±	0.00	0.19	-	0.19	9.62
Lepomis gulosus	0.38	±	0.00	0.38	-	0.38	19.23
Lepomis macrochirus	0.96	±	0.00	0.96	-	0.96	48.08
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2001 (n = 1)				
Lepomis auritus	10.98	±	0.00	10.98	-	10.98	69.83
Lepomis cyanellus	0.98	±	0.00	0.98	-	0.98	6.19
Lepomis gulosus	2.53	±	0.00	2.53	-	2.53	16.18
Lepomis macrochirus	1.23	±	0.00	1.23	-	1.23	7.81
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2003 (n = 1)				
Lepomis auritus	1.44	±	0.00	1.44	-	1.44	16.27
Lepomis cyanellus	5.85	±	0.00	5.85	-	5.85	66.10
Lepomis gulosus	0.58	±	0.00	0.58	-	0.58	6.51
Lepomis macrochirus	0.99	±	0.00	0.98	-	0.99	11.13
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2005 (n = 1)				
Lepomis auritus	1.30	±	0.00	1.30	-	1.30	37.24

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis cyanellus	0.61	±	0.00	0.61	-	0.61	17.99
Lepomis gulosus	0.03	±	0.00	0.03	-	0.03	0.42
Lepomis macrochirus	0.94	±	0.00	0.94	-	0.94	28.03
Lepomis megalotis	0.56	±	0.00	0.56	-	0.56	16.32
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2007 (n = 1)				
Lepomis auritus	5.21	±	0.00	5.21	-	5.21	66.76
Lepomis cyanellus	0.70	±	0.00	0.70	-	0.70	8.99
Lepomis gulosus	0.94	±	0.00	0.94	-	0.94	11.99
Lepomis macrochirus	0.96	±	0.00	0.96	-	0.96	12.26
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2009 (n = 1)				
Lepomis auritus	2.73	±	0.00	2.73	-	2.73	25.65
Lepomis cyanellus	5.87	±	0.00	5.87	-	5.87	55.19
Lepomis gulosus	0.34	±	0.00	0.34	-	0.34	3.22
Lepomis macrochirus	1.70	±	0.00	1.70	-	1.70	15.94
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			20011 (n = 1)				
Lepomis auritus	0.95	±	0.00	0.95	-	0.95	27.60
Lepomis cyanellus	0.15	±	0.00	0.15	-	0.15	4.34
Lepomis gulosus	0.74	±	0.00	0.74	-	0.74	21.35
Lepomis macrochirus	1.61	±	0.00	1.61	-	1.61	46.70
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			Appalachia Reservoir				
			1996 (n = 1)				
Lepomis auritus	0.54	±	0.00	0.54	-	0.54	36.11
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.89	±	0.00	0.88	-	0.89	63.89
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1997 (n = 1)				
Lepomis auritus	0.43	±	0.00	0.43	-	0.43	42.86
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.57	±	0.00	0.57	-	0.57	57.14
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1998 (n = 1)				
Lepomis auritus	0.42	±	0.00	0.42	-	0.42	41.67
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.42	±	0.00	0.42	-	0.42	41.67
Lepomis megalotis	0.17	±	0.00	0.17	-	0.17	16.67
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1999 (n = 1)				
Lepomis auritus	0.33	±	0.00	0.33	-	0.33	33.33
Lepomis cyanellus	0.33	±	0.00	0.33	-	0.33	33.33
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.33	±	0.00	0.33	-	0.33	33.33
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2000 (n = 1)				
Lepomis auritus	0.75	±	0.00	0.75	-	0.75	36.00
Lepomis cyanellus	0.42	±	0.00	0.42	-	0.42	36.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.58	±	0.00	0.58	-	0.58	28.00
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2002 (n = 1)				
Lepomis auritus	4.58	±	0.00	4.58	-	4.58	84.62
Lepomis cyanellus	0.13	±	0.00	0.13	-	0.13	2.31
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.71	±	0.00	0.71	-	0.71	13.08
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2004 (n = 1)				
Lepomis auritus	10.26	±	0.00	10.26	-	10.26	82.28
Lepomis cyanellus	1.35	±	0.00	1.35	-	1.35	10.82
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.86	±	0.00	0.86	-	0.86	6.90
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2006 (n = 1)				
Lepomis auritus	6.17	±	0.00	6.17	-	6.17	71.18
Lepomis cyanellus	1.47	±	0.00	1.47	-	1.47	18.78
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	0.47	±	0.00	0.47	-	0.47	10.04
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2008 (n = 1)				
Lepomis auritus	4.96	±	0.00	4.96	-	4.96	74.63
Lepomis cyanellus	0.76	±	0.00	0.76	-	0.76	11.50
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.92	±	0.00	0.92	-	0.92	13.86
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2008 (n = 1)				
Lepomis auritus	14.09	±	0.00	14.09	-	14.09	93.71
Lepomis cyanellus	0.23	±	0.00	0.23	-	0.23	1.54
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.71	±	0.00	0.71	-	0.71	4.75
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			Hiwassee Reservoir				
			1993 (n = 2)				
Lepomis auritus	0.23	±	0.32	0.00	-	0.45	0.70
Lepomis cyanellus	26.99	±	4.90	23.52	-	30.46	78.21
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	7.05	±	3.18	4.80	-	9.30	21.09
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1994 (n = 2)				
Lepomis auritus	0.11	±	0.15	0.00	-	0.21	0.14
Lepomis cyanellus	39.47	±	52.40	2.42	-	76.52	69.06
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	3.70	±	1.44	2.68	-	4.71	30.80
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1996 (n = 2)				
Lepomis auritus	0.61	±	0.05	0.57	-	0.65	9.24
Lepomis cyanellus	10.67	±	6.07	6.38	-	14.96	78.53
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.93	±	2.20	1.38	-	4.49	12.23
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			1998 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.05	±	0.07	0.00	-	0.10	1.61
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.73	±	1.04	1.00	-	2.47	98.39
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2000 (n = 2)				
Lepomis auritus	0.95	±	0.59	0.54	-	1.37	26.27
Lepomis cyanellus	2.22	±	2.28	0.61	-	3.84	42.40
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.03	±	0.11	0.95	-	1.10	31.33
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2002 (n = 2)				
Lepomis auritus	0.22	±	0.32	0.00	-	0.45	9.59
Lepomis cyanellus	1.08	±	0.28	0.88	-	1.28	41.58
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.26	±	0.34	1.01	-	1.50	48.82
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2004 (n = 2)				
Lepomis auritus	0.81	±	1.07	0.05	-	1.57	11.69
Lepomis cyanellus	5.01	±	0.90	4.37	-	5.64	72.73
Lepomis gulosus	0.10	±	0.14	0.00	-	0.20	1.46
Lepomis macrochirus	0.97	±	0.04	0.95	-	1.00	14.12
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2006 (n = 2)				
Lepomis auritus	1.50	±	0.36	1.24	-	1.75	5.54
Lepomis cyanellus	33.92	±	23.46	17.33	-	50.50	91.14
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.96	±	0.03	0.93	-	0.98	3.32
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2008 (n = 2)				
Lepomis auritus	1.51	±	0.22	1.35	-	1.67	22.64
Lepomis cyanellus	4.96	±	3.94	2.17	-	7.74	57.64
Lepomis gulosus	0.14	±	0.20	0.00	-	0.29	1.36
Lepomis macrochirus	1.14	±	0.22	0.98	-	1.30	17.25
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis microlophus	0.12	±	0.17	0.00	-	0.24	1.12
			2010 (n = 2)				
Lepomis auritus	0.74	±	0.37	0.47	-	1.00	12.09
Lepomis cyanellus	3.99	±	1.82	2.70	-	5.27	59.58
Lepomis gulosus	0.53	±	0.15	0.42	-	0.63	7.99
Lepomis macrochirus	1.27	±	0.32	1.05	-	1.49	20.34
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			Chatuge Reservoir				
			1993 (n = 2)				
Lepomis auritus	6.53	±	2.40	4.83	-	8.23	30.26
Lepomis cyanellus	2.63	±	3.71	0.00	-	5.25	8.87
Lepomis gulosus	2.78	±	3.75	0.13	-	5.43	9.18
Lepomis macrochirus	10.05	±	0.78	9.50	-	10.60	51.25
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.06	±	0.09	0.00	-	0.13	0.44
			1994 (n = 2)				
Lepomis auritus	7.59	±	0.00	7.59	-	7.59	56.96
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	1.02	±	0.00	1.02	-	1.02	7.60
Lepomis macrochirus	4.45	±	0.00	4.45	-	4.45	35.18
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.02	±	0.00	0.02	-	0.02	0.26
			1996 (n = 2)				
Lepomis auritus	0.60	±	0.63	0.16	-	1.05	6.76
Lepomis cyanellus	0.46	±	0.63	0.02	-	0.90	3.47
Lepomis gulosus	1.30	±	0.67	0.83	-	1.78	8.77
Lepomis macrochirus	11.17	±	1.93	9.81	-	12.54	81.01
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1998 (n = 2)				
Lepomis auritus	4.17	±	1.92	2.82	-	5.53	55.80
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.94	±	0.75	0.41	-	1.47	10.68
Lepomis macrochirus	2.74	±	1.51	1.67	-	3.81	33.53
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1999 (n = 2)				
Lepomis auritus	4.68	±	0.86	4.08	-	5.29	75.28

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis cyanellus	0.04	±	0.05	0.00	-	0.08	0.70
Lepomis gulosus	0.61	±	0.10	0.54	-	0.68	9.84
Lepomis macrochirus	0.86	±	0.08	0.81	-	0.92	14.00
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.01	±	0.02	0.00	-	0.03	0.19
			2000 (n = 2)				
Lepomis auritus	1.18	±	0.18	1.05	-	1.30	17.90
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	2.31	±	2.28	0.70	-	3.92	29.16
Lepomis macrochirus	3.24	±	0.94	2.57	-	3.90	47.59
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.45	±	0.63	0.00	-	0.90	5.35
			2001 (n = 2)				
Lepomis auritus	7.41	±	4.08	4.53	-	10.30	55.41
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	3.10	±	1.61	1.96	-	4.24	25.76
Lepomis macrochirus	3.05	±	2.90	1.00	-	5.11	17.07
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.47	±	0.49	0.12	-	0.82	1.76
			2002 (n = 2)				
Lepomis auritus	3.89	±	2.91	1.83	-	5.95	45.70
Lepomis cyanellus	0.38	±	0.22	0.22	-	0.54	6.60
Lepomis gulosus	0.34	±	0.32	0.11	-	0.57	6.26
Lepomis macrochirus	2.56	±	1.46	1.53	-	3.60	35.14
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.35	±	0.26	0.17	-	0.54	6.30
			2003 (n = 2)				
Lepomis auritus	8.68	±	1.71	7.48	-	9.89	41.61
Lepomis cyanellus	6.40	±	8.53	0.37	-	12.43	14.42
Lepomis gulosus	11.50	±	12.65	2.55	-	20.44	31.87
Lepomis macrochirus	3.54	±	2.86	1.51	-	5.56	12.11
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2004 (n = 2)				
Lepomis auritus	4.43	±	4.90	0.97	-	7.89	56.08
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.43	±	0.61	0.00	-	0.87	3.42
Lepomis macrochirus	2.01	±	1.47	0.97	-	3.04	36.98
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.45	±	0.63	0.00	-	0.90	3.52

Appendix I.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2005 (n = 2)				
Lepomis auritus	1.19	±	0.32	0.96	-	1.42	24.11
Lepomis cyanellus	0.03	±	0.01	0.02	-	0.03	0.56
Lepomis gulosus	4.53	±	5.55	0.61	-	8.46	42.06
Lepomis macrochirus	2.18	±	1.51	1.11	-	3.25	28.78
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.16	±	0.22	0.00	-	0.31	4.49
			2006 (n = 2)				
Lepomis auritus	3.82	±	1.33	2.88	-	4.76	60.21
Lepomis cyanellus	0.09	±	0.09	0.02	-	0.15	1.83
Lepomis gulosus	0.58	±	0.46	0.25	-	0.90	8.09
Lepomis macrochirus	1.35	±	0.82	0.78	-	1.93	20.05
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.65	±	0.36	0.40	-	0.91	9.82
			2007 (n = 2)				
Lepomis auritus	1.53	±	0.41	1.24	-	1.82	38.70
Lepomis cyanellus	0.09	±	0.04	0.06	-	0.12	2.16
Lepomis gulosus	0.49	±	0.52	0.12	-	0.85	9.93
Lepomis macrochirus	1.44	±	0.73	0.92	-	1.95	34.09
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.61	±	0.20	0.47	-	0.75	15.12
			2008 (n = 2)				
Lepomis auritus	2.26	±	0.12	2.17	-	2.34	38.65
Lepomis cyanellus	0.39	±	0.22	0.24	-	0.54	7.27
Lepomis gulosus	0.88	±	0.07	0.83	-	0.93	15.13
Lepomis macrochirus	2.38	±	2.13	0.87	-	3.89	33.93
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.39	±	0.51	0.03	-	0.74	5.03
			2010 (n = 2)				
Lepomis auritus	2.10	±	0.74	1.57	-	2.63	35.68
Lepomis cyanellus	0.29	±	0.12	0.21	-	0.38	5.02
Lepomis gulosus	1.55	±	1.13	0.75	-	2.35	19.24
Lepomis macrochirus	3.12	±	3.35	0.75	-	5.49	34.23
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.51	±	0.51	0.16	-	0.87	5.83

APPENDIX J

SUMMARY STATISTICS OF POPULATION PARAMETERS FOR *LEPOMIS* SPECIES COLLECTED FROM TVA COVE-ROTENONE SAMPLES (1949-1994) AND ELECTROFISHING SAMPLES (1993-2012) IN WATTS BAR RESERVOIR AND TRIBUTARY RESERVOIRS

Appendix J.1 Summary statistics for density (fish/ha) of *Lepomis* spp. collected from TVA cove-rotenone samples (1960-1994) in Watts Bar mainstem and tributary reservoirs in the Tennessee River drainage.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						Watts Bar Reservoir						
						1960 (n = 3)						
Lepomis auritus	1.8	±	3.2	0.0	-	5.5	0.1	±	0.2	0.0	-	0.3
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	6.4	±	5.6	0.0	-	9.7	0.2	±	0.2	0.0	-	0.4
Lepomis macrochirus	100.4	±	45.9	73.9	-	153.4	5.1	±	1.9	3.3	-	7.1
Lepomis megalotis	2.4	±	4.2	0.0	-	7.2	0.1	±	0.1	0.0	-	0.2
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1964 (n = 16)						
Lepomis auritus	6.5	±	13.2	0.0	-	42.9	0.4	±	0.6	0.0	-	2.2
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	21.6	±	39.6	0.0	-	149.0	0.7	±	1.2	0.0	-	4.3
Lepomis macrochirus	210.2	±	251.3	60.7	-	1104.7	8.9	±	10.3	2.3	-	46.1
Lepomis megalotis	1.5	±	6.2	0.0	-	24.6	0.0	±	0.2	0.0	-	0.7
Lepomis microlophus	0.2	±	0.5	0.0	-	1.4	0.0	±	0.1	0.0	-	0.2
						1973 (n = 9)						
Lepomis auritus	39.5	±	32.7	0.0	-	108.1	3.4	±	3.0	0.0	-	10.4
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	50.2	±	26.9	10.1	-	84.9	1.5	±	1.0	0.4	-	3.2
Lepomis macrochirus	791.5	±	156.2	434.8	-	959.5	31.1	±	7.5	13.3	-	38.8
Lepomis megalotis	4.6	±	12.5	0.0	-	37.8	0.2	±	0.5	0.0	-	1.5
Lepomis microlophus	4.2	±	6.5	0.0	-	20.0	0.3	±	0.5	0.0	-	1.5
						1975 (n = 6)						
Lepomis auritus	25.1	±	26.2	2.0	-	67.9	1.6	±	1.8	0.2	-	4.1
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	28.3	±	12.7	9.8	-	43.9	0.7	±	0.3	0.2	-	1.1
Lepomis macrochirus	406.6	±	195.5	272.5	-	784.6	17.0	±	7.2	10.6	-	30.9
Lepomis megalotis	9.2	±	16.7	0.0	-	41.5	0.4	±	0.6	0.0	-	1.4
Lepomis microlophus	1.3	±	3.1	0.0	-	7.7	0.1	±	0.2	0.0	-	0.4
						1976 (n = 6)						
Lepomis auritus	131.7	±	96.0	14.8	-	273.5	3.6	±	2.9	1.0	-	8.9
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	44.0	±	30.1	7.4	-	92.6	1.0	±	0.6	0.2	-	1.8
Lepomis macrochirus	829.3	±	304.3	344.4	-	1271.8	26.7	±	16.6	9.2	-	57.0
Lepomis megalotis	17.9	±	20.2	0.0	-	55.6	0.5	±	0.6	0.0	-	1.5
Lepomis microlophus	5.0	±	7.8	0.0	-	19.3	0.4	±	0.7	0.0	-	1.8
						1977 (n = 4)						
Lepomis auritus	45.1	±	30.1	0.0	-	60.3	1.6	±	1.4	0.0	-	3.2

Appendix J.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	33.2	±	18.6	16.7	-	54.3	0.9	±	0.4	0.3	-	1.2
Lepomis macrochirus	570.1	±	169.3	463.2	-	820.0	18.0	±	6.2	11.1	-	26.1
Lepomis megalotis	49.0	±	40.9	14.3	-	108.1	0.9	±	0.9	0.2	-	2.2
Lepomis microlophus	1.0	±	2.1	0.0	-	4.2	0.0	±	0.0	0.0	-	0.1
						1978 (n = 2)						
Lepomis auritus	142.0	±	103.3	69.0	-	215.0	3.1	±	1.9	1.8	-	4.5
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	33.4	±	37.5	6.9	-	60.0	1.0	±	1.0	0.3	-	1.7
Lepomis macrochirus	384.9	±	198.1	244.8	-	525.0	9.2	±	1.7	8.0	-	10.4
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	20.2	±	13.9	10.3	-	30.0	1.5	±	1.3	0.6	-	2.4
						1979 (n = 2)						
Lepomis auritus	26.6	±	27.6	7.1	-	46.2	1.4	±	1.3	0.5	-	2.4
Lepomis cyanellus	1.3	±	1.8	0.0	-	2.6	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	23.9	±	6.1	19.6	-	28.2	1.0	±	0.1	0.9	-	1.1
Lepomis macrochirus	471.7	±	308.4	253.6	-	689.7	22.1	±	12.0	13.6	-	30.5
Lepomis megalotis	17.0	±	1.3	16.1	-	17.9	0.6	±	0.1	0.6	-	0.7
Lepomis microlophus	4.0	±	2.0	2.6	-	5.4	0.2	±	0.1	0.1	-	0.2
						1980 (n = 4)						
Lepomis auritus	15.1	±	20.1	0.0	-	44.7	1.0	±	1.5	0.0	-	3.2
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	18.5	±	13.3	7.9	-	36.6	0.6	±	0.5	0.3	-	1.3
Lepomis macrochirus	368.8	±	123.9	215.8	-	472.1	16.5	±	3.8	11.9	-	20.2
Lepomis megalotis	10.6	±	4.3	6.1	-	16.3	0.4	±	0.2	0.2	-	0.7
Lepomis microlophus	7.5	±	7.8	1.2	-	18.4	0.7	±	0.7	0.2	-	1.6
						1986 (n = 2)						
Lepomis auritus	40.6	±	11.5	32.5	-	48.7	1.6	±	1.3	0.6	-	2.5
Lepomis cyanellus	12.1	±	2.7	10.3	-	14.0	0.2	±	0.0	0.2	-	0.3
Lepomis gulosus	84.3	±	8.9	78.1	-	90.6	1.9	±	0.2	1.7	-	2.0
Lepomis macrochirus	1683.4	±	317.4	1459.0	-	1907.9	47.2	±	1.1	46.4	-	48.0
Lepomis megalotis	27.4	±	38.7	0.0	-	54.7	0.5	±	0.8	0.0	-	1.1
Lepomis microlophus	57.5	±	39.0	29.9	-	85.1	4.4	±	1.7	3.2	-	5.6
						Cheoah Reservoir						
						1965 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	366.7	±	0.0	366.7	-	366.7	12.8	±	0.0	12.8	-	12.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix J.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						Fontana Reservoir						
						1962 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.8	±	1.4	0.0	-	2.4	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	447.2	±	492.5	44.4	-	996.2	4.4	±	3.5	0.5	-	7.1
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1964 (n = 5)						
Lepomis auritus	3.3	±	4.9	0.0	-	11.0	0.1	±	0.2	0.0	-	0.3
Lepomis cyanellus	15.8	±	9.3	1.7	-	25.5	0.4	±	0.3	0.1	-	0.8
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	1638.9	±	1135.3	550.0	-	3156.3	17.6	±	6.8	9.7	-	25.9
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1979 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	130.0	±	112.6	0.0	-	195.2	1.9	±	1.6	0.0	-	2.9
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	1665.1	±	382.0	1298.7	-	2060.9	23.0	±	5.4	17.4	-	28.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1984 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	13.4	±	15.3	2.6	-	24.1	0.3	±	0.3	0.0	-	0.5
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	551.1	±	303.2	336.8	-	765.5	10.6	±	7.6	5.3	-	16.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						Melton Hill Reservoir						
						1964 (n = 2)						
Lepomis auritus	1.2	±	1.7	0.0	-	2.5	0.1	±	0.1	0.0	-	0.1
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	3.4	±	3.0	1.2	-	5.5	0.1	±	0.1	0.0	-	0.3
Lepomis macrochirus	244.6	±	258.6	61.7	-	427.4	6.1	±	7.5	0.8	-	11.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix J.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						1972 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	1.4	±	1.9	0.0	-	2.7	0.0	±	0.0	0.0	-	0.1
Lepomis macrochirus	215.8	±	39.7	187.8	-	243.8	8.0	±	0.6	7.6	-	8.4
Lepomis megalotis	10.6	±	5.3	6.8	-	14.3	1.4	±	0.8	0.9	-	2.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1974 (n = 6)						
Lepomis auritus	10.1	±	15.7	0.0	-	40.5	0.7	±	1.0	0.0	-	2.6
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	17.8	±	16.7	2.0	-	46.9	0.4	±	0.4	0.0	-	1.0
Lepomis macrochirus	279.4	±	201.7	126.5	-	657.1	9.5	±	5.6	3.5	-	19.4
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	2.4	±	4.0	0.0	-	9.5	0.1	±	0.2	0.0	-	0.4
						1975 (n = 6)						
Lepomis auritus	20.9	±	26.1	0.0	-	53.3	1.1	±	1.2	0.0	-	2.6
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	41.4	±	47.4	6.3	-	132.6	0.9	±	0.8	0.1	-	2.3
Lepomis macrochirus	205.2	±	95.8	104.2	-	341.7	7.5	±	4.6	3.3	-	16.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1976 (n = 9)						
Lepomis auritus	36.5	±	66.1	0.0	-	209.3	1.0	±	1.8	0.0	-	5.6
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	19.1	±	21.0	0.0	-	60.4	0.5	±	0.6	0.0	-	1.7
Lepomis macrochirus	173.3	±	209.4	11.1	-	623.3	4.1	±	4.3	0.2	-	11.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	2.6	±	5.2	0.0	-	16.1	0.1	±	0.1	0.0	-	0.3
						1977 (n = 6)						
Lepomis auritus	15.0	±	20.7	0.0	-	52.6	0.4	±	0.6	0.0	-	1.6
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	44.8	±	29.1	5.0	-	82.4	1.1	±	0.7	0.2	-	1.7
Lepomis macrochirus	490.9	±	389.6	64.5	-	963.3	10.8	±	8.6	1.5	-	21.6
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	6.7	±	6.7	0.0	-	15.7	0.2	±	0.3	0.0	-	0.6
						1978 (n = 4)						
Lepomis auritus	16.4	±	16.0	1.7	-	32.6	0.5	±	0.5	0.0	-	1.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	47.9	±	45.1	15.5	-	114.3	1.2	±	1.0	0.4	-	2.7
Lepomis macrochirus	550.6	±	318.6	287.5	-	965.1	11.8	±	5.9	6.9	-	19.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	8.1	±	7.2	0.0	-	16.7	0.4	±	0.4	0.0	-	1.0

Appendix J.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						1979 (n = 2)						
Lepomis auritus	40.3	±	39.7	12.2	-	68.4	1.7	±	2.0	0.3	-	3.1
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	20.7	±	6.9	15.8	-	25.6	0.4	±	0.1	0.3	-	0.5
Lepomis macrochirus	203.5	±	129.1	112.2	-	294.7	6.7	±	4.5	3.5	-	9.9
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	23.6	±	11.3	15.6	-	31.6	1.3	±	0.6	0.9	-	1.8
						1980 (n = 5)						
Lepomis auritus	10.7	±	14.5	2.0	-	36.6	0.7	±	0.8	0.1	-	2.1
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	26.9	±	12.5	13.0	-	39.0	0.5	±	0.2	0.2	-	0.8
Lepomis macrochirus	340.6	±	345.5	61.0	-	861.0	9.2	±	7.0	2.6	-	17.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	8.9	±	15.6	0.0	-	36.6	0.3	±	0.4	0.0	-	0.9
						1982 (n = 2)						
Lepomis auritus	29.9	±	0.5	29.5	-	30.2	0.9	±	0.1	0.8	-	1.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	42.3	±	34.1	18.2	-	66.4	1.0	±	1.1	0.3	-	1.8
Lepomis macrochirus	971.3	±	46.2	938.6	-	1004.0	23.2	±	1.5	22.1	-	24.2
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	23.0	±	8.4	17.0	-	28.9	1.1	±	0.7	0.6	-	1.7
						1987 (n = 1)						
Lepomis auritus	6.3	±	0.0	6.3	-	6.3	0.2	±	0.0	0.2	-	0.2
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	35.4	±	0.0	35.4	-	35.4	0.8	±	0.0	0.8	-	0.8
Lepomis macrochirus	323.6	±	0.0	323.6	-	323.6	10.7	±	0.0	10.7	-	10.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	44.1	±	0.0	44.1	-	44.1	2.7	±	0.0	2.7	-	2.7
						Norris Reservoir						
						1960 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	127.9	±	101.8	21.3	-	224.1	4.6	±	3.7	0.9	-	8.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1961 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	901.7	±	0.0	901.7	-	901.7	21.1	±	0.0	21.1	-	21.1

Appendix J.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis megalotis	2.3	±	0.0	2.3	-	2.3	0.1	±	0.0	0.1	-	0.1
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1963 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	573.7	±	201.6	403.1	-	796.2	10.0	±	4.0	5.8	-	13.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1969 (n = 5)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	181.2	±	81.5	107.2	-	276.4	7.7	±	3.6	3.6	-	13.2
Lepomis megalotis	0.2	±	0.3	0.0	-	0.8	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1970 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	505.9	±	463.5	143.5	-	1028.2	16.2	±	14.9	3.7	-	32.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1975 (n = 8)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	2.4	±	6.9	0.0	-	19.4	0.0	±	0.1	0.0	-	0.3
Lepomis macrochirus	802.9	±	583.2	126.7	-	2018.2	24.4	±	19.6	2.6	-	64.4
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1976 (n = 8)						
Lepomis auritus	0.3	±	1.0	0.0	-	2.8	0.0	±	0.0	0.0	-	0.1
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	3.8	±	9.7	0.0	-	27.8	0.1	±	0.2	0.0	-	0.5
Lepomis macrochirus	860.3	±	413.3	226.3	-	1487.2	26.6	±	13.1	8.4	-	48.3
Lepomis megalotis	0.3	±	0.9	0.0	-	2.4	0.0	±	0.0	0.0	-	0.1
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1977 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix J.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis macrochirus	160.2	±	184.9	29.4	-	290.9	4.2	±	4.5	1.0	-	7.4
Lepomis megalotis	1.1	±	1.6	0.0	-	2.3	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1978 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	252.5	±	60.7	209.6	-	295.5	6.7	±	1.1	5.9	-	7.4
Lepomis megalotis	1.1	±	1.6	0.0	-	2.3	0.0	±	0.1	0.0	-	0.1
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1979 (n = 10)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	1560.9	±	1704.8	408.8	-	6029.0	32.9	±	31.8	9.6	-	115.9
Lepomis megalotis	1.4	±	4.4	0.0	-	14.0	0.0	±	0.1	0.0	-	0.2
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1980 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	540.2	±	304.4	240.0	-	848.6	13.5	±	7.1	5.8	-	19.9
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1981 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	352.0	±	224.8	94.8	-	641.9	10.6	±	5.9	3.1	-	17.3
Lepomis megalotis	4.8	±	9.7	0.0	-	19.4	0.1	±	0.2	0.0	-	0.5
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1982 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	406.1	±	34.0	382.1	-	430.1	9.5	±	3.0	7.4	-	11.6
Lepomis megalotis	6.4	±	9.1	0.0	-	12.8	0.1	±	0.1	0.0	-	0.2
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1983 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix J.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	742.9	±	350.5	495.0	-	990.7	13.8	±	3.3	11.4	-	16.1
Lepomis megalotis	9.1	±	11.5	1.0	-	17.3	0.2	±	0.2	0.0	-	0.4
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1984 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	614.8	±	.	614.8	-	614.8	14.1	±	.	14.1	-	14.1
Lepomis megalotis	2.4	±	.	2.4	-	2.4	0.1	±	.	0.1	-	0.1
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1986 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	169.5	±	66.1	122.8	-	216.3	4.6	±	0.8	4.0	-	5.2
Lepomis megalotis	2.2	±	1.8	1.0	-	3.5	0.0	±	0.0	0.0	-	0.1
Lepomis microlophus	1.8	±	2.5	0.0	-	3.5	0.2	±	0.3	0.0	-	0.4
						1987 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	729.2	±	672.7	253.6	-	1204.9	21.0	±	18.8	7.7	-	34.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1988 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	170.0	±	8.2	164.2	-	175.8	5.9	±	0.5	5.5	-	6.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1989 (n = 2)						
Lepomis auritus	1.2	±	1.7	0.0	-	2.4	0.1	±	0.1	0.0	-	0.1
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	3732.0	±	4106.8	828.1	-	6636.0	79.6	±	86.5	18.5	-	140.8
Lepomis megalotis	0.4	±	0.6	0.0	-	0.8	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1990 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix J.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	1883.0	±	.	1883.0	-	1883.0	53.1	±	.	53.1	-	53.1
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1991 (n = 2)						
Lepomis auritus	0.4	±	0.6	0.0	-	0.8	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.4	±	0.6	0.0	-	0.8	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	1217.0	±	929.5	559.7	-	1874.2	27.4	±	14.0	17.5	-	37.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1992 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	861.9	±	425.9	380.6	-	1189.8	21.4	±	12.8	10.3	-	35.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1993 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	726.0	±	.	726.0	-	726.0	16.5	±	.	16.5	-	16.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1994 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	706.5	±	.	706.5	-	706.5	14.5	±	.	14.5	-	14.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						Santeetlah Reservoir						
						1963 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	931.4	±	302.0	717.9	-	1145.0	53.2	±	17.7	40.7	-	65.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix J.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						1965 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	159.4	±	.	159.4	-	159.4	6.0	±	.	6.0	-	6.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						Tellico Reservoir						
						1980 (n = 1)						
Lepomis auritus	8.3	±	0.0	8.3	-	8.3	0.4	±	0.0	0.4	-	0.4
Lepomis cyanellus	564.0	±	0.0	564.0	-	564.0	11.8	±	0.0	11.8	-	11.8
Lepomis gulosus	50.8	±	0.0	50.8	-	50.8	1.0	±	0.0	1.0	-	1.0
Lepomis macrochirus	288.1	±	0.0	288.1	-	288.1	13.3	±	0.0	13.3	-	13.3
Lepomis megalotis	1.2	±	0.0	1.2	-	1.2	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	6.9	±	0.0	6.9	-	6.9	0.2	±	0.0	0.2	-	0.2
						1981 (n = 1)						
Lepomis auritus	43.2	±	0.0	43.2	-	43.2	1.2	±	0.0	1.2	-	1.2
Lepomis cyanellus	45.8	±	0.0	45.8	-	45.8	0.8	±	0.0	0.8	-	0.8
Lepomis gulosus	98.2	±	0.0	98.2	-	98.2	1.6	±	0.0	1.6	-	1.6
Lepomis macrochirus	1470.5	±	0.0	1470.5	-	1470.5	35.6	±	0.0	35.6	-	35.6
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	2.8	±	0.0	2.8	-	2.8	0.2	±	0.0	0.2	-	0.2
						1982 (n = 1)						
Lepomis auritus	37.7	±	0.0	37.7	-	37.7	1.0	±	0.0	1.0	-	1.0
Lepomis cyanellus	15.5	±	0.0	15.5	-	15.5	0.2	±	0.0	0.2	-	0.2
Lepomis gulosus	11.9	±	0.0	11.9	-	11.9	0.3	±	0.0	0.3	-	0.3
Lepomis macrochirus	893.8	±	0.0	893.8	-	893.8	27.9	±	0.0	27.9	-	27.9
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	5.5	±	0.0	5.5	-	5.5	0.3	±	0.0	0.3	-	0.3
						1984 (n = 1)						
Lepomis auritus	31.7	±	0.0	31.7	-	31.7	0.8	±	0.0	0.8	-	0.8
Lepomis cyanellus	12.6	±	0.0	12.6	-	12.6	0.3	±	0.0	0.3	-	0.3
Lepomis gulosus	20.5	±	0.0	20.5	-	20.5	0.5	±	0.0	0.5	-	0.5
Lepomis macrochirus	565.9	±	0.0	565.9	-	565.9	17.7	±	0.0	17.7	-	17.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	4.6	±	0.0	4.6	-	4.6	0.4	±	0.0	0.4	-	0.4
						1985 (n = 1)						
Lepomis auritus	36.1	±	0.0	36.1	-	36.1	1.2	±	0.0	1.2	-	1.2
Lepomis cyanellus	1.7	±	0.0	1.7	-	1.7	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	8.5	±	0.0	8.5	-	8.5	0.1	±	0.0	0.1	-	0.1
Lepomis macrochirus	542.7	±	0.0	542.7	-	542.7	15.5	±	0.0	15.5	-	15.5

Appendix J.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	7.7	±	0.0	7.7	-	7.7	0.5	±	0.0	0.5	-	0.5
						1989 (n = 1)						
Lepomis auritus	73.3	±	0.0	73.3	-	73.3	2.1	±	0.0	2.1	-	2.1
Lepomis cyanellus	15.7	±	0.0	15.7	-	15.7	0.5	±	0.0	0.5	-	0.5
Lepomis gulosus	66.5	±	0.0	66.5	-	66.5	1.5	±	0.0	1.5	-	1.5
Lepomis macrochirus	1114.3	±	0.0	1114.3	-	1114.3	27.7	±	0.0	27.7	-	27.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	6.0	±	0.0	6.0	-	6.0	0.1	±	0.0	0.1	-	0.1
						1992 (n = 1)						
Lepomis auritus	12.8	±	0.0	12.8	-	12.8	0.5	±	0.0	0.5	-	0.5
Lepomis cyanellus	8.1	±	0.0	8.1	-	8.1	0.2	±	0.0	0.2	-	0.2
Lepomis gulosus	46.3	±	0.0	46.3	-	46.3	0.8	±	0.0	0.8	-	0.8
Lepomis macrochirus	1110.3	±	0.0	1110.3	-	1110.3	31.8	±	0.0	31.8	-	31.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	8.2	±	0.0	8.2	-	8.2	0.6	±	0.0	0.6	-	0.6
						Thorpe Reservoir						
						1965 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix J.2 Percent abundance of *Lepomis* spp. collected from TVA cove-rotenone samples (1949-1994) in Watts Bar mainstem and tributary reservoirs in the Tennessee River drainage.

Year	Percent Abundance						Total Number
	Lepomis auritus	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	
				Watts Bar Reservoir			
1949	0.00	0.00	0.00	88.89	11.11	0.00	9
1950	0.00	0.00	0.00	100.00	0.00	0.00	62
1951	0.00	0.00	2.53	97.47	0.00	0.00	79
1953	0.00	0.00	0.89	97.32	1.79	0.00	112
1957	0.61	0.00	1.84	97.55	0.00	0.00	978
1958	0.00	0.00	2.90	97.10	0.00	0.00	207
1959	0.00	0.00	4.12	95.88	0.00	0.00	194
1960	1.38	0.00	6.87	90.03	1.72	0.00	291
1964	2.65	0.00	8.72	87.95	0.61	0.07	2788
1973	4.34	0.00	5.40	89.38	0.48	0.41	4151
1975	5.90	0.00	6.21	85.77	1.89	0.24	1272
1976	12.52	0.00	4.60	81.02	1.39	0.48	2739
1977	6.14	0.00	4.78	82.94	6.05	0.09	1108
1978	24.77	0.00	6.08	65.65	0.00	3.51	428
1979	4.62	0.21	4.62	86.35	3.36	0.84	476
1980	2.89	0.00	5.03	88.33	2.25	1.50	934
1986	2.14	0.64	4.44	88.33	1.46	3.00	4395
				Cheoah Reservoir			
1952	0.00	0.00	0.00	100.00	0.00	0.00	13
1955	0.00	0.00	0.00	100.00	0.00	0.00	74
1965	0.00	0.00	0.00	100.00	0.00	0.00	44
				Fontana Reservoir			
1949	0.00	0.00	0.00	100.00	0.00	0.00	40
1950	0.00	0.00	0.00	100.00	0.00	0.00	384
1951	0.00	0.00	0.00	100.00	0.00	0.00	215
1952	0.00	0.00	0.00	91.67	0.00	8.33	36
1954	0.00	0.00	0.00	100.00	0.00	0.00	42
1955	0.00	0.00	0.00	100.00	0.00	0.00	35
1956	0.00	0.00	0.00	100.00	0.00	0.00	74
1962	0.00	0.32	0.00	99.68	0.00	0.00	930
1964	0.22	0.96	0.00	98.83	0.00	0.00	4183
1979	0.00	5.06	0.00	94.94	0.00	0.00	4542
1984	0.00	2.36	0.00	97.64	0.00	0.00	1313

Appendix J.2 Continued.

Year	*Lepomis auritus*	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
			Percent Abundance				
			Melton Hill Reservoir				
1964	0.54	0.00	1.36	98.10	0.00	0.00	369
1972	0.00	0.00	0.70	95.07	4.23	0.00	284
1974	3.09	0.00	5.94	90.17	0.00	0.80	875
1975	6.80	0.00	15.78	77.42	0.00	0.00	735
1976	13.26	0.00	11.28	74.51	0.00	0.95	1161
1977	2.90	0.00	7.64	88.33	0.00	1.13	1688
1978	2.40	0.00	8.62	87.66	0.00	1.33	1126
1979	12.13	0.00	9.51	69.84	0.00	8.53	305
1980	2.21	0.00	7.34	88.96	0.00	1.50	1404
1982	2.77	0.00	4.48	90.49	0.00	2.26	2566
1987	1.54	0.00	8.65	79.04	0.00	10.77	520
			Norris Reservoir				
1949	0.00	0.00	0.00	100.00	0.00	0.00	28
1950	0.00	0.00	0.00	100.00	0.00	0.00	383
1951	0.00	0.00	0.00	100.00	0.00	0.00	28
1952	0.00	0.00	0.00	100.00	0.00	0.00	303
1953	0.00	0.00	0.00	100.00	0.00	0.00	64
1954	0.00	0.00	0.00	100.00	0.00	0.00	285
1955	0.00	0.00	0.00	100.00	0.00	0.00	274
1956	0.00	0.00	0.00	99.02	0.99	0.00	406
1957	0.40	0.00	0.00	99.60	0.00	0.00	501
1958	0.90	0.00	0.00	99.10	0.00	0.00	1225
1959	0.00	0.00	0.00	100.00	0.00	0.00	698
1960	0.00	0.00	0.00	100.00	0.00	0.00	502
1961	0.00	0.00	0.00	99.72	0.28	0.00	1076
1963	0.00	0.00	0.00	100.00	0.00	0.00	550
1969	0.00	0.00	0.00	99.86	0.14	0.00	733
1970	0.00	0.00	0.00	100.00	0.00	0.00	1191
1975	0.00	0.00	0.24	99.77	0.00	0.00	2985
1976	0.04	0.00	0.42	99.51	0.04	0.00	2635
1977	0.00	0.00	0.00	99.31	0.69	0.00	144
1978	0.00	0.00	0.00	99.56	0.44	0.00	459
1979	0.00	0.00	0.00	99.93	0.07	0.00	8439
1980	0.00	0.00	0.00	100.00	0.00	0.00	704
1981	0.00	0.00	0.00	99.49	0.51	0.00	895
1982	0.00	0.00	0.00	98.67	1.33	0.00	751
1983	0.00	0.00	0.00	98.64	1.36	0.00	2129
1984	0.00	0.00	0.00	99.62	0.38	0.00	2086
1986	0.00	0.00	0.00	98.86	0.76	0.38	528
1987	0.00	0.00	0.00	100.00	0.00	0.00	1454
1988	0.00	0.00	0.00	100.00	0.00	0.00	219
1989	0.03	0.00	0.00	99.95	0.01	0.00	8771

Appendix J.2 Continued.

Year	*Lepomis auritus*	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
			Percent Abundance				
1990	0.00	0.00	0.00	100.00	0.00	0.00	2655
1991	0.04	0.00	0.04	99.93	0.00	0.00	2832
1992	0.00	0.00	0.00	100.00	0.00	0.00	6157
1993	0.00	0.00	0.00	100.00	0.00	0.00	2708
1994	0.00	0.00	0.00	100.00	0.00	0.00	2840
			Santeetlah Reservoir				
1949	0.00	0.00	0.00	100.00	0.00	0.00	76
1950	0.00	0.00	0.00	100.00	0.00	0.00	176
1951	0.00	0.00	0.00	100.00	0.00	0.00	184
1957	0.00	0.00	0.00	100.00	0.00	0.00	124
1958	0.00	0.00	0.00	100.00	0.00	0.00	2647
1959	0.00	0.00	0.00	100.00	0.00	0.00	32
1963	0.00	0.00	0.00	100.00	0.00	0.00	430
1965	0.00	0.00	0.00	100.00	0.00	0.00	51
			Tellico Reservoir				
1980	1.04	60.05	5.77	32.22	0.12	0.81	866
1981	2.55	2.80	6.01	88.50	0.00	0.15	1965
1982	3.84	1.65	1.28	92.69	0.00	0.55	1094
1984	4.82	1.93	3.31	89.26	0.00	0.69	726
1985	5.93	0.30	1.48	90.96	0.00	1.33	675
1989	5.82	1.23	5.21	87.26	0.00	0.48	1460
1992	1.14	0.68	3.86	93.65	0.00	0.68	1322
			Thorpe Reservoir				
1952	92.07	0.00	0.00	7.93	0.00	0.00	227
1957	0.00	0.00	0.00	0.00	0.00	0.00	0
1958	0.00	0.00	0.00	0.00	0.00	0.00	0
1959	0.00	0.00	0.00	0.00	0.00	0.00	0
1965	0.00	0.00	0.00	0.00	0.00	0.00	0

Appendix J.3 Summary statistics for relative density (CPUE) of *Lepomis* spp. collected from TVA electrofishing samples (1993-2012) in Watts Bar mainstem and tributary reservoirs in the Tennessee River drainage.

Species	Mean ± SD	Min - Max	% Abundance
	Watts Bar Reservoir		
	1993 (n = 4)		
Lepomis auritus	0.27 ± 0.43	0.00 - 0.91	6.67
Lepomis cyanellus	0.83 ± 1.03	0.00 - 2.10	22.56
Lepomis gulosus	0.28 ± 0.29	0.00 - 0.62	3.89
Lepomis macrochirus	3.96 ± 5.86	0.82 - 12.74	51.23
Lepomis megalotis	0.01 ± 0.01	0.00 - 0.02	0.19
Lepomis microlophus	0.59 ± 0.35	0.18 - 0.98	15.45
	1994 (n = 4)		
Lepomis auritus	0.51 ± 0.50	0.18 - 1.24	7.99
Lepomis cyanellus	0.23 ± 0.24	0.00 - 0.56	5.06
Lepomis gulosus	0.15 ± 0.26	0.00 - 0.53	6.57
Lepomis macrochirus	5.62 ± 5.50	1.11 - 12.81	71.17
Lepomis megalotis	0.09 ± 0.18	0.00 - 0.37	0.97
Lepomis microlophus	0.62 ± 0.55	0.09 - 1.18	8.24
	1996 (n = 4)		
Lepomis auritus	0.21 ± 0.42	0.00 - 0.83	2.72
Lepomis cyanellus	0.06 ± 0.03	0.03 - 0.09	1.05
Lepomis gulosus	0.18 ± 0.19	0.03 - 0.42	3.85
Lepomis macrochirus	4.44 ± 2.55	2.06 - 7.38	74.83
Lepomis megalotis	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis microlophus	0.79 ± 0.25	0.44 - 0.97	17.55
	1998 (n = 4)		
Lepomis auritus	1.00 ± 1.88	0.00 - 3.81	8.63
Lepomis cyanellus	0.68 ± 1.18	0.00 - 2.45	6.07
Lepomis gulosus	0.21 ± 0.22	0.00 - 0.52	2.33
Lepomis macrochirus	7.84 ± 7.14	3.55 - 18.50	73.98
Lepomis megalotis	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis microlophus	0.75 ± 0.19	0.55 - 0.91	8.99
	1999 (n = 1)		
Lepomis auritus	0.67 ± 0.00	0.67 - 0.67	21.52
Lepomis cyanellus	0.31 ± 0.00	0.31 - 0.31	10.13
Lepomis gulosus	0.00 ± 0.00	0.00 - 0.00	0.00

Appendix J.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	0.96	±	0.00	0.96	-	0.96	31.65
Lepomis megalotis	0.25	±	0.00	0.25	-	0.25	8.23
Lepomis microlophus	0.86	±	0.00	0.86	-	0.86	28.48
			2000 (n = 4)				
Lepomis auritus	0.67	±	0.78	0.00	-	1.79	10.19
Lepomis cyanellus	0.51	±	0.55	0.00	-	1.28	7.86
Lepomis gulosus	0.15	±	0.10	0.05	-	0.26	3.32
Lepomis macrochirus	3.20	±	1.93	1.00	-	5.50	65.40
Lepomis megalotis	0.14	±	0.28	0.00	-	0.56	2.22
Lepomis microlophus	0.66	±	0.41	0.05	-	0.93	11.01
			2001 (n = 3)				
Lepomis auritus	0.50	±	0.55	0.14	-	1.13	9.67
Lepomis cyanellus	0.24	±	0.11	0.14	-	0.37	3.75
Lepomis gulosus	0.01	±	0.01	0.00	-	0.01	0.08
Lepomis macrochirus	6.79	±	4.11	2.07	-	9.59	67.67
Lepomis megalotis	0.80	±	0.69	0.00	-	1.21	6.82
Lepomis microlophus	0.94	±	0.08	0.84	-	0.99	12.01
			2002 (n = 4)				
Lepomis auritus	0.45	±	0.37	0.00	-	0.90	7.31
Lepomis cyanellus	1.46	±	1.95	0.10	-	4.31	23.59
Lepomis gulosus	0.08	±	0.07	0.00	-	0.15	1.48
Lepomis macrochirus	2.37	±	1.76	0.86	-	4.63	43.60
Lepomis megalotis	0.05	±	0.10	0.00	-	0.21	0.80
Lepomis microlophus	0.93	±	0.06	0.88	-	0.99	23.22
			2003 (n = 3)				
Lepomis auritus	0.34	±	0.37	0.00	-	0.73	3.73
Lepomis cyanellus	0.44	±	0.15	0.34	-	0.62	5.38
Lepomis gulosus	0.12	±	0.20	0.00	-	0.35	1.84
Lepomis macrochirus	5.68	±	1.98	3.41	-	7.08	67.20
Lepomis megalotis	0.78	±	0.60	0.10	-	1.23	10.35
Lepomis microlophus	0.91	±	0.09	0.81	-	1.00	11.49
			2004 (n = 4)				
Lepomis auritus	0.72	±	1.34	0.00	-	2.73	7.29
Lepomis cyanellus	1.37	±	1.94	0.26	-	4.26	20.31
Lepomis gulosus	0.26	±	0.30	0.00	-	0.58	2.38
Lepomis macrochirus	3.21	±	3.42	0.92	-	8.19	46.80
Lepomis megalotis	0.18	±	0.36	0.00	-	0.72	1.67
Lepomis microlophus	0.87	±	0.14	0.73	-	1.00	21.55

Appendix J.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2005 (n = 3)				
Lepomis auritus	0.62	±	0.55	0.00	-	1.04	5.51
Lepomis cyanellus	2.61	±	2.10	1.31	-	5.03	24.32
Lepomis gulosus	0.34	±	0.60	0.00	-	1.03	3.98
Lepomis macrochirus	3.40	±	1.05	2.65	-	4.59	39.06
Lepomis megalotis	2.15	±	2.58	0.28	-	5.09	18.49
Lepomis microlophus	0.70	±	0.29	0.41	-	0.99	8.64
			2006 (n = 4)				
Lepomis auritus	1.25	±	1.67	0.00	-	3.53	13.64
Lepomis cyanellus	1.40	±	1.07	0.28	-	2.38	21.10
Lepomis gulosus	0.36	±	0.69	0.00	-	1.40	3.44
Lepomis macrochirus	2.41	±	1.11	1.00	-	3.37	40.34
Lepomis megalotis	0.53	±	0.53	0.00	-	1.13	6.60
Lepomis microlophus	0.78	±	0.23	0.46	-	0.99	14.87
			2007 (n = 3)				
Lepomis auritus	0.45	±	0.73	0.00	-	1.29	5.49
Lepomis cyanellus	0.82	±	0.68	0.03	-	1.22	8.28
Lepomis gulosus	0.07	±	0.11	0.00	-	0.20	0.81
Lepomis macrochirus	4.46	±	0.59	3.95	-	5.11	43.97
Lepomis megalotis	3.66	±	2.83	0.46	-	5.80	32.60
Lepomis microlophus	0.86	±	0.16	0.67	-	0.98	8.85
			2008 (n = 4)				
Lepomis auritus	0.95	±	0.97	0.03	-	2.19	11.00
Lepomis cyanellus	0.68	±	0.53	0.07	-	1.35	15.55
Lepomis gulosus	0.19	±	0.26	0.00	-	0.56	5.88
Lepomis macrochirus	4.08	±	3.29	0.99	-	7.75	55.28
Lepomis megalotis	0.47	±	0.53	0.00	-	1.03	4.50
Lepomis microlophus	0.52	±	0.36	0.20	-	0.91	7.78
			2009 (n = 7)				
Lepomis auritus	0.76	±	0.80	0.01	-	2.21	9.43
Lepomis cyanellus	0.80	±	0.45	0.14	-	1.50	14.11
Lepomis gulosus	0.32	±	0.29	0.00	-	0.65	3.52
Lepomis macrochirus	4.23	±	3.07	1.00	-	8.80	51.28
Lepomis megalotis	1.11	±	1.13	0.00	-	2.95	11.97
Lepomis microlophus	0.74	±	0.38	0.07	-	1.00	9.68
			2010 (n = 7)				
Lepomis auritus	0.62	±	0.59	0.00	-	1.70	8.34
Lepomis cyanellus	1.13	±	0.63	0.45	-	2.38	17.98
Lepomis gulosus	0.14	±	0.14	0.00	-	0.36	2.19
Lepomis macrochirus	3.37	±	2.06	0.97	-	6.35	49.18
Lepomis megalotis	0.67	±	0.72	0.00	-	1.93	7.74

Appendix J.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis microlophus	0.81	±	0.22	0.39	-	1.01	14.57
			2011 (n = 7)				
Lepomis auritus	0.49	±	0.43	0.00	-	1.23	9.07
Lepomis cyanellus	1.31	±	0.74	0.47	-	2.49	22.08
Lepomis gulosus	0.57	±	0.26	0.36	-	1.10	9.94
Lepomis macrochirus	3.69	±	5.24	1.00	-	15.38	38.82
Lepomis megalotis	0.48	±	0.72	0.00	-	1.90	5.83
Lepomis microlophus	0.82	±	0.12	0.68	-	1.00	14.26
			2012 (n = 3)				
Lepomis auritus	0.39	±	0.45	0.00	-	0.89	7.59
Lepomis cyanellus	0.91	±	0.09	0.81	-	0.98	15.60
Lepomis gulosus	0.04	±	0.07	0.00	-	0.12	0.58
Lepomis macrochirus	3.15	±	0.77	2.43	-	3.96	51.98
Lepomis megalotis	0.85	±	0.75	0.00	-	1.40	12.92
Lepomis microlophus	0.69	±	0.22	0.56	-	0.94	11.32
			Melton Hill Reservoir				
			1993 (n = 3)				
Lepomis auritus	0.17	±	0.20	0.00	-	0.39	9.62
Lepomis cyanellus	0.02	±	0.04	0.00	-	0.07	1.07
Lepomis gulosus	0.09	±	0.15	0.00	-	0.26	3.73
Lepomis macrochirus	0.83	±	0.28	0.50	-	1.00	50.45
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.56	±	0.27	0.31	-	0.85	35.13
			1994 (n = 3)				
Lepomis auritus	0.23	±	0.35	0.00	-	0.63	8.84
Lepomis cyanellus	0.24	±	0.22	0.00	-	0.43	8.26
Lepomis gulosus	0.12	±	0.10	0.00	-	0.18	3.99
Lepomis macrochirus	1.44	±	0.64	0.80	-	2.08	58.48
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.39	±	0.20	0.21	-	0.60	20.43
			1996 (n = 3)				
Lepomis auritus	0.01	±	0.01	0.00	-	0.02	0.39
Lepomis cyanellus	0.52	±	0.29	0.29	-	0.85	26.39
Lepomis gulosus	0.03	±	0.05	0.00	-	0.08	1.05
Lepomis macrochirus	1.07	±	0.19	0.86	-	1.22	60.07
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.28	±	0.26	0.00	-	0.50	12.10

Appendix J.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			1998 (n = 3)				
Lepomis auritus	0.12	±	0.10	0.00	-	0.18	1.51
Lepomis cyanellus	2.14	±	3.33	0.00	-	5.98	22.25
Lepomis gulosus	0.12	±	0.21	0.00	-	0.36	1.83
Lepomis macrochirus	3.20	±	2.14	1.00	-	5.27	70.92
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.29	±	0.26	0.00	-	0.50	3.50
			2000 (n = 3)				
Lepomis auritus	0.73	±	0.54	0.17	-	1.24	18.70
Lepomis cyanellus	0.67	±	0.82	0.08	-	1.61	15.60
Lepomis gulosus	0.29	±	0.42	0.00	-	0.77	7.55
Lepomis macrochirus	1.43	±	0.70	1.00	-	2.24	47.93
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.33	±	0.14	0.17	-	0.43	10.22
			2001 (n = 2)				
Lepomis auritus	0.36	±	0.51	0.00	-	0.73	10.51
Lepomis cyanellus	1.42	±	1.41	0.42	-	2.42	34.89
Lepomis gulosus	0.46	±	0.19	0.33	-	0.60	11.90
Lepomis macrochirus	1.21	±	0.32	0.98	-	1.44	32.46
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.37	±	0.24	0.20	-	0.54	10.23
			2002 (n = 3)				
Lepomis auritus	0.07	±	0.06	0.00	-	0.12	3.05
Lepomis cyanellus	0.32	±	0.35	0.07	-	0.72	13.84
Lepomis gulosus	0.16	±	0.14	0.00	-	0.24	7.48
Lepomis macrochirus	1.08	±	0.14	1.00	-	1.24	54.12
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.44	±	0.37	0.06	-	0.80	21.51
			2003 (n = 2)				
Lepomis auritus	0.51	±	0.72	0.00	-	1.02	17.11
Lepomis cyanellus	0.35	±	0.26	0.17	-	0.53	10.18
Lepomis gulosus	0.62	±	0.77	0.07	-	1.16	17.10
Lepomis macrochirus	1.07	±	0.01	1.06	-	1.07	32.44
Lepomis megalotis	0.02	±	0.03	0.00	-	0.05	0.64
Lepomis microlophus	0.75	±	0.13	0.66	-	0.84	22.54
			2004 (n = 3)				
Lepomis auritus	0.18	±	0.25	0.00	-	0.47	3.27
Lepomis cyanellus	2.96	±	1.90	1.00	-	4.80	52.65
Lepomis gulosus	0.19	±	0.30	0.00	-	0.54	2.43
Lepomis macrochirus	1.56	±	0.97	0.50	-	2.39	28.53
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00

Appendix J.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis microlophus	0.52	±	0.06	0.47	-	0.58	13.13
			2005 (n = 2)				
Lepomis auritus	1.13	±	1.60	0.00	-	2.27	17.24
Lepomis cyanellus	1.02	±	1.16	0.20	-	1.84	21.89
Lepomis gulosus	0.47	±	0.66	0.00	-	0.93	7.10
Lepomis macrochirus	0.93	±	0.09	0.87	-	0.99	41.72
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.37	±	0.25	0.20	-	0.55	12.05
			2006 (n = 3)				
Lepomis auritus	0.57	±	0.49	0.10	-	1.07	16.81
Lepomis cyanellus	0.97	±	1.16	0.10	-	2.28	23.10
Lepomis gulosus	0.02	±	0.04	0.00	-	0.06	0.40
Lepomis macrochirus	1.11	±	0.30	0.90	-	1.46	46.10
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.55	±	0.49	0.00	-	0.93	13.59
			2007 (n = 2)				
Lepomis auritus	1.15	±	1.55	0.06	-	2.25	15.16
Lepomis cyanellus	1.82	±	2.05	0.37	-	3.27	29.09
Lepomis gulosus	0.08	±	0.12	0.00	-	0.17	1.03
Lepomis macrochirus	1.35	±	0.63	0.91	-	1.79	33.07
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.69	±	0.04	0.66	-	0.72	21.64
			2008 (n = 3)				
Lepomis auritus	0.74	±	0.74	0.28	-	1.59	17.49
Lepomis cyanellus	1.43	±	0.52	0.83	-	1.79	39.17
Lepomis gulosus	0.13	±	0.23	0.00	-	0.40	2.19
Lepomis macrochirus	1.28	±	0.97	0.17	-	1.99	27.28
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.50	±	0.19	0.33	-	0.71	13.86
			2010 (n = 4)				
Lepomis auritus	0.29	±	0.38	0.00	-	0.80	7.51
Lepomis cyanellus	1.37	±	0.50	0.89	-	1.98	46.93
Lepomis gulosus	0.03	±	0.06	0.00	-	0.11	1.32
Lepomis macrochirus	1.07	±	0.70	0.43	-	2.06	31.50
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.45	±	0.34	0.14	-	0.77	12.75
			2011 (n = 4)				
Lepomis auritus	2.01	±	3.69	0.03	-	7.55	12.64
Lepomis cyanellus	3.23	±	5.52	0.06	-	11.49	24.06
Lepomis gulosus	0.55	±	0.70	0.00	-	1.57	15.41

Appendix J.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	1.50	±	0.88	0.96	-	2.81	28.38
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.71	±	0.21	0.41	-	0.88	19.51
			Norris Reservoir				
			1993 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.30	±	0.18	1.09	-	1.43	100.00
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1994 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	3.85	±	1.91	2.59	-	6.05	91.45
Lepomis megalotis	0.33	±	0.58	0.00	-	1.00	8.55
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1995 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.15	±	2.00	0.00	-	3.46	22.34
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.27	±	0.38	1.03	-	1.70	77.66
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1999 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.01	±	0.02	0.00	-	0.04	0.30
Lepomis gulosus	0.31	±	0.53	0.00	-	0.92	15.94
Lepomis macrochirus	2.19	±	2.07	1.00	-	4.58	72.71
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	10.75
Lepomis microlophus	0.01	±	0.02	0.00	-	0.04	0.30
			2001 (n = 3)				
Lepomis auritus	0.05	±	0.10	0.00	-	0.16	1.90
Lepomis cyanellus	0.14	±	0.24	0.00	-	0.41	4.79
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.17	±	0.58	1.53	-	2.68	93.30
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix J.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2003 (n = 3)				
Lepomis auritus	0.04	±	0.08	0.00	-	0.13	1.21
Lepomis cyanellus	0.29	±	0.51	0.00	-	0.88	2.65
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	6.92	±	2.97	3.50	-	8.85	92.05
Lepomis megalotis	0.45	±	0.79	0.00	-	1.36	4.09
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2005 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.52	±	0.84	0.00	-	1.48	8.41
Lepomis gulosus	0.18	±	0.31	0.00	-	0.54	6.73
Lepomis macrochirus	3.39	±	1.30	2.07	-	4.68	76.60
Lepomis megalotis	0.27	±	0.47	0.00	-	0.82	4.21
Lepomis microlophus	0.26	±	0.46	0.00	-	0.79	4.05
			2007 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.15	±	1.82	0.02	-	3.24	23.05
Lepomis gulosus	0.08	±	0.14	0.00	-	0.24	5.21
Lepomis macrochirus	1.95	±	0.72	1.13	-	2.45	70.49
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.07	±	0.13	0.00	-	0.22	1.26
			2009 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.50	±	0.53	0.10	-	1.10	9.77
Lepomis gulosus	0.09	±	0.16	0.00	-	0.28	2.23
Lepomis macrochirus	3.56	±	1.07	2.44	-	4.58	86.03
Lepomis megalotis	0.06	±	0.10	0.00	-	0.17	0.94
Lepomis microlophus	0.06	±	0.11	0.00	-	0.19	1.02
			2011 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.93	±	1.69	1.74	-	4.86	45.22
Lepomis gulosus	2.28	±	3.94	0.00	-	6.83	20.48
Lepomis macrochirus	2.19	±	0.34	1.87	-	2.55	32.83
Lepomis megalotis	0.03	±	0.06	0.00	-	0.10	0.46
Lepomis microlophus	0.07	±	0.13	0.00	-	0.22	1.00
			Tellico Reservoir				
			1993 (n = 2)				
Lepomis auritus	0.96	±	0.27	0.77	-	1.16	34.12
Lepomis cyanellus	0.04	±	0.05	0.00	-	0.08	1.21
Lepomis gulosus	0.23	±	0.11	0.15	-	0.32	8.42

Appendix J.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	1.53	±	0.90	0.89	-	2.17	52.24
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.11	±	0.15	0.00	-	0.21	4.00
			1994 (n = 2)				
Lepomis auritus	2.98	±	0.70	2.48	-	3.47	40.12
Lepomis cyanellus	0.48	±	0.65	0.02	-	0.94	5.92
Lepomis gulosus	0.49	±	0.66	0.02	-	0.95	7.98
Lepomis macrochirus	3.44	±	1.13	2.64	-	4.24	45.87
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.01	±	0.01	0.00	-	0.02	0.12
			1995 (n = 2)				
Lepomis auritus	0.41	±	0.13	0.32	-	0.50	17.01
Lepomis cyanellus	0.20	±	0.28	0.00	-	0.40	11.76
Lepomis gulosus	2.30	±	3.25	0.00	-	4.59	33.74
Lepomis macrochirus	1.33	±	0.88	0.70	-	1.95	34.55
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.05	±	0.07	0.00	-	0.10	2.94
			1997 (n = 2)				
Lepomis auritus	0.33	±	0.35	0.09	-	0.58	15.82
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.18	±	1.23	1.31	-	3.04	76.65
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.20	±	0.03	0.18	-	0.22	7.53
			1999 (n = 2)				
Lepomis auritus	0.68	±	0.79	0.12	-	1.24	20.45
Lepomis cyanellus	0.89	±	1.25	0.00	-	1.77	22.09
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.98	±	0.03	0.96	-	1.00	54.13
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.04	±	0.05	0.00	-	0.08	3.33
			2001 (n = 2)				
Lepomis auritus	1.61	±	2.28	0.00	-	3.22	16.83
Lepomis cyanellus	1.68	±	2.38	0.00	-	3.37	17.68
Lepomis gulosus	0.08	±	0.07	0.03	-	0.13	5.61
Lepomis macrochirus	1.76	±	1.07	1.00	-	2.51	55.65
Lepomis megalotis	0.02	±	0.03	0.00	-	0.05	4.18
Lepomis microlophus	0.00	±	0.01	0.00	-	0.01	0.04
			2003 (n = 2)				
Lepomis auritus	0.61	±	0.51	0.25	-	0.97	12.59

Appendix J.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis cyanellus	1.13	±	0.10	1.05	-	1.20	24.00
Lepomis gulosus	0.02	±	0.02	0.01	-	0.03	0.43
Lepomis macrochirus	2.79	±	0.10	2.72	-	2.86	59.33
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.17	±	0.23	0.00	-	0.33	3.65
			2004 (n = 2)				
Lepomis auritus	2.30	±	2.03	0.86	-	3.74	45.97
Lepomis cyanellus	0.84	±	0.39	0.56	-	1.12	22.21
Lepomis gulosus	0.34	±	0.14	0.24	-	0.44	7.64
Lepomis macrochirus	1.00	±	0.01	0.99	-	1.00	24.19
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2005 (n = 2)				
Lepomis auritus	0.48	±	0.47	0.15	-	0.82	9.37
Lepomis cyanellus	1.29	±	0.53	0.91	-	1.66	29.41
Lepomis gulosus	0.35	±	0.47	0.01	-	0.69	11.92
Lepomis macrochirus	2.33	±	1.74	1.10	-	3.56	48.19
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.04	±	0.03	0.01	-	0.06	1.10
			2007 (n = 2)				
Lepomis auritus	0.83	±	0.31	0.61	-	1.06	20.22
Lepomis cyanellus	1.83	±	1.79	0.56	-	3.10	35.35
Lepomis gulosus	0.16	±	0.22	0.00	-	0.32	6.15
Lepomis macrochirus	1.40	±	0.45	1.08	-	1.72	34.45
Lepomis megalotis	0.24	±	0.34	0.00	-	0.48	3.75
Lepomis microlophus	0.00	±	0.01	0.00	-	0.01	0.07
			2009 (n = 2)				
Lepomis auritus	0.67	±	0.40	0.40	-	0.95	15.44
Lepomis cyanellus	1.06	±	0.79	0.50	-	1.62	23.25
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.45	±	0.60	2.03	-	2.87	60.60
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.02	±	0.03	0.00	-	0.04	0.71
			2011 (n = 2)				
Lepomis auritus	0.78	±	0.19	0.65	-	0.91	13.25
Lepomis cyanellus	2.27	±	0.89	1.64	-	2.90	42.29
Lepomis gulosus	0.07	±	0.05	0.04	-	0.10	1.34
Lepomis macrochirus	2.64	±	2.61	0.79	-	4.48	39.68
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.18	±	0.10	0.11	-	0.25	3.44

Appendix J.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Fontana Reservoir							
1993 (n = 3)							
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	12.83	±	6.65	6.67	-	19.89	76.77
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.51	±	0.63	0.96	-	2.20	23.23
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
1994 (n = 3)							
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	10.63	±	4.54	7.34	-	15.82	84.58
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.82	±	0.22	1.62	-	2.05	15.42
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
1995 (n = 2)							
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	11.05	±	14.50	0.80	-	21.30	73.79
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	0.48	±	0.29	0.28	-	0.68	26.21
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
1996 (n = 3)							
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.37	±	2.24	0.86	-	4.95	63.73
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.12	±	1.11	0.23	-	2.37	36.27
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
1998 (n = 3)							
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.12	±	2.30	0.21	-	4.67	36.08
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.69	±	0.15	2.52	-	2.80	63.92
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
2000 (n = 3)							
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.08	±	0.58	1.43	-	2.55	60.21
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix J.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	1.03	±	0.24	0.75	-	1.17	39.79
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2002 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.25	±	1.25	1.47	-	3.68	60.31
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.20	±	0.27	0.90	-	1.42	36.49
Lepomis megalotis	0.10	±	0.17	0.00	-	0.29	3.21
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2004 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	3.23	±	1.41	1.78	-	4.61	70.72
Lepomis gulosus	0.03	±	0.02	0.00	-	0.04	0.77
Lepomis macrochirus	1.20	±	0.41	0.92	-	1.68	28.51
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2006 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.34	±	1.52	1.12	-	4.04	64.38
Lepomis gulosus	0.21	±	0.25	0.00	-	0.48	8.53
Lepomis macrochirus	0.83	±	0.14	0.67	-	0.94	27.09
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2008 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	9.15	±	0.45	8.64	-	9.50	90.60
Lepomis gulosus	0.15	±	0.13	0.00	-	0.24	1.54
Lepomis macrochirus	0.79	±	0.15	0.63	-	0.93	7.86
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2010 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	4.13	±	1.11	3.44	-	5.40	77.35
Lepomis gulosus	0.36	±	0.20	0.14	-	0.53	6.74
Lepomis macrochirus	0.82	±	0.04	0.80	-	0.87	15.91
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00

APPENDIX K

SUMMARY STATISTICS OF POPULATION PARAMETERS FOR *LEPOMIS* SPECIES COLLECTED FROM TVA COVE-ROTENONE SAMPLES (1949-1994) AND ELECTROFISHING SAMPLES (1993-2011) IN FORT LOUDOUN RESERVOIR AND TRIBUTARY RESERVOIRS

Appendix K.1 Summary statistics for density (fish/ha) of *Lepomis* spp. collected from TVA cove-rotenone samples (1961-1988) in Fort Loudoun mainstem and tributary reservoirs in the Tennessee River drainage.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						Fort Loudoun Reservoir						
						1961 (n = 3)						
Lepomis auritus	4.1	±	7.2	0.0	-	12.4	0.3	±	0.4	0.0	-	0.8
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	10.0	±	10.8	0.7	-	21.9	0.5	±	0.5	0.1	-	1.0
Lepomis macrochirus	195.8	±	104.2	76.5	-	268.8	6.8	±	3.8	3.0	-	10.6
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1972 (n = 8)						
Lepomis auritus	43.6	±	44.7	0.0	-	114.5	2.5	±	2.6	0.0	-	6.1
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	26.6	±	16.8	4.9	-	52.5	0.8	±	0.5	0.2	-	1.6
Lepomis macrochirus	982.2	±	445.1	378.7	-	1707.5	35.9	±	15.5	15.4	-	60.3
Lepomis megalotis	0.6	±	1.1	0.0	-	2.5	0.0	±	0.0	0.0	-	0.1
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1982 (n = 10)						
Lepomis auritus	7.0	±	22.1	0.0	-	70.0	0.5	±	1.5	0.0	-	4.6
Lepomis cyanellus	145.0	±	182.1	0.0	-	500.0	3.2	±	4.1	0.0	-	12.3
Lepomis gulosus	47.7	±	77.9	0.0	-	255.6	0.9	±	1.4	0.0	-	4.1
Lepomis macrochirus	1383.8	±	1337.0	133.3	-	4660.0	35.0	±	27.1	3.8	-	96.8
Lepomis megalotis	10.3	±	21.1	0.0	-	55.6	0.5	±	1.1	0.0	-	3.6
Lepomis microlophus	0.3	±	0.8	0.0	-	2.5	0.0	±	0.1	0.0	-	0.3
						1984 (n = 2)						
Lepomis auritus	52.3	±	30.2	31.0	-	73.7	2.5	±	1.8	1.3	-	3.8
Lepomis cyanellus	29.6	±	41.9	0.0	-	59.2	0.4	±	0.6	0.0	-	0.8
Lepomis gulosus	74.6	±	47.8	40.8	-	108.5	1.4	±	1.1	0.6	-	2.1
Lepomis macrochirus	1358.8	±	604.1	931.6	-	1785.9	33.3	±	17.6	20.8	-	45.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	14.8	±	20.9	0.0	-	29.6	0.6	±	0.9	0.0	-	1.3
						1988 (n = 2)						
Lepomis auritus	61.1	±	39.3	33.3	-	88.9	2.5	±	1.3	1.6	-	3.4
Lepomis cyanellus	83.1	±	77.3	28.4	-	137.8	1.4	±	1.0	0.7	-	2.1
Lepomis gulosus	46.8	±	47.3	13.3	-	80.2	0.8	±	0.7	0.3	-	1.3
Lepomis macrochirus	2486.2	±	10.1	2479.0	-	2493.3	51.4	±	1.3	50.4	-	52.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	10.2	±	8.2	4.4	-	16.0	0.5	±	0.4	0.2	-	0.8

Appendix K.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						Boone Reservoir						
						1961 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	7.6	±	0.0	7.6	-	7.6	0.3	±	0.0	0.3	-	0.3
Lepomis gulosus	65.7	±	0.0	65.7	-	65.7	1.4	±	0.0	1.4	-	1.4
Lepomis macrochirus	1434.3	±	0.0	1434.3	-	1434.3	40.9	±	0.0	40.9	-	40.9
Lepomis megalotis	50.0	±	0.0	50.0	-	50.0	1.2	±	0.0	1.2	-	1.2
Lepomis microlophus	1.3	±	0.0	1.3	-	1.3	0.1	±	0.0	0.1	-	0.1
						1962 (n = 9)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.7	±	1.4	0.0	-	3.8	0.0	±	0.0	0.0	-	0.1
Lepomis gulosus	86.4	±	80.8	26.1	-	288.1	1.7	±	1.4	0.8	-	5.2
Lepomis macrochirus	1825.1	±	637.3	891.8	-	2638.7	39.1	±	9.5	20.7	-	52.3
Lepomis megalotis	44.0	±	34.0	3.3	-	110.3	0.8	±	0.6	0.1	-	2.1
Lepomis microlophus	7.0	±	18.2	0.0	-	55.0	0.1	±	0.2	0.0	-	0.6
						1982 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1983 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1987 (n = 2)						
Lepomis auritus	17.5	±	7.0	12.5	-	22.4	0.7	±	0.3	0.4	-	0.9
Lepomis cyanellus	53.8	±	48.3	19.6	-	87.9	1.2	±	0.9	0.6	-	1.8
Lepomis gulosus	69.8	±	30.5	48.2	-	91.4	1.8	±	0.4	1.5	-	2.1
Lepomis macrochirus	1459.5	±	225.5	1300.0	-	1619.0	35.3	±	9.3	28.8	-	41.9
Lepomis megalotis	78.1	±	71.4	27.6	-	128.6	1.4	±	1.4	0.4	-	2.4
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1988 (n = 2)						
Lepomis auritus	14.4	±	20.4	0.0	-	28.8	0.4	±	0.6	0.0	-	0.8
Lepomis cyanellus	107.5	±	123.7	20.0	-	194.9	1.9	±	2.1	0.4	-	3.4
Lepomis gulosus	91.9	±	54.6	53.3	-	130.5	1.7	±	0.8	1.1	-	2.3
Lepomis macrochirus	3159.0	±	1584.9	2038.3	-	4279.7	55.7	±	24.0	38.7	-	72.6

Appendix K.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis megalotis	174.8	±	0.3	174.6	-	175.0	2.4	±	0.2	2.2	-	2.6
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1989 (n = 2)						
Lepomis auritus	11.8	±	2.2	10.2	-	13.3	0.5	±	0.1	0.4	-	0.6
Lepomis cyanellus	87.9	±	86.6	26.7	-	149.2	1.7	±	1.4	0.7	-	2.7
Lepomis gulosus	49.8	±	44.6	18.3	-	81.4	0.9	±	0.6	0.5	-	1.3
Lepomis macrochirus	2602.2	±	1080.3	1838.3	-	3366.1	66.4	±	30.8	44.6	-	88.2
Lepomis megalotis	185.4	±	51.3	149.2	-	221.7	2.6	±	0.9	2.0	-	3.2
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1990 (n = 1)						
Lepomis auritus	6.7	±	0.0	6.7	-	6.7	0.2	±	0.0	0.2	-	0.2
Lepomis cyanellus	13.3	±	0.0	13.3	-	13.3	0.2	±	0.0	0.2	-	0.2
Lepomis gulosus	5.0	±	0.0	5.0	-	5.0	0.1	±	0.0	0.1	-	0.1
Lepomis macrochirus	1493.3	±	0.0	1493.3	-	1493.3	36.2	±	0.0	36.2	-	36.2
Lepomis megalotis	146.7	±	0.0	146.7	-	146.7	2.2	±	0.0	2.2	-	2.2
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1991 (n = 2)						
Lepomis auritus	0.2	±	0.3	0.0	-	0.4	0.2	±	0.3	0.0	-	0.4
Lepomis cyanellus	85.5	±	97.3	16.7	-	154.2	1.2	±	1.3	0.3	-	2.1
Lepomis gulosus	122.7	±	135.7	26.7	-	218.6	1.9	±	1.8	0.7	-	3.2
Lepomis macrochirus	2259.4	±	38.5	2232.2	-	2286.7	39.7	±	3.4	37.3	-	42.1
Lepomis megalotis	105.7	±	22.5	89.8	-	121.7	1.2	±	0.4	0.9	-	1.5
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1994 (n = 2)						
Lepomis auritus	1.6	±	2.2	0.0	-	3.1	0.0	±	0.0	0.0	-	0.1
Lepomis cyanellus	5.7	±	3.7	3.1	-	8.3	0.1	±	0.1	0.0	-	0.2
Lepomis gulosus	43.9	±	21.9	28.3	-	59.4	0.6	±	0.1	0.5	-	0.7
Lepomis macrochirus	2627.9	±	337.7	2389.1	-	2866.7	45.8	±	5.5	41.9	-	49.6
Lepomis megalotis	29.0	±	34.4	4.7	-	53.3	0.5	±	0.6	0.1	-	0.9
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						Cherokee Reservoir						
						1960 (n = 3)						
Lepomis auritus	5.5	±	7.9	0.0	-	14.5	0.2	±	0.3	0.0	-	0.5
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	25.4	±	32.7	0.0	-	62.3	1.1	±	1.6	0.0	-	2.9
Lepomis macrochirus	543.0	±	300.8	269.7	-	865.2	18.7	±	14.5	6.6	-	34.8
Lepomis megalotis	0.3	±	0.6	0.0	-	1.0	0.0	±	0.1	0.0	-	0.1
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1963 (n = 12)						
Lepomis auritus	2.0	±	3.8	0.0	-	10.2	0.1	±	0.2	0.0	-	0.6

Appendix K.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	32.9	±	31.2	10.3	-	120.4	1.6	±	3.0	0.2	-	11.0
Lepomis macrochirus	1054.8	±	857.5	166.2	-	2954.1	16.5	±	9.5	5.6	-	36.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1972 (n = 3)						
Lepomis auritus	29.9	±	6.9	24.7	-	37.7	2.4	±	1.5	1.5	-	4.1
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	70.9	±	65.8	26.0	-	146.4	2.7	±	2.4	1.0	-	5.4
Lepomis macrochirus	1489.4	±	329.6	1217.4	-	1855.8	56.0	±	6.5	49.2	-	62.2
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1973 (n = 4)						
Lepomis auritus	5.5	±	6.5	0.0	-	12.2	0.5	±	0.6	0.0	-	1.1
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	47.3	±	41.9	0.0	-	92.5	1.7	±	1.4	0.0	-	3.2
Lepomis macrochirus	2438.0	±	1938.0	123.8	-	4862.5	90.2	±	55.2	10.5	-	134.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1974 (n = 3)						
Lepomis auritus	129.4	±	103.3	56.1	-	247.5	4.5	±	3.3	2.3	-	8.2
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	233.0	±	277.6	51.3	-	552.5	3.6	±	4.0	0.8	-	8.2
Lepomis macrochirus	7213.6	±	2709.5	4529.3	-	9947.5	157.9	±	35.8	127.4	-	197.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	3.3	±	5.6	0.0	-	9.8	0.2	±	0.3	0.0	-	0.5
						1975 (n = 7)						
Lepomis auritus	30.9	±	49.4	0.0	-	140.9	1.5	±	2.6	0.0	-	7.4
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	63.2	±	130.9	0.0	-	359.1	1.2	±	2.5	0.0	-	6.8
Lepomis macrochirus	1434.8	±	1115.6	183.3	-	2784.1	38.9	±	26.8	5.6	-	74.9
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1976 (n = 7)						
Lepomis auritus	22.3	±	29.7	4.5	-	84.0	1.4	±	2.2	0.1	-	5.9
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	61.9	±	62.8	0.0	-	153.7	1.0	±	0.9	0.0	-	2.3
Lepomis macrochirus	1363.2	±	785.9	148.8	-	2351.2	42.2	±	22.7	5.8	-	76.6
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.7	±	1.2	0.0	-	2.7	0.0	±	0.1	0.0	-	0.2

Appendix K.1 Continued.

Species	fish/ha							kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						1977 (n = 7)						
Lepomis auritus	16.7	±	22.1	0.0	-	62.5	0.6	±	1.3	0.0	-	3.5
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	33.7	±	75.4	0.0	-	204.2	0.5	±	1.1	0.0	-	3.1
Lepomis macrochirus	375.1	±	230.2	73.7	-	754.2	12.4	±	5.6	4.2	-	20.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1978 (n = 4)						
Lepomis auritus	6.9	±	8.7	0.0	-	17.9	0.3	±	0.4	0.0	-	0.8
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	36.3	±	38.6	1.9	-	88.2	0.8	±	0.8	0.0	-	1.8
Lepomis macrochirus	884.8	±	918.0	135.2	-	2078.4	21.3	±	17.5	5.8	-	43.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1979 (n = 4)						
Lepomis auritus	7.3	±	12.0	0.0	-	25.0	0.2	±	0.3	0.0	-	0.6
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	299.8	±	94.4	204.5	-	429.5	7.9	±	1.7	5.6	-	9.8
Lepomis macrochirus	1131.5	±	981.7	480.9	-	2593.2	37.4	±	22.0	21.2	-	68.9
Lepomis megalotis	0.5	±	1.1	0.0	-	2.1	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1980 (n = 6)						
Lepomis auritus	4.6	±	8.3	0.0	-	20.4	0.2	±	0.4	0.0	-	1.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	40.5	±	56.2	0.0	-	128.6	1.0	±	1.4	0.0	-	3.5
Lepomis macrochirus	615.7	±	415.1	203.4	-	1050.0	20.1	±	11.4	8.6	-	36.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.3	±	0.7	0.0	-	1.7	0.0	±	0.1	0.0	-	0.1
						1981 (n = 2)						
Lepomis auritus	1.3	±	1.8	0.0	-	2.5	0.0	±	0.0	0.0	-	0.1
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	6.8	±	1.0	6.1	-	7.5	0.2	±	0.1	0.1	-	0.2
Lepomis macrochirus	104.2	±	62.6	60.0	-	148.5	5.3	±	3.5	2.8	-	7.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1982 (n = 6)						
Lepomis auritus	6.4	±	13.6	0.0	-	33.8	0.2	±	0.4	0.0	-	0.9
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	52.1	±	71.6	2.3	-	188.6	0.8	±	1.0	0.1	-	2.8
Lepomis macrochirus	473.6	±	332.0	51.2	-	922.7	16.1	±	11.7	2.1	-	36.2
Lepomis megalotis	1.5	±	3.7	0.0	-	9.1	0.0	±	0.1	0.0	-	0.2

Appendix K.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis microlophus	1.3	±	3.1	0.0	-	7.7	0.0	±	0.1	0.0	-	0.2
						1983 (n = 4)						
Lepomis auritus	8.8	±	7.5	0.0	-	15.5	0.6	±	0.5	0.0	-	1.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	381.2	±	305.8	67.4	-	800.0	8.3	±	5.3	2.8	-	15.6
Lepomis macrochirus	4239.5	±	2672.2	1626.9	-	7190.5	90.2	±	41.2	51.0	-	147.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1984 (n = 4)						
Lepomis auritus	5.5	±	5.0	1.7	-	12.9	0.2	±	0.1	0.0	-	0.3
Lepomis cyanellus	2.2	±	2.5	0.0	-	4.8	0.0	±	0.1	0.0	-	0.1
Lepomis gulosus	222.9	±	270.0	61.3	-	626.9	3.4	±	2.8	1.6	-	7.6
Lepomis macrochirus	2799.1	±	1930.5	1234.7	-	5288.2	74.9	±	33.5	48.7	-	124.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	1.4	±	2.3	0.0	-	4.8	0.0	±	0.1	0.0	-	0.1
						1985 (n = 4)						
Lepomis auritus	1.3	±	1.5	0.0	-	2.9	0.0	±	0.0	0.0	-	0.1
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	15.0	±	24.3	0.0	-	51.2	0.2	±	0.3	0.0	-	0.7
Lepomis macrochirus	1176.2	±	979.9	540.5	-	2637.2	30.2	±	11.1	21.9	-	46.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1986 (n = 4)						
Lepomis auritus	10.3	±	13.0	0.0	-	27.1	0.4	±	0.5	0.0	-	0.9
Lepomis cyanellus	1.3	±	2.5	0.0	-	5.1	0.1	±	0.1	0.0	-	0.2
Lepomis gulosus	62.4	±	92.1	5.1	-	200.0	0.9	±	1.4	0.1	-	3.0
Lepomis macrochirus	1559.4	±	1075.3	688.6	-	3013.9	45.8	±	18.4	26.3	-	70.2
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	1.9	±	3.8	0.0	-	7.6	0.1	±	0.2	0.0	-	0.4
						1987 (n = 4)						
Lepomis auritus	16.2	±	28.1	0.0	-	58.1	0.5	±	0.7	0.0	-	1.5
Lepomis cyanellus	7.6	±	13.8	0.0	-	28.2	0.2	±	0.4	0.0	-	0.8
Lepomis gulosus	157.7	±	126.6	73.8	-	345.4	4.0	±	3.3	1.7	-	8.9
Lepomis macrochirus	5082.8	±	3922.3	1142.3	-	9408.9	88.4	±	42.7	43.2	-	127.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.4	±	0.9	0.0	-	1.7	0.0	±	0.0	0.0	-	0.0
						1988 (n = 4)						
Lepomis auritus	1.9	±	1.7	0.0	-	4.0	0.1	±	0.1	0.0	-	0.2
Lepomis cyanellus	1.6	±	3.3	0.0	-	6.5	0.1	±	0.1	0.0	-	0.3

Appendix K.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis gulosus	7.7	±	9.6	2.1	-	22.0	0.1	±	0.1	0.0	-	0.3
Lepomis macrochirus	1461.0	±	626.3	922.8	-	2184.0	36.9	±	11.5	20.8	-	46.6
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	13.2	±	10.4	0.0	-	22.2	0.4	±	0.3	0.0	-	0.7
						1989 (n = 4)						
Lepomis auritus	16.1	±	31.8	0.0	-	63.8	0.8	±	1.5	0.0	-	3.1
Lepomis cyanellus	7.2	±	5.3	0.0	-	12.2	0.2	±	0.2	0.0	-	0.4
Lepomis gulosus	117.5	±	110.4	26.7	-	276.4	2.8	±	2.2	1.0	-	5.9
Lepomis macrochirus	3398.0	±	2090.2	1067.6	-	5743.6	94.4	±	43.6	52.1	-	152.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	1.1	±	1.7	0.0	-	3.6	0.1	±	0.2	0.0	-	0.3
						1991 (n = 4)						
Lepomis auritus	3.2	±	4.1	0.0	-	8.4	0.2	±	0.2	0.0	-	0.5
Lepomis cyanellus	8.2	±	5.2	3.7	-	13.3	0.2	±	0.2	0.0	-	0.4
Lepomis gulosus	62.9	±	67.7	8.9	-	161.7	1.0	±	0.9	0.3	-	2.2
Lepomis macrochirus	2761.9	±	807.9	2139.8	-	3940.7	81.6	±	21.0	50.7	-	96.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	9.0	±	7.8	0.0	-	15.7	0.5	±	0.5	0.0	-	1.1
						1993 (n = 2)						
Lepomis auritus	0.7	±	1.1	0.0	-	1.5	0.0	±	0.0	0.0	-	0.1
Lepomis cyanellus	4.6	±	6.5	0.0	-	9.2	0.1	±	0.1	0.0	-	0.2
Lepomis gulosus	108.4	±	149.1	3.0	-	213.8	2.1	±	2.8	0.1	-	4.0
Lepomis macrochirus	1759.7	±	1116.6	970.1	-	2549.2	58.0	±	33.1	34.6	-	81.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	3.0	±	4.2	0.0	-	6.0	0.3	±	0.4	0.0	-	0.5
						Douglas Reservoir						
						1961 (n = 9)						
Lepomis auritus	0.5	±	1.2	0.0	-	3.6	0.0	±	0.1	0.0	-	0.2
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	2.9	±	2.4	0.2	-	6.9	0.2	±	0.3	0.0	-	0.7
Lepomis macrochirus	48.6	±	26.0	14.3	-	91.7	1.8	±	0.8	0.5	-	3.2
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1964 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	20.8	±	.	20.8	-	20.8	1.0	±	.	1.0	-	1.0
Lepomis macrochirus	225.0	±	.	225.0	-	225.0	13.2	±	.	13.2	-	13.2
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix K.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						1973 (n = 12)						
Lepomis auritus	3.6	±	10.6	0.0	-	37.0	0.4	±	1.1	0.0	-	3.9
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	8.0	±	11.9	0.0	-	31.4	0.2	±	0.4	0.0	-	1.2
Lepomis macrochirus	369.5	±	263.3	40.0	-	1011.6	14.5	±	6.5	3.4	-	26.9
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1983 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1986 (n = 2)						
Lepomis auritus	18.3	±	25.9	0.0	-	36.6	0.8	±	1.2	0.0	-	1.6
Lepomis cyanellus	5.6	±	2.5	3.8	-	7.3	0.2	±	0.1	0.1	-	0.2
Lepomis gulosus	17.5	±	14.4	7.3	-	27.7	0.7	±	0.7	0.2	-	1.1
Lepomis macrochirus	754.5	±	384.1	482.9	-	1026.2	32.8	±	24.0	15.8	-	49.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1987 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	47.1	±	60.7	4.1	-	90.0	1.3	±	1.6	0.2	-	2.3
Lepomis gulosus	76.5	±	66.2	29.8	-	123.3	3.0	±	1.4	2.0	-	4.0
Lepomis macrochirus	647.0	±	447.4	330.6	-	963.3	23.4	±	1.5	22.3	-	24.4
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1989 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	27.1	±	13.3	17.7	-	36.5	0.4	±	0.2	0.3	-	0.6
Lepomis gulosus	91.7	±	79.7	35.4	-	148.1	2.4	±	1.3	1.5	-	3.4
Lepomis macrochirus	1253.2	±	129.6	1161.5	-	1344.8	47.2	±	15.4	36.3	-	58.1
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1990 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	5.7	±	0.0	5.7	-	5.7	0.2	±	0.0	0.2	-	0.2
Lepomis gulosus	53.4	±	0.0	53.4	-	53.4	1.3	±	0.0	1.3	-	1.3
Lepomis macrochirus	861.4	±	0.0	861.4	-	861.4	17.3	±	0.0	17.3	-	17.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	1.1	±	0.0	1.1	-	1.1	0.1	±	0.0	0.1	-	0.1

Appendix K.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
						1992 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	4.0	±	4.2	1.1	-	7.0	0.1	±	0.1	0.0	-	0.2
Lepomis gulosus	26.3	±	18.7	13.0	-	39.5	1.1	±	0.4	0.9	-	1.4
Lepomis macrochirus	553.4	±	118.2	469.8	-	637.0	21.5	±	13.7	11.8	-	31.1
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						Fort Patrick Henry Reservoir						
						1960 (n = 1)						
Lepomis auritus	4.9	±	0.0	4.9	-	4.9	0.2	±	0.0	0.2	-	0.2
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	22.2	±	0.0	22.2	-	22.2	0.4	±	0.0	0.4	-	0.4
Lepomis macrochirus	454.3	±	0.0	454.3	-	454.3	13.4	±	0.0	13.4	-	13.4
Lepomis megalotis	4.9	±	0.0	4.9	-	4.9	0.1	±	0.0	0.1	-	0.1
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1985 (n = 1)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	3.3	±	0.0	3.3	-	3.3	0.1	±	0.0	0.1	-	0.1
Lepomis macrochirus	65.6	±	0.0	65.6	-	65.6	2.6	±	0.0	2.6	-	2.6
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						South Holston Reservoir						
						1960 (n = 3)						
Lepomis auritus	1.7	±	2.9	0.0	-	5.0	0.1	±	0.1	0.0	-	0.2
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	56.0	±	39.2	19.7	-	97.5	1.4	±	1.2	0.4	-	2.7
Lepomis macrochirus	1157.1	±	631.7	431.6	-	1585.0	28.5	±	14.6	11.9	-	39.1
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1962 (n = 15)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	111.4	±	107.4	0.0	-	407.0	1.3	±	1.7	0.0	-	7.2
Lepomis macrochirus	1161.9	±	746.6	0.0	-	2165.6	20.2	±	11.4	0.0	-	35.6
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1972 (n = 8)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix K.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis gulosus	44.0	±	45.8	6.3	-	152.5	1.6	±	1.8	0.4	-	5.6
Lepomis macrochirus	1290.2	±	480.8	908.2	-	2270.0	34.6	±	9.7	25.5	-	55.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1977 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	42.9	±	30.6	6.8	-	77.1	0.5	±	0.3	0.1	-	0.8
Lepomis macrochirus	1141.0	±	1166.0	281.8	-	2797.1	17.7	±	17.2	4.7	-	42.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	39.1	±	61.1	0.0	-	128.6	0.5	±	0.9	0.0	-	1.8
						1978 (n = 4)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	40.6	±	16.9	16.7	-	54.5	0.8	±	0.4	0.3	-	1.1
Lepomis macrochirus	945.6	±	324.6	702.9	-	1424.1	25.8	±	19.3	11.0	-	51.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1979 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	28.9	±	12.6	20.0	-	37.8	0.5	±	0.3	0.3	-	0.7
Lepomis macrochirus	1040.1	±	1070.9	282.9	-	1797.3	23.5	±	23.4	7.0	-	40.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	16.2	±	22.9	0.0	-	32.4	0.4	±	0.6	0.0	-	0.9
						1985 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	12.4	±	9.6	5.6	-	19.2	0.4	±	0.4	0.2	-	0.7
Lepomis macrochirus	655.4	±	351.3	407.0	-	903.8	21.4	±	12.8	12.3	-	30.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1986 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	25.3	±	4.9	21.8	-	28.8	0.8	±	0.4	0.5	-	1.0
Lepomis macrochirus	754.8	±	454.6	433.3	-	1076.3	21.3	±	13.7	11.6	-	31.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1990 (n = 1)						
Lepomis auritus	14.5	±	0.0	14.5	-	14.5	0.6	±	0.0	0.6	-	0.6

Appendix K.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	64.5	±	0.0	64.5	-	64.5	1.0	±	0.0	1.0	-	1.0
Lepomis macrochirus	2553.2	±	0.0	2553.2	-	2553.2	67.0	±	0.0	67.0	-	67.0
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	22.6	±	0.0	22.6	-	22.6	0.5	±	0.0	0.5	-	0.5
						1993 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.8	±	1.1	0.0	-	1.6	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	41.1	±	35.4	16.1	-	66.1	1.1	±	1.1	0.3	-	1.8
Lepomis macrochirus	2429.9	±	2491.9	667.9	-	4191.9	48.2	±	42.6	18.1	-	78.3
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						Watauga Reservoir						
						1961 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	344.2	±	255.3	169.2	-	637.1	7.7	±	4.1	4.4	-	12.2
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1971 (n = 6)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	202.7	±	93.8	132.7	-	384.4	5.2	±	2.0	3.8	-	9.2
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1972 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.4	±	0.6	0.0	-	1.1	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	357.7	±	19.1	344.4	-	379.6	10.1	±	2.2	8.0	-	12.5
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1973 (n = 3)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	580.8	±	279.8	383.6	-	901.1	17.7	±	11.3	10.5	-	30.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix K.1 Continued.

Species	fish/ha							kg/ha					
	Mean	±	SD	(min	-	max)		Mean	±	SD	(min	-	max)
						1979 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	123.1	±	54.7	84.4	-	161.8		3.7	±	2.0	2.3	-	5.2
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
						1980 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	275.5	±	251.0	98.0	-	452.9		8.0	±	7.6	2.7	-	13.4
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
						1981 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	682.0	±	573.8	276.2	-	1087.7		15.5	±	12.2	6.9	-	24.1
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
						1982 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	698.5	±	278.8	501.3	-	895.7		15.1	±	6.5	10.5	-	19.7
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
						1983 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	1279.2	±	274.7	1084.9	-	1473.4		20.3	±	5.4	16.5	-	24.2
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
						1984 (n = 2)							
Lepomis auritus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	0.8	±	1.2	0.0	-	1.7		0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0		0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	1430.2	±	70.4	1380.5	-	1480.0		28.1	±	0.9	27.5	-	28.7

Appendix K.1 Continued.

Species	fish/ha						kg/ha					
	Mean	±	SD	(min	-	max)	Mean	±	SD	(min	-	max)
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1988 (n = 2)						
Lepomis auritus	8.7	±	12.2	0.0	-	17.3	0.2	±	0.3	0.0	-	0.5
Lepomis cyanellus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	4563.2	±	2431.0	2844.2	-	6282.2	65.9	±	39.2	38.2	-	93.6
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
						1991 (n = 2)						
Lepomis auritus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis cyanellus	1.8	±	2.6	0.0	-	3.6	0.0	±	0.0	0.0	-	0.0
Lepomis gulosus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis macrochirus	2326.6	±	2228.4	750.9	-	3902.3	41.0	±	36.4	15.3	-	66.8
Lepomis megalotis	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0
Lepomis microlophus	0.0	±	0.0	0.0	-	0.0	0.0	±	0.0	0.0	-	0.0

Appendix K.2 Percent abundance of *Lepomis* spp. collected from TVA cove-rotenone samples (1949-1988) in Fort Loudoun mainstem and tributary reservoirs in the Tennessee River drainage.

Year	Percent Abundance *Lepomis auritus*	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
			Fort Loudoun Reservoir				
1949	0.0	0.0	0.0	100.00	0.00	0.00	121
1950	0.0	0.0	0.0	93.75	6.25	0.00	48
1951	0.0	0.0	1.1	52.41	0.00	0.00	187
1953	10.2	0.0	1.6	88.24	0.00	0.00	255
1956	24.7	0.0	3.2	71.52	0.63	0.00	158
1957	2.1	0.0	4.8	91.7	1.4	0.00	1249
1958	6.5	0.0	4.4	88.9	0.00	0.00	1246
1959	7.2	0.0	4.5	88.28	0.00	0.00	913
1961	2.9	0.0	3.3	93.79	0.00	0.00	515
1972	4.3	0.0	2.5	93.15	0.05	0.00	3988
1982	1.0	4.5	2.1	92.1	0.3	0.03	2909
1984	3.5	2.02	4.9	88.69	0.00	0.94	2228
1988	2.6	2.5	2.1	92.39	0.00	0.44	3388
			Boone Reservoir				
1953	0.00	0.00	0.00	100.00	0.00	0.00	36
1955	0.00	0.00	0.98	99.02	0.00	0.00	205
1956	0.00	0.00	8.86	91.14	0.00	0.00	79
1959	0.31	0.00	0.78	98.91	0.00	0.00	1289
1961	0.00	0.55	4.04	92.11	3.21	0.09	1090
1962	0.00	0.04	4.30	93.09	2.28	0.29	10684
1982	0.00	0.00	0.00	0.00	0.00	0.00	0
1983	0.00	0.00	0.00	0.00	0.00	0.00	0
1987	1.04	3.23	4.17	86.96	4.59	0.00	1917
1988	0.40	3.02	2.59	89.05	4.94	0.00	4209
1989	0.40	2.98	1.69	88.56	6.34	0.00	3488
1990	0.40	0.80	0.30	89.69	8.81	0.00	999
1991	0.39	3.29	4.72	87.50	4.10	0.00	3073
1994	0.06	0.21	1.64	97.04	1.05	0.00	3348
			Cherokee Reservoir				
1949	0.00	0.00	0.00	100.00	0.00	0.00	189
1950	0.00	0.00	0.00	100.00	0.00	0.00	30
1951	0.00	0.00	0.00	100.00	0.00	0.00	125
1953	0.00	0.00	4.63	95.37	0.00	0.00	497
1954	0.00	0.00	2.44	97.56	0.00	0.00	82
1955	0.00	0.00	0.53	99.47	0.00	0.00	190
1956	7.63	0.00	17.80	74.58	0.00	0.00	118

Appendix K.2 Continued.

Year	*Lepomis auritus*	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
				Percent Abundance			
1957	0.59	0.00	0.89	98.52	0.00	0.00	338
1958	0.97	0.00	0.00	99.03	0.00	0.00	309
1959	0.00	0.00	1.74	98.27	0.00	0.00	461
1960	0.85	0.00	4.05	95.02	0.07	0.00	1406
1963	0.21	0.00	3.16	96.63	0.00	0.00	8539
1972	1.85	0.00	4.27	93.88	0.00	0.00	3561
1973	0.19	0.00	1.79	98.02	0.00	0.00	4643
1974	1.71	0.00	3.09	95.16	0.00	0.04	9069
1975	1.97	0.00	3.94	94.09	0.00	0.00	5021
1976	1.84	0.00	4.45	93.65	0.00	0.06	5169
1977	3.17	0.00	5.34	91.49	0.00	0.00	1199
1978	0.67	0.00	3.89	95.44	0.00	0.00	1800
1979	0.51	0.00	20.93	78.52	0.04	0.00	2537
1980	0.67	0.00	5.67	93.62	0.00	0.05	2241
1981	1.27	0.00	6.33	92.41	0.00	0.00	79
1982	1.43	0.00	9.31	88.72	0.24	0.30	1676
1983	0.23	0.00	9.06	90.72	0.00	0.00	14500
1984	0.21	0.09	8.01	91.63	0.00	0.05	12897
1985	0.16	0.00	1.20	98.64	0.00	0.00	2500
1986	0.55	0.06	4.10	95.17	0.00	0.12	94927
1987	0.42	0.20	3.69	95.68	0.00	0.01	18090
1988	0.14	0.17	0.50	98.05	0.00	1.15	3640
1989	0.57	0.28	3.10	96.01	0.00	0.05	12021
1991	0.13	0.31	2.20	97.00	0.00	0.36	8712
1993	0.04	0.24	5.73	93.82	0.00	0.16	2459
				Douglas Reservoir			
1949	0.00	0.00	0.00	100.00	0.00	0.00	16
1950	0.00	0.00	10.64	89.36	0.00	0.00	47
1951	0.00	0.00	16.67	83.33	0.00	0.00	36
1952	5.33	0.00	10.67	84.00	0.00	0.00	150
1954	0.00	0.00	23.75	76.25	0.00	0.00	80
1955	0.00	0.00	7.32	92.68	0.00	0.00	41
1956	0.00	0.00	25.00	75.00	0.00	0.00	8
1957	0.00	0.00	21.18	84.83	0.00	0.00	85
1958	0.00	0.00	12.02	87.98	0.00	0.00	183
1959	0.00	0.00	12.88	87.12	0.00	0.00	132
1961	0.43	0.00	3.14	96.43	0.00	0.00	701
1964	0.00	0.00	8.48	91.53	0.00	0.00	118
1973	0.58	0.00	1.99	97.43	0.00	0.00	2257
1983	0.00	0.00	0.00	0.00	0.00	0.00	0
1986	0.94	0.50	2.45	96.11	0.00	0.00	1594
1987	0.00	5.14	9.59	85.27	0.00	0.00	1147
1989	0.00	1.76	5.44	92.80	0.00	0.00	2042
1990	0.00	0.62	5.80	93.47	0.00	0.12	811

Appendix K.2 Continued.

Year	Percent Abundance *Lepomis auritus*	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	Total Number
1991	0.00	0.49	3.53	95.98	0.00	0.00	821
				Fort Patrick Reservoir			
1954	0.0	0.0	15.3	60.0	24.7	0.0	85
1955	0.0	0.0	3.3	96.3	0.0	0.0	122
1956	8.9	0.0	7.9	83.2	0.0	0.0	214
1960	1.0	0.0	4.6	93.4	1.0	0.0	394
1985	0.0	0.0	4.8	95.2	0.0	0.0	42
				South Holston Reservoir			
1951	0.00	0.00	33.33	0.00	0.00	0.00	18
1953	0.00	0.00	0.70	99.31	0.00	0.00	1151
1955	0.00	0.00	1.27	98.73	0.00	0.00	394
1956	0.00	0.00	0.62	96.76	0.00	0.00	649
1957	0.00	0.00	3.81	96.19	0.00	0.00	210
1958	0.00	0.00	6.52	93.37	0.00	0.11	905
1959	0.00	0.00	2.71	97.30	0.00	0.00	1146
1960	0.10	0.00	4.45	95.45	0.00	0.00	2001
1962	0.00	0.00	7.63	74.87	0.00	0.00	13796
1972	0.00	0.00	3.44	95.91	0.00	0.00	4471
1977	0.00	0.00	3.52	93.52	0.00	2.96	2129
1978	0.00	0.00	4.09	92.22	0.00	0.00	1272
1979	0.00	0.00	2.64	95.86	0.00	1.51	797
1985	0.00	0.00	1.78	96.32	0.00	0.00	788
1986	0.00	0.00	3.28	96.64	0.00	0.00	1281
1990	0.55	0.00	2.43	96.17	0.00	0.85	1646
1993	0.00	0.03	1.65	98.31	0.00	0.00	3024
				Watauga Reservoir			
1949	0.00	0.00	0.00	100.00	0.00	0.00	85
1950	0.00	0.00	0.00	100.00	0.00	0.00	1847
1951	0.00	0.00	0.00	100.00	0.00	0.00	1429
1952	0.00	0.00	0.00	100.00	0.00	0.00	99
1954	0.00	0.00	0.00	100.00	0.00	0.00	248
1955	0.00	0.00	0.00	100.00	0.00	0.00	102
1956	0.00	0.00	0.00	100.00	0.00	0.00	228
1957	0.00	0.00	0.00	100.00	0.00	0.00	831
1958	0.00	0.00	0.00	100.00	0.00	0.00	1967
1959	0.00	0.00	0.00	100.00	0.00	0.00	302
1961	0.00	0.00	0.00	100.00	0.00	0.00	1091
1971	0.00	0.00	0.00	100.00	0.00	0.00	602
1972	0.00	0.14	0.00	99.86	0.00	0.00	708
1973	0.00	0.00	0.00	100.00	0.00	0.00	1319

Appendix K.2 Continued.

Year	Percent Abundance						Total Number
	Lepomis auritus	*Lepomis cyanellus*	*Lepomis gulosus*	*Lepomis macrochirus*	*Lepomis megalotis*	*Lepomis microlophus*	
1979	0.00	0.00	0.00	100.00	0.00	0.00	171
1980	0.00	0.00	0.00	100.00	0.00	0.00	407
1981	0.00	0.00	0.00	100.00	0.00	0.00	986
1982	0.00	0.00	0.00	100.00	0.00	0.00	1370
1983	0.00	0.00	0.00	100.00	0.00	0.00	2668
1984	0.00	0.04	0.00	99.96	0.00	0.00	2656
1988	0.21	0.00	0.00	99.79	0.00	0.00	4315
1991	0.00	0.05	0.00	99.95	0.00	0.00	3849

Appendix K.3 Summary statistics for relative density (CPUE) of *Lepomis* spp. collected from TVA electrofishing samples (1993-2011) in Fort Loudoun mainstem and tributary reservoirs in the Tennessee River drainage.

Species	Mean ± SD	Min - Max	% Abundance
Fort Loudoun Reservoir			
1993 (n = 2)			
Lepomis auritus	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.08 ± 0.12	0.00 - 0.17	9.56
Lepomis gulosus	0.44 ± 0.07	0.39 - 0.49	20.75
Lepomis macrochirus	1.52 ± 0.64	1.07 - 1.98	69.69
Lepomis megalotis	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis microlophus	0.00 ± 0.00	0.00 - 0.00	0.00
1994 (n = 2)			
Lepomis auritus	0.03 ± 0.04	0.00 - 0.05	1.92
Lepomis cyanellus	0.38 ± 0.41	0.09 - 0.67	11.83
Lepomis gulosus	0.39 ± 0.28	0.19 - 0.59	14.64
Lepomis macrochirus	1.82 ± 1.12	1.04 - 2.61	71.61
Lepomis megalotis	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis microlophus	0.00 ± 0.00	0.00 - 0.00	0.00
1995 (n = 2)			
Lepomis auritus	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis cyanellus	0.18 ± 0.26	0.00 - 0.37	5.98
Lepomis gulosus	0.33 ± 0.21	0.18 - 0.47	13.02
Lepomis macrochirus	1.86 ± 0.54	1.47 - 2.24	79.77
Lepomis megalotis	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis microlophus	0.02 ± 0.03	0.00 - 0.04	1.23
1997 (n = 2)			
Lepomis auritus	0.25 ± 0.35	0.00 - 0.50	1.86
Lepomis cyanellus	1.63 ± 1.25	0.75 - 2.52	25.35
Lepomis gulosus	0.19 ± 0.27	0.00 - 0.38	1.40
Lepomis macrochirus	7.44 ± 6.19	3.06 - 11.81	71.39
Lepomis megalotis	0.00 ± 0.00	0.00 - 0.00	0.00
Lepomis microlophus	0.00 ± 0.00	0.00 - 0.00	0.00
1999 (n = 2)			
Lepomis auritus	0.02 ± 0.03	0.00 - 0.04	1.12
Lepomis cyanellus	0.22 ± 0.31	0.00 - 0.44	26.85
Lepomis gulosus	0.02 ± 0.03	0.00 - 0.04	1.12
Lepomis macrochirus	1.05 ± 0.06	1.00 - 1.09	70.35
Lepomis megalotis	0.00 ± 0.00	0.00 - 0.00	0.00

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis microlophus	0.01	±	0.01	0.00	-	0.02	0.56
			2001 (n = 2)				
Lepomis auritus	0.02	±	0.02	0.00	-	0.03	0.38
Lepomis cyanellus	1.93	±	0.90	1.30	-	2.57	53.03
Lepomis gulosus	0.20	±	0.06	0.16	-	0.24	5.97
Lepomis macrochirus	1.36	±	0.30	1.15	-	1.57	34.69
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.23	±	0.03	0.21	-	0.25	5.93
			2003 (n = 2)				
Lepomis auritus	0.07	±	0.10	0.00	-	0.14	1.30
Lepomis cyanellus	2.62	±	1.64	1.47	-	3.78	61.19
Lepomis gulosus	0.13	±	0.19	0.00	-	0.26	2.50
Lepomis macrochirus	1.19	±	0.27	1.00	-	1.38	33.45
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.07	±	0.05	0.03	-	0.10	1.56
			2005 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.82	±	0.14	0.72	-	0.92	35.92
Lepomis gulosus	0.44	±	0.62	0.00	-	0.88	17.19
Lepomis macrochirus	0.99	±	0.04	0.96	-	1.01	42.70
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.09	±	0.13	0.00	-	0.18	4.19
			2007 (n = 2)				
Lepomis auritus	0.03	±	0.05	0.00	-	0.07	0.84
Lepomis cyanellus	1.81	±	1.66	0.64	-	2.98	52.73
Lepomis gulosus	0.23	±	0.32	0.00	-	0.45	11.90
Lepomis macrochirus	0.91	±	0.12	0.82	-	0.99	33.47
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.04	±	0.06	0.00	-	0.09	1.05
			2009 (n = 2)				
Lepomis auritus	0.34	±	0.42	0.04	-	0.64	6.54
Lepomis cyanellus	2.15	±	0.41	1.86	-	2.44	44.38
Lepomis gulosus	0.13	±	0.18	0.00	-	0.25	2.36
Lepomis macrochirus	1.97	±	0.50	1.61	-	2.33	42.05
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.24	±	0.22	0.09	-	0.39	4.68
			2011 (n = 2)				
Lepomis auritus	0.99	±	1.36	0.02	-	1.95	10.23
Lepomis cyanellus	2.27	±	0.80	1.70	-	2.84	46.08
Lepomis gulosus	1.89	±	2.67	0.00	-	3.78	19.02

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	0.94	±	0.02	0.93	-	0.96	22.49
Lepomis megalotis	0.07	±	0.09	0.00	-	0.13	0.67
Lepomis microlophus	0.15	±	0.21	0.00	-	0.30	1.50
			Douglas Reservoir				
			1993 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.08	±	0.12	0.00	-	0.17	9.56
Lepomis gulosus	0.44	±	0.07	0.39	-	0.49	20.75
Lepomis macrochirus	1.52	±	0.64	1.07	-	1.98	69.69
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1994 (n = 2)				
Lepomis auritus	0.03	±	0.04	0.00	-	0.05	1.92
Lepomis cyanellus	0.38	±	0.41	0.09	-	0.67	11.83
Lepomis gulosus	0.39	±	0.28	0.19	-	0.59	14.64
Lepomis macrochirus	1.82	±	1.12	1.04	-	2.61	71.61
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1995 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.18	±	0.26	0.00	-	0.37	5.98
Lepomis gulosus	0.33	±	0.21	0.18	-	0.47	13.02
Lepomis macrochirus	1.86	±	0.54	1.47	-	2.24	79.77
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.02	±	0.03	0.00	-	0.04	1.23
			1997 (n = 2)				
Lepomis auritus	0.25	±	0.35	0.00	-	0.50	1.86
Lepomis cyanellus	1.63	±	1.25	0.75	-	2.52	25.35
Lepomis gulosus	0.19	±	0.27	0.00	-	0.38	1.40
Lepomis macrochirus	7.44	±	6.19	3.06	-	11.81	71.39
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1999 (n = 2)				
Lepomis auritus	0.02	±	0.03	0.00	-	0.04	1.12
Lepomis cyanellus	0.22	±	0.31	0.00	-	0.44	26.85
Lepomis gulosus	0.02	±	0.03	0.00	-	0.04	1.12
Lepomis macrochirus	1.05	±	0.06	1.00	-	1.09	70.35
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.01	±	0.01	0.00	-	0.02	0.56

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2001 (n = 2)				
Lepomis auritus	0.02	±	0.02	0.00	-	0.03	0.38
Lepomis cyanellus	1.93	±	0.90	1.30	-	2.57	53.03
Lepomis gulosus	0.20	±	0.06	0.16	-	0.24	5.97
Lepomis macrochirus	1.36	±	0.30	1.15	-	1.57	34.69
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.23	±	0.03	0.21	-	0.25	5.93
			2003 (n = 2)				
Lepomis auritus	0.07	±	0.10	0.00	-	0.14	1.30
Lepomis cyanellus	2.62	±	1.64	1.47	-	3.78	61.19
Lepomis gulosus	0.13	±	0.19	0.00	-	0.26	2.50
Lepomis macrochirus	1.19	±	0.27	1.00	-	1.38	33.45
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.07	±	0.05	0.03	-	0.10	1.56
			2005 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.82	±	0.14	0.72	-	0.92	35.92
Lepomis gulosus	0.44	±	0.62	0.00	-	0.88	17.19
Lepomis macrochirus	0.99	±	0.04	0.96	-	1.01	42.70
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.09	±	0.13	0.00	-	0.18	4.19
			2007 (n = 2)				
Lepomis auritus	0.03	±	0.05	0.00	-	0.07	0.84
Lepomis cyanellus	1.81	±	1.66	0.64	-	2.98	52.73
Lepomis gulosus	0.23	±	0.32	0.00	-	0.45	11.90
Lepomis macrochirus	0.91	±	0.12	0.82	-	0.99	33.47
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.04	±	0.06	0.00	-	0.09	1.05
			2009 (n = 2)				
Lepomis auritus	0.34	±	0.42	0.04	-	0.64	6.54
Lepomis cyanellus	2.15	±	0.41	1.86	-	2.44	44.38
Lepomis gulosus	0.13	±	0.18	0.00	-	0.25	2.36
Lepomis macrochirus	1.97	±	0.50	1.61	-	2.33	42.05
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.24	±	0.22	0.09	-	0.39	4.68
			2011 (n = 2)				
Lepomis auritus	0.99	±	1.36	0.02	-	1.95	10.23
Lepomis cyanellus	2.27	±	0.80	1.70	-	2.84	46.08
Lepomis gulosus	1.89	±	2.67	0.00	-	3.78	19.02
Lepomis macrochirus	0.94	±	0.02	0.93	-	0.96	22.49
Lepomis megalotis	0.07	±	0.09	0.00	-	0.13	0.67

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis microlophus	0.15	±	0.21	0.00	-	0.30	1.50
			Watauga Reservoir				
			1993 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.30	±	1.09	1.53	-	3.06	100.00
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1994 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	3.22	±	0.67	2.75	-	3.69	100.00
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1996 (n = 2)				
Lepomis auritus	0.08	±	0.03	0.06	-	0.10	5.14
Lepomis cyanellus	0.09	±	0.09	0.02	-	0.15	4.62
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.53	±	0.37	1.27	-	1.79	90.24
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2000 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.30	±	0.02	2.29	-	2.31	100.00
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2002 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.64	±	0.21	2.49	-	2.79	100.00
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2004 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis cyanellus	0.05	±	0.07	0.00	-	0.10	4.35
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.00	±	0.00	1.00	-	1.00	95.65
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2006 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.77	±	1.02	0.05	-	1.49	32.05
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.00	±	0.00	1.00	-	1.00	67.95
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2008 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.75	±	3.90	0.00	-	5.51	38.15
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.75	±	0.06	1.71	-	1.80	61.85
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2010 (n = 2)				
Lepomis auritus	0.02	±	0.03	0.00	-	0.04	0.72
Lepomis cyanellus	1.46	±	2.07	0.00	-	2.93	24.62
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	2.76	±	0.37	2.50	-	3.02	74.66
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			Fort Patrick Henry Reservoir				
			1993 (n = 1)				
Lepomis auritus	0.07	±	0.00	0.07	-	0.07	2.54
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.35	±	0.00	0.35	-	0.35	12.71
Lepomis macrochirus	2.09	±	0.00	2.09	-	2.09	76.27
Lepomis megalotis	0.23	±	0.00	0.23	-	0.23	8.47
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1994 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.82	±	0.00	0.82	-	0.82	12.27
Lepomis gulosus	1.64	±	0.00	1.64	-	1.64	25.99
Lepomis macrochirus	2.65	±	0.00	2.64	-	2.65	41.79
Lepomis megalotis	1.26	±	0.00	1.26	-	1.26	19.96

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1995 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.00	±	0.00	1.00	-	1.00	100.00
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1996 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.64	±	0.00	0.64	-	0.64	26.72
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.67	±	0.00	1.67	-	1.67	70.23
Lepomis megalotis	0.07	±	0.00	0.07	-	0.07	3.05
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1997 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.04	±	0.00	0.04	-	0.04	3.57
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.00	±	0.00	1.00	-	1.00	89.29
Lepomis megalotis	0.08	±	0.00	0.08	-	0.08	7.14
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1999 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.67	±	0.00	0.67	-	0.67	40.00
Lepomis macrochirus	1.00	±	0.00	1.00	-	1.00	60.00
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2001 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.05	±	0.00	1.05	-	1.05	27.60
Lepomis gulosus	0.78	±	0.00	0.78	-	0.78	23.08
Lepomis macrochirus	0.97	±	0.00	0.97	-	0.97	28.51
Lepomis megalotis	0.71	±	0.00	0.71	-	0.71	20.81
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2003 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.57	±	0.00	0.57	-	0.57	40.00
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	0.29	±	0.00	0.29	-	0.29	20.00
Lepomis megalotis	0.57	±	0.00	0.57	-	0.57	40.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2005 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.61	±	0.00	1.61	-	1.61	46.01
Lepomis gulosus	0.60	±	0.00	0.60	-	0.60	17.11
Lepomis macrochirus	1.00	±	0.00	1.00	-	1.00	28.14
Lepomis megalotis	0.28	±	0.00	0.28	-	0.28	8.75
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2007 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.44	±	0.00	0.44	-	0.44	13.28
Lepomis gulosus	0.69	±	0.00	0.69	-	0.69	21.09
Lepomis macrochirus	1.44	±	0.00	1.44	-	1.44	43.75
Lepomis megalotis	0.72	±	0.00	0.72	-	0.72	21.88
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2009 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.09	±	0.00	1.09	-	1.09	27.17
Lepomis gulosus	1.51	±	0.00	1.51	-	1.51	37.57
Lepomis macrochirus	0.84	±	0.00	0.84	-	0.84	20.81
Lepomis megalotis	0.58	±	0.00	0.58	-	0.58	14.45
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2011 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.28	±	0.00	1.28	-	1.28	41.15
Lepomis gulosus	0.87	±	0.00	0.87	-	0.87	27.75
Lepomis macrochirus	0.97	±	0.00	0.97	-	0.97	31.10
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			Boone Reservoir				
			1993 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.11	±	0.19	0.00	-	0.33	3.03
Lepomis gulosus	0.07	±	0.12	0.00	-	0.21	1.91
Lepomis macrochirus	3.19	±	2.23	1.00	-	5.45	95.06
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			1994 (n = 3)				
Lepomis auritus	0.28	±	0.45	0.00	-	0.80	3.80
Lepomis cyanellus	3.07	±	3.27	0.56	-	6.77	30.37
Lepomis gulosus	0.49	±	0.37	0.07	-	0.78	5.31
Lepomis macrochirus	4.94	±	1.29	3.82	-	6.35	60.53
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1995 (n = 3)				
Lepomis auritus	0.04	±	0.06	0.00	-	0.11	2.14
Lepomis cyanellus	0.14	±	0.21	0.00	-	0.38	2.75
Lepomis gulosus	0.50	±	0.47	0.00	-	0.93	16.73
Lepomis macrochirus	2.14	±	1.78	1.02	-	4.19	78.39
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1997 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.27	±	1.76	0.15	-	3.31	11.31
Lepomis gulosus	1.22	±	2.04	0.00	-	3.58	16.81
Lepomis macrochirus	6.35	±	2.88	3.24	-	8.92	71.44
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.04	±	0.04	0.00	-	0.08	0.44
			1999 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.20	±	0.32	0.00	-	0.56	3.20
Lepomis gulosus	0.16	±	0.14	0.03	-	0.31	5.98
Lepomis macrochirus	3.40	±	3.41	1.00	-	7.31	90.47
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.01	±	0.01	0.00	-	0.02	0.35
			2001 (n = 3)				
Lepomis auritus	0.01	±	0.02	0.00	-	0.03	0.12
Lepomis cyanellus	0.65	±	0.96	0.06	-	1.76	10.00
Lepomis gulosus	0.76	±	0.51	0.37	-	1.34	14.34
Lepomis macrochirus	3.70	±	1.14	2.83	-	5.00	75.53
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2003 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.34	±	0.34	0.02	-	0.69	8.59
Lepomis gulosus	0.02	±	0.01	0.01	-	0.03	0.66
Lepomis macrochirus	3.19	±	0.72	2.39	-	3.79	87.62
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis microlophus	0.16	±	0.27	0.00	-	0.47	3.13
			2005 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.31	±	0.54	0.69	-	1.63	22.41
Lepomis gulosus	0.65	±	0.28	0.38	-	0.93	11.32
Lepomis macrochirus	3.90	±	1.07	2.66	-	4.55	64.37
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.12	±	0.21	0.00	-	0.36	1.91
			2007 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.28	±	1.57	0.94	-	4.01	29.31
Lepomis gulosus	0.76	±	0.62	0.05	-	1.19	9.82
Lepomis macrochirus	4.87	±	1.70	3.76	-	6.82	60.39
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.04	±	0.05	0.00	-	0.10	0.48
			2009 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.76	±	0.62	0.09	-	1.31	20.64
Lepomis gulosus	0.43	±	0.42	0.00	-	0.83	8.98
Lepomis macrochirus	3.28	±	1.76	1.69	-	5.17	70.23
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.01	±	0.01	0.00	-	0.02	0.15
			2011 (n = 3)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	3.52	±	1.94	2.16	-	5.74	42.20
Lepomis gulosus	0.55	±	0.04	0.52	-	0.60	7.94
Lepomis macrochirus	4.32	±	2.77	2.22	-	7.46	49.86
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			South Holston Reservoir				
			1993 (n = 1)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.38	±	0.00	0.38	-	0.38	17.69
Lepomis macrochirus	1.82	±	0.00	1.82	-	1.82	71.54
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.12	±	0.00	0.12	-	0.12	10.77
			1994 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.14	±	0.15	0.03	-	0.25	6.73
Lepomis macrochirus	1.83	±	0.38	1.57	-	2.10	93.27
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1996 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.10	±	0.14	0.00	-	0.20	2.56
Lepomis gulosus	0.08	±	0.11	0.00	-	0.15	1.92
Lepomis macrochirus	3.20	±	0.50	2.84	-	3.55	92.88
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.08	±	0.11	0.00	-	0.16	2.63
			2000 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.23	±	0.03	0.21	-	0.26	11.98
Lepomis macrochirus	3.64	±	3.49	1.18	-	6.11	88.02
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2002 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.04	±	0.05	0.00	-	0.08	0.95
Lepomis macrochirus	3.97	±	0.02	3.96	-	3.98	99.05
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2004 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.16	±	0.23	0.00	-	0.32	6.98
Lepomis gulosus	0.28	±	0.39	0.00	-	0.55	11.94
Lepomis macrochirus	2.38	±	1.34	1.43	-	3.33	81.07
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2006 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.04	±	0.06	0.00	-	0.09	1.23
Lepomis gulosus	0.42	±	0.17	0.30	-	0.54	17.23
Lepomis macrochirus	2.11	±	1.21	1.25	-	2.97	81.53
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
			2008 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	2.34	±	3.14	0.12	-	4.56	36.97
Lepomis gulosus	0.30	±	0.16	0.19	-	0.42	9.46
Lepomis macrochirus	1.55	±	0.58	1.14	-	1.96	53.57
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2010 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.54	±	0.76	0.01	-	1.08	19.91
Lepomis gulosus	0.52	±	0.24	0.35	-	0.69	15.49
Lepomis macrochirus	2.21	±	1.30	1.29	-	3.13	64.60
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			Cherokee Reservoir				
			1993 (n = 2)				
Lepomis auritus	0.01	±	0.01	0.00	-	0.02	0.53
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.53	±	0.39	0.25	-	0.80	13.81
Lepomis macrochirus	7.95	±	8.18	2.17	-	13.73	85.67
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1995 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.03	±	0.04	0.00	-	0.06	0.94
Lepomis macrochirus	1.94	±	1.34	1.00	-	2.89	99.06
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			1996 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis gulosus	0.31	±	0.44	0.00	-	0.63	9.13
Lepomis macrochirus	2.01	±	1.14	1.20	-	2.81	90.87
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2000 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.53	±	0.75	0.00	-	1.06	20.71
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	9.00

Appendix K.3 Continued.

Species	Mean	±	SD	Min	-	Max	% Abundance
Lepomis macrochirus	2.69	±	2.38	1.01	-	4.38	69.67
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.02	±	0.02	0.00	-	0.03	0.63
			2002 (n = 2)				
Lepomis auritus	0.01	±	0.01	0.00	-	0.02	0.20
Lepomis cyanellus	1.12	±	1.58	0.00	-	2.23	29.17
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	1.75	±	0.24	1.58	-	1.92	70.63
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2004 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	0.16	±	0.20	0.02	-	0.30	5.08
Lepomis gulosus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis macrochirus	3.20	±	0.57	2.80	-	3.60	94.80
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.01	0.00	-	0.01	0.12
			2006 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.51	±	0.43	1.21	-	1.82	24.58
Lepomis gulosus	0.95	±	0.54	0.56	-	1.33	11.70
Lepomis macrochirus	5.73	±	4.89	2.27	-	9.19	63.36
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.02	±	0.02	0.00	-	0.03	0.37
			2008 (n = 2)				
Lepomis auritus	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis cyanellus	1.04	±	0.38	0.76	-	1.31	23.03
Lepomis gulosus	0.07	±	0.10	0.00	-	0.14	1.19
Lepomis macrochirus	3.75	±	1.49	2.70	-	4.80	75.78
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00
			2010 (n = 2)				
Lepomis auritus	0.03	±	0.05	0.00	-	0.07	0.75
Lepomis cyanellus	1.54	±	0.15	1.44	-	1.65	39.39
Lepomis gulosus	0.42	±	0.49	0.08	-	0.77	9.72
Lepomis macrochirus	1.95	±	0.08	1.90	-	2.01	50.14
Lepomis megalotis	0.00	±	0.00	0.00	-	0.00	0.00
Lepomis microlophus	0.00	±	0.00	0.00	-	0.00	0.00

VITA

Lacey M. Genard was born in Valley Grande, Alabama to Thomas M. Genard and Carla M. Pugh. She attended Dallas County High School and graduated Valedictorian in 2006. She then attended Birmingham-Southern College and received a Bachelor of Arts degree in Urban Environmental Studies with a Natural Science concentration. She graduated *Magna Cum Laude* and was a member of the Phi Beta Kappa Honor Society. She accepted research and later a teaching assistantship to attend the University of Tennessee at Chattanooga (UTC). She graduated from UTC with a Master of Science degree in May of 2014. She currently works as an environmental scientist in the Aquatic Assessment Unit of the Alabama Department of Environmental Management.