To the Graduate Council:

I am submitting herewith a thesis written by Stephenie L. Hammons entitled "Reservoir Riparian Island Habitats and Representative Arboreal Species Importance in Watts Bar, Tennessee." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Botany.

Clifford C. Amundsen, Major Professor

We have read this thesis
and recommend its acceptance:

Accepted for the Council:

Associate Vice Chancellor and
Dean of The Graduate School

RESERVOIR RIPARIAN ISLAND HABITATS AND REPRESENTATIVE ARBOREAL SPECIES IMPORTANCE IN WATTS BAR, TENNESSEE

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Stephenie L. Hammons
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DEDICATION

This thesis is dedicated to my parents

Mrs. Judy A. Hammons

and the late

Mr. Gerald W. Hammons.

ACKNOWLEDGMENTS

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Abstract

The Tennessee Valley Authority (TVA) closed Watts Bar Dam in 1942 and inundated the corresponding Tennessee riverbed and its riparian shoreline. Mesic ridge top habitats were isolated and United States Geological Survey (USGS) revised quadrangle editions from 1942 to 1953 delineated 165 islands along the reservoir. The most recent USGS map revisions from 1976 to 1990 delineated 1.5 times more islands due to fragmentation of the surrounding shoreline and existing islands. Fifteen small (flat surface area of 0.871 to 2.323 hectares), low-lying (elevation of 225.9 to 231.6 meters mean sea level) islands that were surrounded by water during all seasons were selected for study.

The canopy and subcanopy arboreal forest communities were sampled by the point-quarter method. The shrub strata was sampled within a three meter radius circle plot. Samples were taken along the longest axis of the islands. Data involved a total of 95 canopy, 71 subcanopy, and 71 shrub strata centers.

The total basal area (BA) of the island forest communities were compared to the BA of 50 year old bottomland and Watts Bar shoreline forest communities. The Mann-Whitney "U" Test showed that the five island forest communities with the largest BA were similar at a critical value of 14 and a significance level of 0.10, and the 12 island forest communities with the largest BA were similar at a critical value of 102 and a significance level of 0.01, respectively.

A general trend from low to high species diversity was shown from the lesser

to more areally extensive islands. The number of new species encountered on the islands tended to increase downstream for all strata.

Overall, the three most important canopy species represented were *Acer saccharinum* (13.8%), *Platanus occidentalis* (10.3%), and *Fraxinus pennsylvanica* (10.0%). The three most important subcanopy species were *Acer saccharinum* (13.6%), *Ligustrum sinense* (13.5%), and *Acer rubrum* (8.1%).

The island riparian forest species list was shown to be similar to other wet habitat lists and Tennessee reservoir riparian shoreline lists by >70% and >80%, respectively.

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LIST OF ABBREVIATIONS

C	Celsius
cm	centimeter
Co	county
DBH	diameter at breast height
°F	degrees Fahrenheit
FE	field examination
ha	hectare
km	kilometer
m	meters
msl	mean sea level
PR	photorevised
quad	quadrangle
spp	species
TVA	Tennessee Valley Authority
USGS	United States Geological Survey

I. INTRODUCTION

A riparian habitat describes the transition between a terrestrial and an aquatic ecosystem that often has woody vegetation (Swift, 1984) (Figure 1-1). This ecotonal habitat comprises plant communities in response to gradients of environmental factors and ecological processes (Gregory et al., 1991). The vegetation in the riparian habitat is adapted to and tolerant of high substrate water levels (Odum, 1978). Historically, riparian habitats have incurred substantial human modifications, primarily through water impoundment, in the United States (Swift, 1984). Pre-impoundment mesic communities in the reservoir riparian habitat tend to shift from a mesic to riparian arboreal community when the underlying soils become periodically saturated post-impoundment (Amundsen, 1994).

The Tennessee Valley Authority (TVA) closed Watts Bar Dam 54 years ago and inundated the corresponding Tennessee riverbed and its riparian shoreline. Mesic ridge top habitats above pool level in the Watts Bar Impoundment formed isolated islands after the dam closure. Selected, low-lying, small islands were investigated in this study to determine impoundment effects on historically mesic terrain.

The purpose of this study was to evaluate differences between small island forest communities and to compare composition with other reservoir shoreline and bottomland forest communities. For this study, it was hypothesized that islands created by impounding the Tennessee River in 1942 are identical in number and area to those documented most recently and that the arboreal species are now identical in importance on selected Watts Bar small islands.

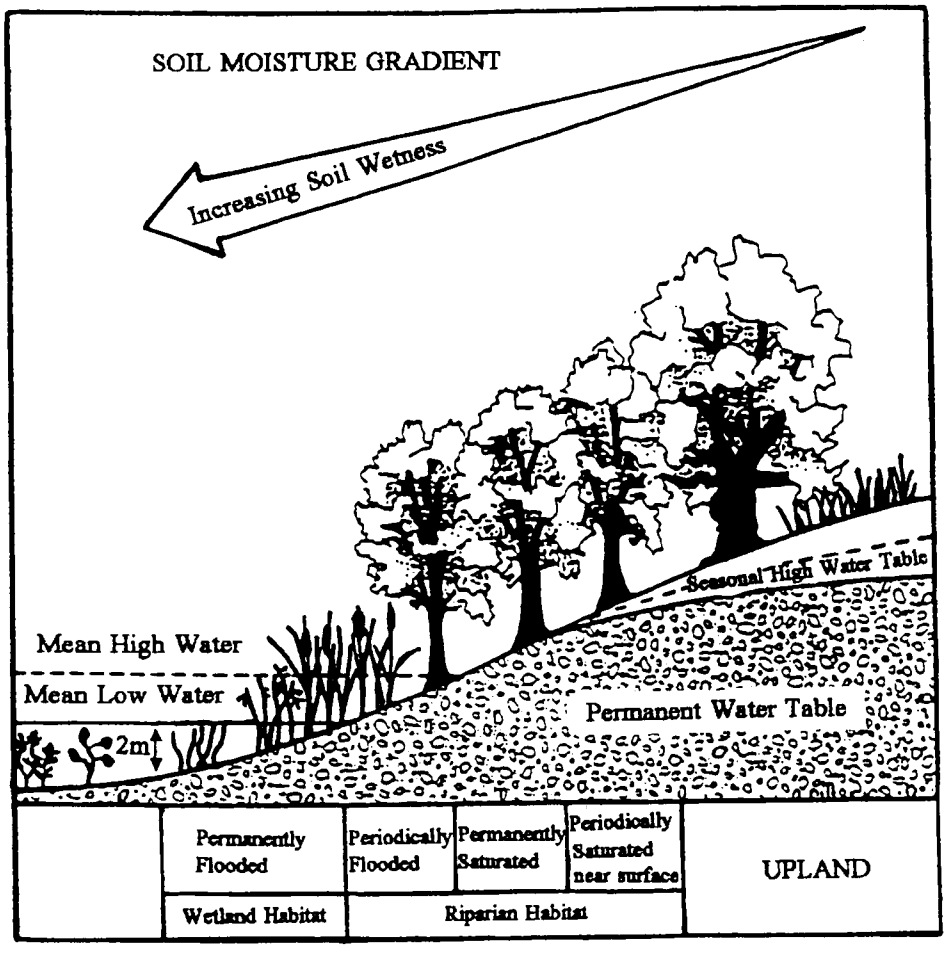

Figure 1-1. The location of habitats along a moisture and topographic gradient.

Source: Adapted from Tiner, R. W. 1991. The Concept of a Hydrophyte for Wetland Identification. Bioscience 41(4):236-247.

II. LITERATURE REVIEW

1. THE STUDY AREA

Location

Watts Bar Reservoir is located southwest of Knoxville, Tennessee in Rhea, Meigs, Roane, and Loudon Counties (Figure 2-1). Watts Bar Dam was closed on January 1, 1942 and is located at river mile 529.9 on the Tennessee River. The impoundment extends 116.5 kilometers (km) upstream to Fort Loudoun Dam at river mile 602.3, east of Lenoir City (TVA, 1949). Topographically at the "normal" reservoir pool level of 225.9 meters mean sea level (m msl), 247 islands of all categories are delineated in the most recent United States Geological Survey (USGS) editions of maps covering the impoundment (USGS, 1973a, 1973b, 1974, 1976, 1966 PR 1980, 1968 PR 1980a, 1968 PR 1980b, 1969 PR 1980, 1952 PR 1984, 1968 PR 1984, 1968 PR 1986, 1968 PR 1989, and 1968 PR 1990). Fifteen islands (Figure 2-1), isolated by water during all seasons, have been categorically selected for this study and are characterized in the sequence studied (Table 2-1).

Geology and Soils

Watts Bar Reservoir is located in the Great Valley of Tennessee, which is bound on the west by the Cumberland Plateau and on the east by the Blue Ridge Region of the Appalachian Mountains. The underlying geology of the Watts Bar locale was formed primarily during the Paleozoic Era in the Ordovician and Cambrian Periods. The lithology consists of limestone, sandstone, and shale dated 250 to 500 million years old. (Moore, 1949).

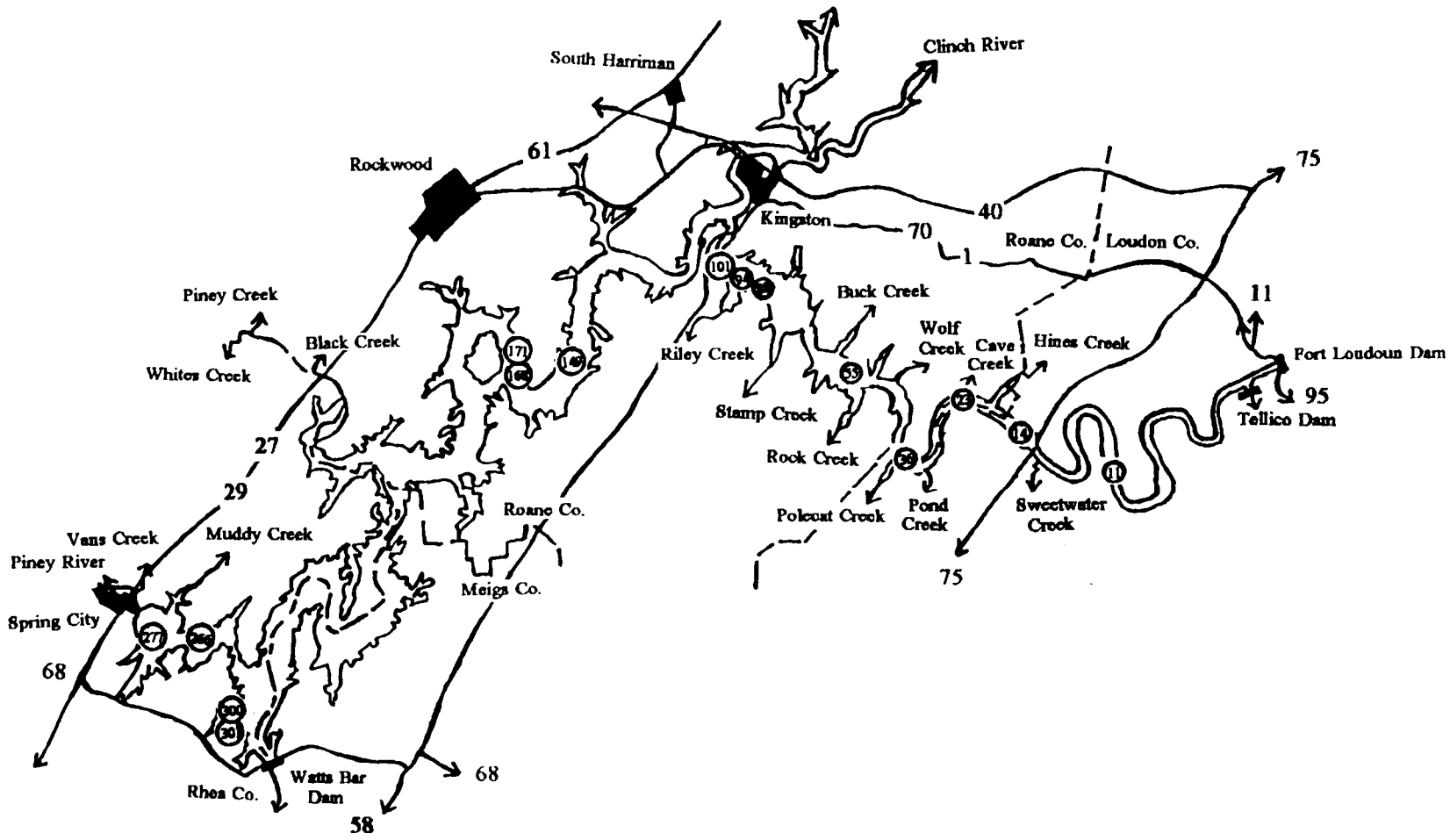

Figure 2-1. Location of the Watts Bar Reservoir and fifteen small islands selected for study.

Source: [USGS.] 1:250,000. Chattanooga Sheet, Tennessee and North Carolina. Reston, Virginia, 1957 photorevised 1972.

Table 2-1. Watts Bar Reservoir small island study locations and TVA land management use.

Island #	River Mile	Latitude	Longitude	Quadrangle	County	Flat Surface Area (ha)	Cartographic Island Name	TVA Land Management Use
11	591.1	354500	841954	Loudon	Loudon	1.161	Blair	VP, WM
14	584.3	354545	842251	Cave Creek	Loudon	1.161	Sweetwater	HP, VP, WM
23	582.2	354645	842437	Cave Creek	Roane	1.742	------	HP, WM
36	578.6	354520	842643	Cave Creek	Roane	1.161	------	HP, WM
55	574.7	354737	842823	Cave Creek	Roane	0.871*	Seven	FM, HP, VP, WM
88	570.4	354947	843116	Bacon Gap	Roane	0.871*	------	HPA, VP, WM
94	570.0	354953	843148	Bacon Gap	Roane	1.161	------	HPA, VP, WM
101	569.6	355020	843156	Bacon Gap	Roane	1.742	------	HPA, VP, WM
149	558.4	354757	843713	Bacon Gap	Roane	1.161	------	HPA, WM
168	555.4	354740	843848	Rockwood	Roane	2.323	------	HP, VM, WM
171	555.2	354752	843845	Rockwood	Roane	1.742	------	HP, VM, WM
266	532.3	354008	844916	Spring City	Rhea	1.161	Doc Smith	OS
277	532.3	354024	845059	Spring City	Rhea	1.161	------	VP, WM
300	531.0	353820	844759	Spring City	Rhea	1.161	------	WM
301	531.0	353828	844830	Spring City	Rhea	1.161	------	WM

Notes: Island # corresponds to Appendix A. * = Island flat surface area of two English Grid dots, both occurring on the boundary (labeled 1.161/2). FM = Forest Management. HP = Historic Preservation. HPA = Habitat Protection Area. OS = Open Space. VM = Visual Management. VP = Visual Protection. WM = Wildlife Management.

Sources: [USGS.] 1:24,000. Spring City Quadrangle (Quad), TN. Reston, VA, 1966 photorevised (PR) 1980. [USGS.] 1:24,000. Bacon Gap Quad, TN. Reston, VA, 1968 PR 1980. [USGS.] 1:24,000. Rockwood Quad, TN. Reston, VA, 1969 PR 1980. [USGS.] 1:24,000. Loudon Quad, TN. Reston, VA, 1952 PR 1984. [USGS.] 1:24,000. Cave Creek Quad, TN. Reston, VA, 1968 PR 1989. TVA. Sheets 1 and 2. Watts Bar Reservoir Land Management Plan. TVA Reservoir Lands Planning, Norris, TN. 1988 PR 1992.

Historically mesic soils, which now form most of the Watts Bar shoreline, were pedogenetically characterized by Springer and Elder (1980) as acidic and low in fertility. The following two general soil series were identified:

- Fullerton-Bodine: Hilly and steep, deep, well drained, cherty and clayey, acidic soils from dolomitic limestone that are typically low in fertility; and,

- Wallen-Talbott-Montevallo: Steep ridges and rolling valleys with shallow to moderately deep excessively drained and well-drained, stony and clayey soils from sandstone, shale, and limestone.

Hydrology

Watts Bar Reservoir has a total watershed drainage area, by TVA classification, of 44,829 km^2. Principal tributaries contributing to the Watts Bar drainage include the Little Tennessee River (manipulated by Tellico Dam), Clinch River (manipulated by Melton Hill Dam), Emory River, and Piney River (TVA, 1949). The primary Tennessee River (manipulated by Fort Loudoun Dam) and the Little Tennessee River together account for approximately 75 percent of the flow through the Watts Bar Reservoir. The Clinch River accounts for approximately 15 percent of the flow. The Emory River, which is a tributary to the Clinch River, accounts for only about five percent of the flow. Prior to impoundment the extant reservoir terrain at river level had a natural fall of 19.7 m, approximately 0.17 m/km. The general flow in the upper half of the impoundment from Loudoun Dam (mile 602.3) to the mouth of Clinch River (mile 568) is roughly northwest. The general flow changes abruptly to southwest from the Clinch River to Watts Bar Dam (mile 529.9) in the lower half of the impoundment. Overall the flow pattern roughly parallels the Cumberland Plateau

towards the southwest (TVA, 1949).

TVA hydrological management practices for the Watts Bar Impoundment impose water levels that are reversed from the regime typically observed in regional, free flowing river systems. Historically, river water levels would be high during the winter months when watershed run-off would be at its greatest due to decreased biological activity in chilled soils and decreased evapo-transpiration by terrestrial vegetation. During the summer months when soils would be biologically active and vegetative absorption processes would be at their peak, the river water level would normally be low. Current TVA management practices involve a low water pool level designated "winter pool" of a nominal 224 m msl from October to March for flood control. The "normal or summer pool" high water level is maintained at about 225.9 m msl from April to September to accommodate summer flash floods, mosquito control, and recreational purposes (Figure 2-2). The top of the flood gates is reached at a pool level of 227.1 m msl (TVA 1980b) and impounds an area of 17,443 hectares (ha). Winter and normal pool levels contain projected areas of 13,315 ha and 15,621 ha, respectively (TVA, 1949).

The Tennessee River riparian shoreline was submerged in 1942 upon the closing of Watts Bar Dam. The resulting Watts Bar Reservoir shoreline was imposed on mesic slope and ridge top terrain (Amundsen, 1994). At river mile 565, the current, normal pool level exceeds the maximum known flood level, which occurred in 1867 (TVA, 1949) (Figure 2-3). Examination of Figure 2-3 reveals that the pre-reservoir areas later defined as study islands #11 and #14 were completely inundated

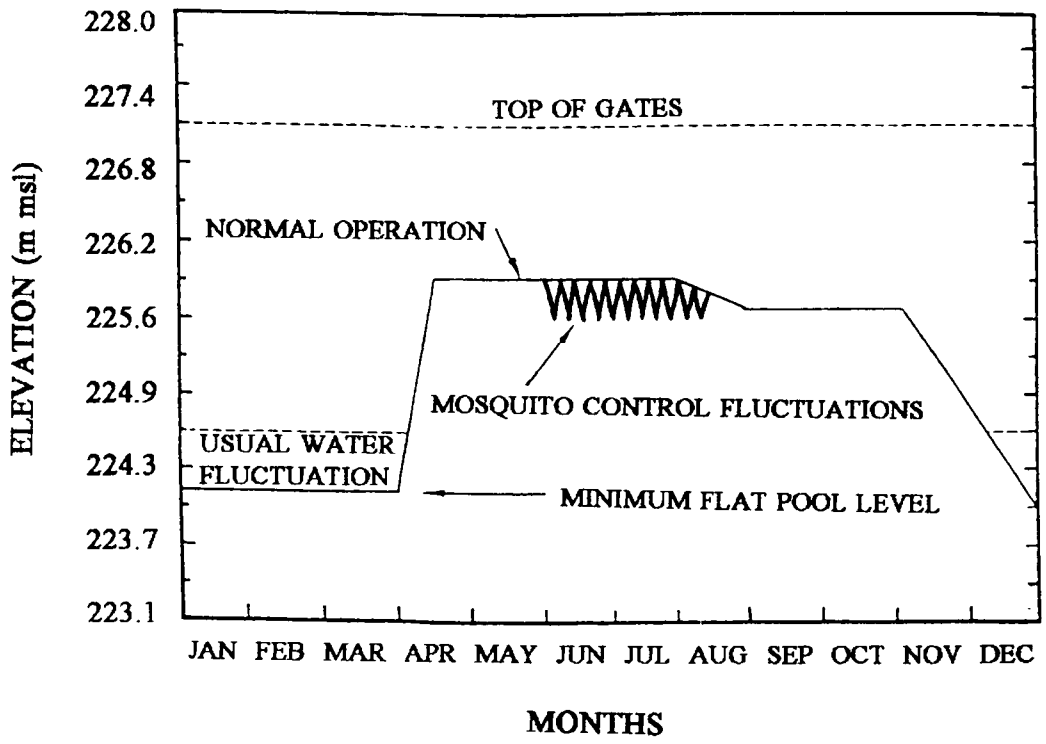

Figure 2-2. Watts Bar Reservoir annual operating guide.

Source: Adapted from Amundsen, C. C. 1994. Reservoir Riparian Zone Characteristics in the Upper Tennessee River Valley. Water, Air and Soil Pollution 77:469-493.

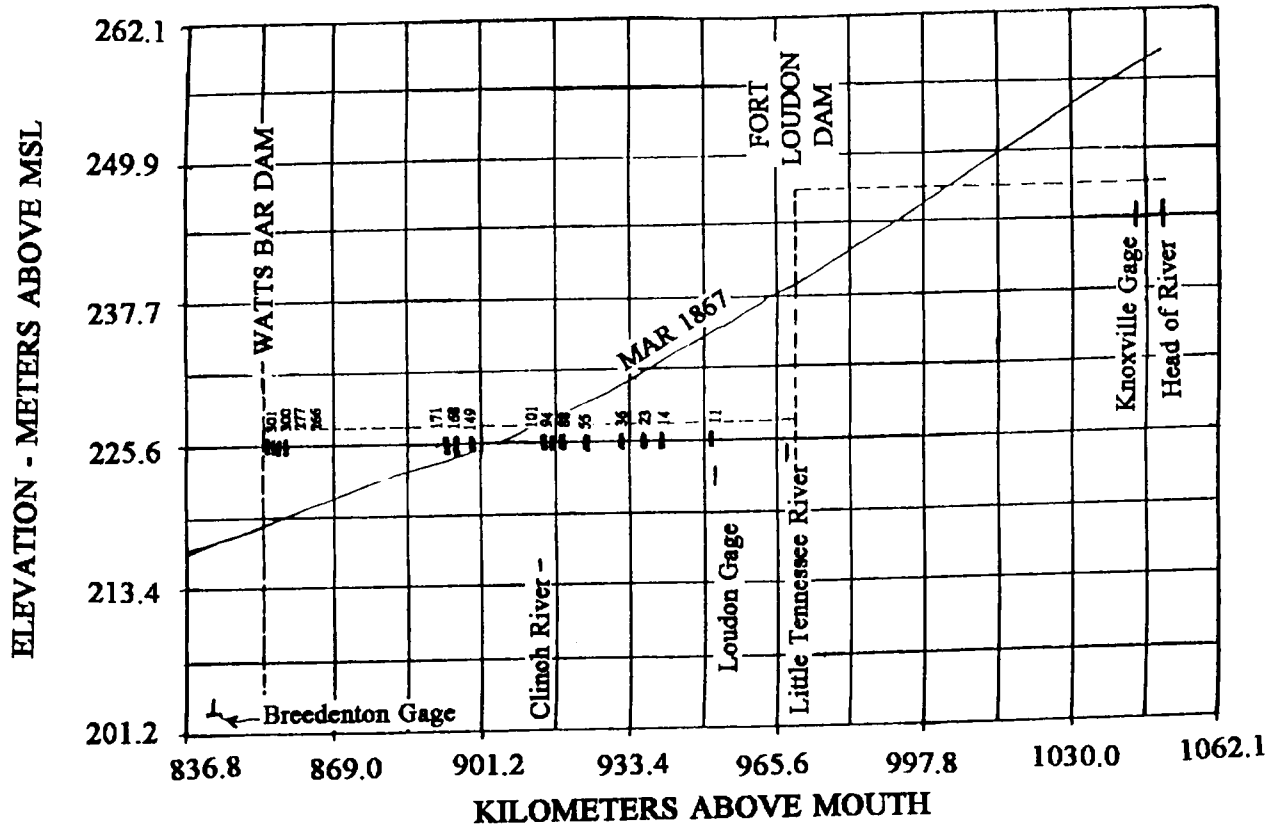

Figure 2-3. The 1867 flood profile of the Watts Bar Reservoir area and current locations of the small islands selected for study.

Source: Adapted from Tennessee Valley Authority (TVA). 1949. The Watts Bar Project: A Comprehensive Report on the Planning, Design, Construction, and Initial Operations of the Watts Bar Project. Technical Report No. 9. United States Government Printing Office, Washington, D. C.

by the 1867 flood. Peak water level was above 231.6 m msl at these upstream locales. Pre-reservoir area locations later defined as study islands #23, #36, #55, #88, #94, and #101 may also have been inundated depending on their uppermost elevations, which could not be determined due to the 6.10 m interval between topographic contour lines from available records. Pre-reservoir areas later defined as study islands #149, #168, #171, #266, #277, #300, and #301 were at an elevation above the 1867 flood water level.

Climate

The Watts Bar Reservoir region is located in a temperate, deciduous forest biome (Curtis, 1979) and is characterized by a moderate climate with cool winters and moist, warm summers (TVA, 1980a). Over the past 100 years, rainfall has occurred at its highest seasonal average during the winter months (December to March) at about 37 centimeters (cm) and at its lowest seasonal average during the autumn months (September to December) at about 28 cm. The average annual rainfall is roughly 130 cm (TVA, 1995). TVA reported that the monthly mean temperature ranges from 40.2 degrees Fahrenheit (°F) [4.6 Celsius (C), January] to 78.8 °F (26 C, July) in Chattanooga, located approximately 80 km southwest of the Watts Bar Dam. The average annual temperature was 59.8 °F (15.4 C) (TVA, 1980a).

2. WATTS BAR RESERVOIR AREA PRIOR TO IMPOUNDMENT

Channel Improvements

Early alterations of the Tennessee River flow in the Watts Bar Reservoir area include the construction of a rock dike across the head of Watt Island at river mile

529.9 by the United States Army Corps of Engineers between 1872 and 1874. Two wing dikes were also constructed, which projected out from the west bank into the river. One dike was located slightly below the head of Watt Island and the other several meters farther downstream. These improvements developed a channel along the west side of Watt Island. In August, 1911, dredging efforts were initiated to deepen the original channel, and the project was completed in January, 1913. A report by the United States Army Corps of Engineers, on March 15, 1930, recommended that a dam be constructed in the area. The mouth of Whites Creek, approximately 21.7 km upstream from the current dam site, was core-drilled in 1932, but the area where the dam foundation would be constructed was unfavorable. The Whites Creek location was rejected and the Watts Bar Dam site core-drilling project was initiated in 1935 (TVA, 1949).

Land Use

Historically, land inundated by the Watts Bar Reservoir was bottomland or old river terrace, hardwood forest. Much of the land, however, had apparently been modified at some time for agricultural use. In 1936, approximately 90 percent of the land to be flooded by the construction of Watts Bar Dam was reported to be in active agricultural use involving crop and pasture land. Only ten percent of the land to be inundated was classified as waste or forest land of low commercial value, but criteria used in land classification were not clear (Olson, 1938), as reported woodland clearing involved over 20 percent of the impoundment area (TVA, 1949).

Island Status

The USGS was founded in 1882 with a goal of providing standard topographic maps of the entire United States. In the collections of the University of Tennessee Cartographic Center, the first available USGS maps, which cover the upper Tennessee River, were produced in 1893. These maps show the general topography and culture of the area at a scale of 1/125,000. The area later encompassed as the Watts Bar Impoundment was delineated on the Loudon and Kingston sheets and 27 riverine islands were delineated (Figure 2-4). No islands were delineated along the Clinch River and Piney River at least up to about mile 6.5 and 5.0, respectively.

North American polyconic data collected in 1927 in the Watts Bar Reservoir area was initially field checked by TVA for a more detailed USGS topographic assessment in 1935 and 1936. All 7.5 minute series quadrangle maps that included the future impoundment areas were compiled with the exception of the Concord and Elverton quadrangles, which were not issued until 1940 and 1941, respectively. During the 1935 to 1936 field examination period, 32 islands were delineated along the Tennessee River in the proposed impoundment area. The USGS chronological and dynamic topographic status of the 32 islands by quadrangle map is shown in Table 2-2. The original and present location and size of all islands delineated from 1935 to the most recent USGS map editions can be found in Appendix A.

TVA performed pre-inundation field examinations of the Watts Bar area from 1939 to 1941 for USGS quadrangle revision processes. All quadrangle editions were updated with the exception of the Roddy quadrangle, which showed no islands until

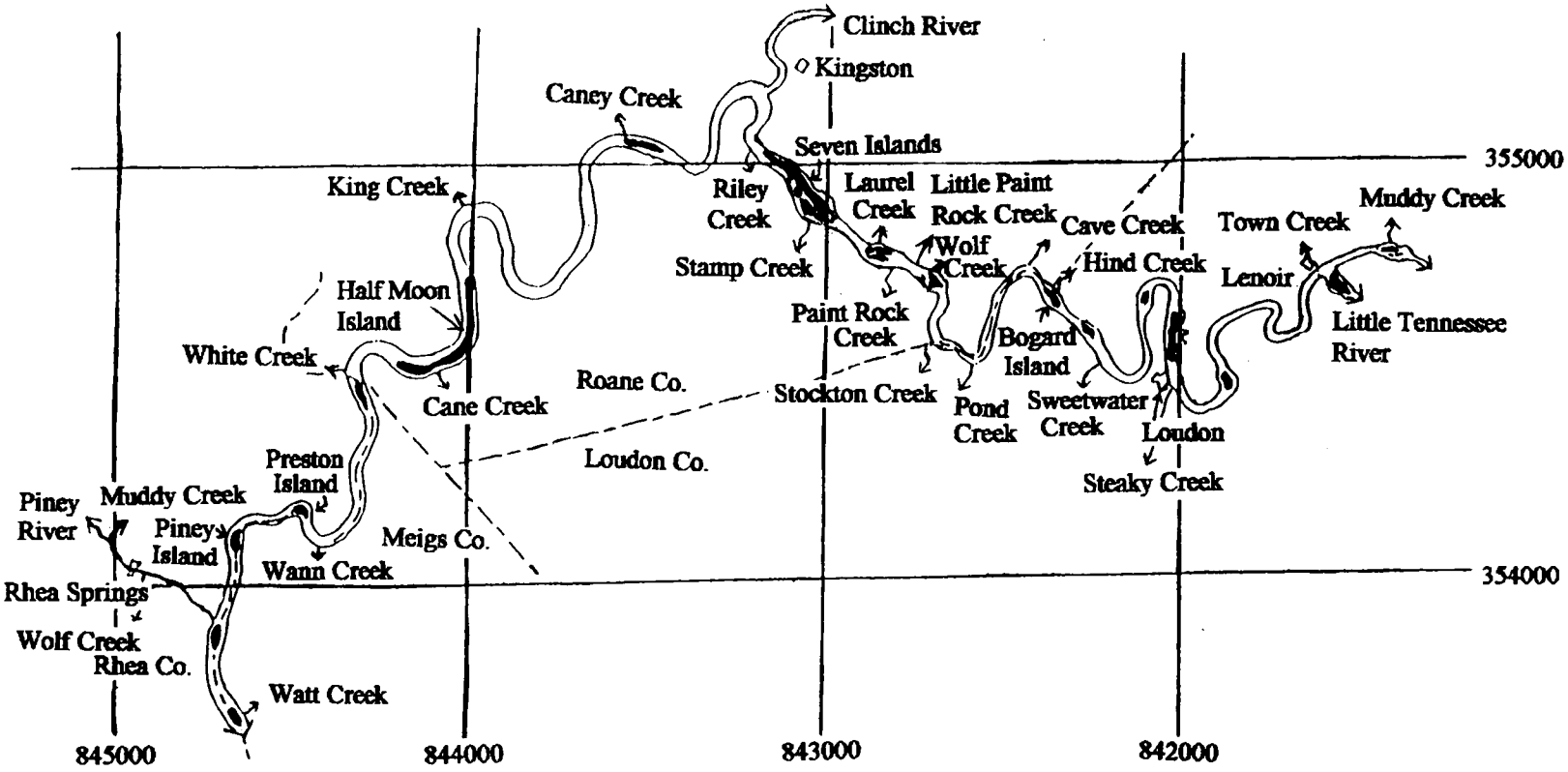

Figure 2-4. River islands delineated on 1893 and 1895 USGS topographic sheets in the Watts Bar Reservoir area.

Sources: [USGS.] 1:125,000. Kingston Sheet, Tennessee. Reston, Virginia, 1893.
[USGS.] 1:125,000. Loudon Sheet, Tennessee. Reston, Virginia, 1895.

Table 2-2. 1935-36 USGS chronological and dynamic topographic status of the 32 depicted islands in the pre- and post-impoundment Watts Bar Reservoir area.

Quadrangle	1935 - 36	1939 - 41	1942 - 53	1966 - 74	1976 - 90
Bacon Gap	2	6	0	0	0
Cave Creek	11	13	16	18	18
Concord	No Edition	3	0 *	0	0
Decatur	1	No Edition	0 **	0	No Edition
Elverton	No Edition	1	1	1	1
Harriman	0	0	0	0	0
Lenoir City	4	4	8	7	7
Loudon	1	1	1	1***	1
Philadelphia	0	0	0	0	No Edition
Rockwood	5	3	0	0	0
Roddy	0	No Edition	0	0	0
Spring City	5	7	No Edition	0	0
Ten Mile	3	2	0	0	No Edition
Total:	32	40	26	27	27

Notes: * = Island incorporated into Watts Bar Dam structure. ** = Island incorporated into Fort Loudoun Dam structure. *** = No revised map edition was found during this period; however, the same island was observed in previous and later editions, so a value of one was assigned. Quad = Quadrangle. FE = Field Examination. PR = Photorevised.

Sources: [USGS.] 1:24,000. Decatur Quad, TN. Reston, VA, FE 1935, 1942, 1943, and 1973.
[USGS.] 1:24,000. Harriman Quad, TN. Reston, VA, FE 1935, 1941, 1952, 1953, 1968, and 1968 PR 1980.
[USGS.] 1:24,000. Lenoir City Quad, TN. Reston, VA, FE 1935, 1940, 1953, 1968, and 1968 PR 1986.
[USGS.] 1:24,000. Philadelphia Quad, TN. Reston, VA, FE 1935, 1940, 1952, and 1974.

Table 2-2. (continued)

Sources:

[USGS.] 1:24,000. Rockwood Quad, TN. Reston, VA, FE 1935, FE 1939, 1952, 1969, and 1969 PR 1980.
[USGS.] 1:24,000. Loudon Quad, TN. Reston, VA, FE 1935 and 1936, 1940, 1952, and 1952 PR 1984.
[USGS.] 1:24,000. Spring City Quad, TN. Reston, VA, FE 1935 and 1936, 1940, 1966, and 1966 PR 1980.
[USGS.] 1:24,000. Ten Mile Quad, TN. Reston, VA, FE 1935 and 1936, 1940, 1952, and 1973.
[USGS.] 1:24,000. Bacon Gap Quad, TN. Reston, VA, FE 1936, FE 1940, 1952, 1968, and 1968 PR 1980.
[USGS.] 1:24,000. Cave Creek Quad, TN. Reston, VA, FE 1936, 1940, 1953, 1968, and 1968 PR 1989.
[USGS.] 1:24,000. Roddy Quad, TN. Reston, VA, FE 1936, 1946, 1947, 1973, and 1973 PR 1976.
[USGS.] 1:24,000. Concord Quad, TN. Reston, VA, 1940, 1953, 1968, and 1968 PR 1984.
[USGS.] 1:24,000. Elverton Quad, TN. Reston, VA, 1941, 1953, 1968, and 1968 PR 1990.

after the reservoir had been established. Thirty-four riverine islands were delineated in these revised editions (Appendix A).

3. THE ORIGINAL TVA WATTS BAR RESERVOIR PLAN

TVA History

TVA was created on May 18, 1933, by an act of Congress. Among its many mandates, TVA was specifically authorized to create a navigation channel from the mouth of the Tennessee River to Knoxville, to provide for flood control, to generate power by hydro-electric facilities, and to provide other related benefits. In a report to Congress on March 31, 1936, TVA proposed the construction of seven main-river multipurpose dam projects (including Watts Bar) and the acquisition of two other existing dam projects (Hales Bar, 1939 and Wilson, 1933) (TVA, 1949).

Watts Bar Reservoir Construction

Watts Bar Dam was authorized for construction on March 16, 1939 and started July 1, 1939. The outbreak of war in Europe in September, 1939 promoted the construction of the dam to a national wartime emergency defense program and completion of the project became a priority. Reservoir filling began January 1, 1942, two weeks earlier than the scheduled date of January 15, 1942. The Watts Bar Dam lock began operation on February 16, 1942 and the last of the five electric power generating units began commercial operation on April 24, 1944. Although the original purpose of the reservoir was for power generation, it would eventually be used for recreational purposes by tourists and sportsmen (TVA, 1949).

The Watts Bar Dam was constructed at river mile 529.9 and the impoundment

extended 116.5 km upstream to river mile 602.3, which is currently the site of Fort Loudoun Dam. The filling of the reservoir involved the submersion of approximately 15,800 ha of land and former riverbed at a normal pool level of 225.9 m msl. A total of 22,138 ha of land was appropriated under various mechanisms by TVA reaching to an elevation of 228.6 m msl. The 228.6 m msl contour allowed TVA flood easement rights up to and just above the flood pool boundary. Approximately 8,661 ha of land was acquired above the 227.1 m msl contour and about one half of this land was cleared and, in part, used for crop and pasture purposes.

The pre-impoundment clearing of acquired areas had the following purposes: to aid in malaria control by eliminating possible mosquito (*Anopheles quadrimaculatus*) breeding habitats, to remove navigational hazards, to eliminate timber that might be swept into and damage the dam, to eliminate silt accumulation hazards, and to create a reservoir free of dead forests. Clearing of the land to be inundated began on August 19, 1939, and involved an area of 2,956.3 ha classified as woodland lying along the Tennessee River and its tributaries. Land owners were allowed to inhabit and continue farming their land until December, 1941; therefore, initial clearing efforts involved written or oral consent of the owners. Unlike most of the other main-river projects, the Watts Bar site had virtually no swamps, at least none that did not dry out during the dry season. As a result, no drainage work was needed prior to clearing processes. Two types of clearing methods were established, regular or bank clearing and marginal clearing. These methods removed a total of 113,756 m^3 of material (TVA, 1949).

Regular clearing occurred over 1,885.1 ha of land and involved primarily hand tools. Valuable timber was cut into stock lengths and sold. Scrap timber was hauled away by local farmers for firewood and all other timber and debris was burned. Bank clearing occurred over 1071.2 ha and amounted to approximately one-third of the total acreage cleared. The timber along the banks of the river and its tributaries were felled by machine into the water and dragged to the shore to burn (TVA, 1949).

Marginal clearing occurred from the normal pool level at 225.9 m msl and extended horizontally 4.6 m or vertically 0.46 m, whichever was reached first. In areas where drift and flotage was likely to collect, clearing was extended 7.6 m horizontally. The 225.9 m msl elevation clearance border at the Watts Bar Dam site was raised in 0.15 m intervals upstream to 226.3 m msl at the current Fort Loudoun Dam site. All aerial underbrush, undesirable timber, and debris was completely cleared and removed or burned. All sprouts and annual growth were removed from the 224.3 to the 225.9 m msl contour to provide a clear shoreline during the winter pool. Stumps of most trees in the cleared area were cut within 10.2 cm of the ground and all shrubs were cut flush with the ground between the 225.2 and 225.9 m msl elevations. The process of cutting a stump flush with the ground and bevelling the remaining sharp edges is called "stumping". Stumping occurred on 143.7 ha surrounding the main river channel and 163.5 ha surrounding tributary channels (TVA, 1949).

Island Status

TVA map revisions accomplished from 1942 to 1953 delineated 165 islands along the Watts Bar Reservoir (Appendix A). All USGS quadrangle maps were updated during this time with the exception of the Spring City quadrangle, which had seven islands delineated on the 1940 USGS map edition and 50 islands on the 1966 USGS map edition.

4. THE PRESENT TVA WATTS BAR RESERVOIR PLAN

Current TVA Management

The mission of TVA has expanded since its formation in 1933. The following are some of the current additional objectives: reservoir and land management, land transfer and sales, reforestation, various water supplies, waste dilution, pest control, scenic vistas, and recreation.

Current uses of mainshore lands adjacent to the reservoir include: industrial facilities, navigation support, power generating facilities, recreation facilities, agriculture sites, archeological sites, and natural resources. The current management plan classification for the selected study islands (TVA, 1988) (Table 2-1) is restricted as to the amount of disturbance allowed, predominantly for management of wildlife resource habitats.

Island Status

USGS map revisions conducted by TVA from 1966 to 1974 delineated 247 islands of all classes along the reservoir (Appendix A). Revised versions from 1976 to 1990 delineated the same 247 islands (Appendix A). Currently, most aerial surveys

are conducted during the winter months when deciduous foliage is down and the pool level is low. This may result in islands that appear larger than they actually are, due to mud flat exposure, and representations that do not appear as discrete islands at the normal pool level (Schmidt, 1996).

III. METHODS

1. ISLAND SELECTION

USGS quadrangle maps were used to estimate the number and approximate surface area (tested with the English Dot Grid) of documented islands. Flat surface area determinations were considered an appropriate method for primary selection of study islands. A mapped elevational change was only discernable for three islands (#39, #150, and #227) due to the 6.10 m contour interval of the USGS quadrangle maps issued from 1935 to 1990. Islands #150 and #227 did not show a 231.6 m contour line when depicted in 1952, but did in the revised USGS editions of 1968 and 1973, respectively. The recorded increase in elevation was likely due to human error in one of the editions rather than substrate formation or deposition. Island #39 was the only island depicted with a decrease in elevation from a 231.6 m contour line in 1953 to only a 225.6 m contour line in 1968, resulting possibly from erosional forces.

Islands delineated prior to the Watts Bar Impoundment, reservoir islands immediately following the Watts Bar Impoundment, and those still shown on the most recent map editions were recorded in Appendix A. Of the 247 islands delineated on the most recent USGS quadrangle maps along the impoundment and considering the efficiency of small boat access, fifteen (Table 2-1) were categorically selected for sampling using the following key criteria:

1. Flat Size (English Dot Grid)
    - 1a. Omit if equal to or larger than five dots (2.904 ha).
    - 1b. Omit if equal to or smaller than one dot (0.581 ha).
    - 1c. If the two English Grid dots fall on the island boundary [0.871 ha (1.5 dots)], 2 dots (1.161 ha), 3 dots (1.742 ha), or 4 dots (2.323 ha), go to 2.

2. Elevation (based on a summer pool of 225.9 m msl)
    2a. Omit if 231.6 m msl or greater.
    2b. If between 225.9 to 231.6 m msl, go to 3.

3. Exposure to shore during the winter pool (224.0 m msl)
    3a. Omit if exposed, mud flat connected.
    3b. If not exposed, go to 4.

4. Location
    4a. Omit if marginal access area.
    4b. Accept if logistically accessible area.

2. FIELD METHODOLOGY

Fixed plot or quadrat sampling methods tend to be laborious and time consuming. Various plotless methods have been developed to lessen those constraints (Brower et al., 1990), including the point-quarter method, nearest-neighbor, closest-individual, and random pairs methods. The point-quarter method (Brower et al., 1990) was selected to sample the fifteen Watts Bar small island forest communities for structural and compositional comparison with shoreline and other riverine forest communities. Data were collected from July to November, 1995, and involved a total of 95 canopy, 71 subcanopy, and 71 shrub centers. The following features of the island communities were measured or observed: orientation, canopy height, identification of arboreal species, diameter at breast height (DBH) of arboreal species, reproduction of arboreal species, scarp height, and scarp depth.

Island Characterization

A compass was used to determine orientation at each end of the longest axis of each island (Appendix B). A Suunto clinometer was used to estimate the height of the largest tree on each island to the closest foot, which was converted to meters

(Appendix B). Photographs of forest profiles were taken from each of the four sides of each island and remain in the possession of C. C. Amundsen, Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville.

Identification of Arboreal Species

Leaf and twig samples from arboreal species individuals positioned at each end of the longest axis of each island, species sampled by the point-quarter method, species with the largest DBH on each island, and other species encountered (Appendix C) were collected for later identification. Samples were identified following nomenclature used in Radford et al. (1964) or Wofford (1989). Identifications were verified by B. E. Wofford, director of the University of Tennessee, Knoxville, Herbarium. Pressed leaf and twig samples remain in the possession of C. C. Amundsen, Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville.

A riparian arboreal species list, which may include opportunistic and successional species (*sensu* Tiner, 1991) was formed by an interpretive combination of Smith et al. (1975) and Mann and Bierner (1975) (Table 3-1). This riparian species list was compared for community similarity to the Watts Bar island riparian species list.

Sampling Methods

Islands selected for study were sampled along the longest axis, which would have been an expression of mesic habitat on low ridge top terrain prior to impoundment. Point-quarter (Brower et al., 1990) samples were centered at 10 m

Table 3-1. Riparian species list formed by the combined lists of Smith et al. (1975) and Mann and Bierner (1975).

Scientific Name	Common Name
Acer negundo	Boxelder
Acer rubrum	Red Maple
Alnus serrulata	Smooth Alder
Betula nigra	River Birch
Carpinus caroliniana	Ironwood
Carya	Hickory spp.
Catalpa speciosa	Catawba Tree
Celtis occidentalis	Hackberry
Cornus	Dogwood spp.
Fagus grandifolia	American Beech
Fraxinus pennsylvanica	Green Ash
Hypericum	St. John's-wort spp.
Ilex	Holly spp.
Liquidambar styraciflua	Sweetgum
Liriodendron tulipifera	Tulip Poplar
Magnolia	Magnolia spp.
Morus	Mulberry spp.
Nyssa	Gum spp.
Pinus	Pine spp.
Platanus occidentalis	Eastern Sycamore
Populus	Poplar spp.
Quercus	Red Oak spp.
Quercus	White Oak spp.
Rhododendron	Rhododendron spp.
Salix	Willow spp.
Sassafras albidum	Sassafras
Taxodium distichum	Bald Cypress
Tilia	Basswood spp.
Ulmus	Elm spp.
Vaccinium	Vaccinium spp.
Viburnum	Viburnum spp.

Note: spp. = species

Sources: Mann, L. K. and M. W. Bierner. 1975. Oak Ridge, Tennessee, Flora: Habitats of the Vascular Plants–Revised Inventory. Environmental Sciences Division Publication No. 775, Oak Ridge National Laboratory, Tennessee.

Table 3-1. (continued)

Sources: Smith, H. D., W. L. Hafley, D. L. Holley, and R. C. Kellison. 1975. Yields of Mixed Hardwood Stands Occurring Naturally on a Variety of Sites in the Southeastern United States. Technical Report No. 55. School of Forest Resources, North Carolina State University, North Carolina.

intervals along the axis, originating at each end and joining at the middle of the island. If an included tree was beyond a 10 m distance, then the next center was placed 20 m away. The two centers at each axial end and the center in the middle of the island included canopy, subcanopy, and shrub strata data. If an island had more than five centers, then only the canopy strata was sampled. No island was sampled at more than ten centers. Canopy species had a DBH of 12.5 cm or greater and subcanopy species had a DBH of 2.5 to 12.49 cm. Each shrub and small tree strata species with a DBH of 2.49 cm or less and reaching an approximate one to two meter height was recorded within a three meter radius circular plot for arboreal reproduction information.

Evaluation of Erosion

Information concerning erosion of the island perimeter was gathered by observing the scarp height and scarp depth of each island (Figure 3-1). The overall riparian scarp height and depth was approximated for each of the four sides of the islands using the following ranges: 0-0.49 m, 0.5-1.0 m, and >1.0 m.

3. DATA ANALYSIS

Basal Area

The basal area (BA) for each arboreal species was calculated based on the DBH (approximately 1.5 m above ground) and then summed for each island. The Mann-Whitney "U" Test (Brower et al., 1990) was used to compare the basal areas of the Watts Bar island forest communities, reservoir shoreline forest communities, and other bottomland forest communities because it is less restrictive than the parametric

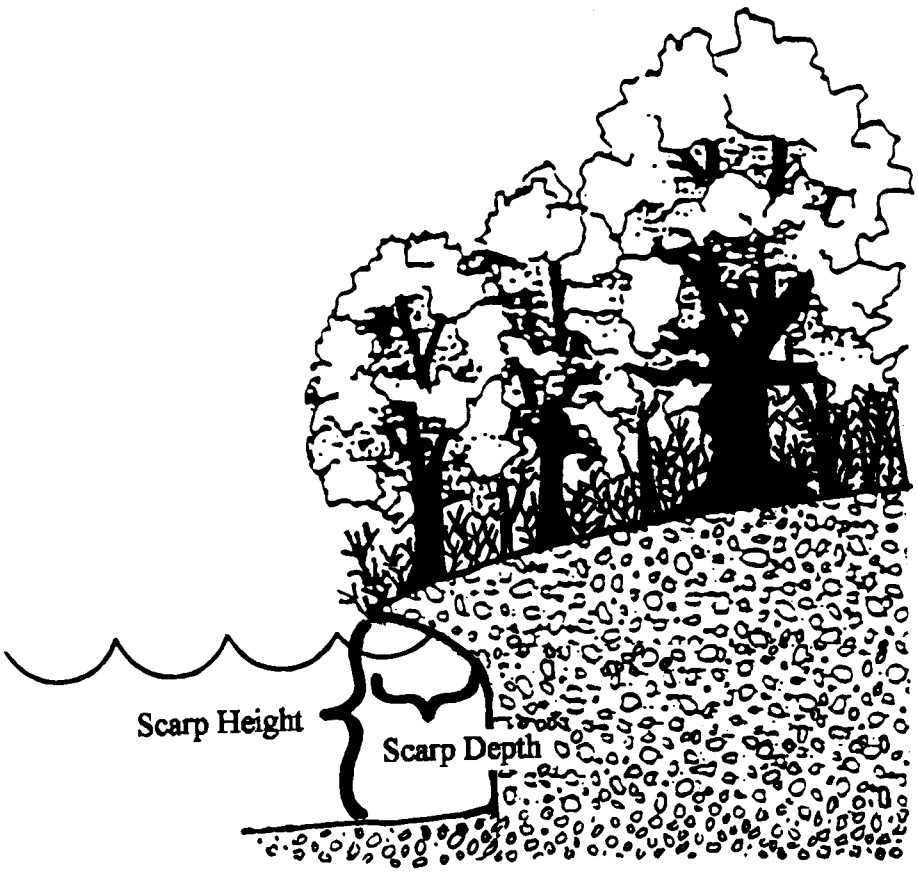

Figure 3-1. Riparian scarp height and scarp depth identifications.

Source: Adapted from Tiner, R. W. 1991. The Concept of a Hydrophyte for Wetland Identification. Bioscience 41(4):236-247.

t-test (Tanner, 1978).

Species Diversity

The Shannon Diversity Index (Brower et al., 1990) is an appropriate test for species richness and evenness when a random sample of species abundances from a larger community has been collected. The arboreal species diversity for the canopy, subcanopy, and shrub strata for each island was used in this study to indicate island forest communities that are relatively more or less diverse than others.

A species-richness curve (Brower et al., 1990) was plotted (Figure 4-1) to show the cumulative number of canopy, subcanopy, and shrub species observed on each island.

Species Importance

Arboreal species importance (Brower et al., 1990) in the canopy and subcanopy strata was determined by combining the relative density, frequency, and coverage.

Community Similarity

The Sørensen coefficient of community similarity (Sørensen, 1948) was used to estimate similarity between the Watts Bar island, reservoir shoreline, and bottomland forest communities.

IV. RESULTS AND DISCUSSION

1. BASAL AREA

The total basal area for each canopy and subcanopy species in sample plots by island, total basal area sampled for each species, and total for each forest community by island is shown in Appendix D and E, respectively. However, no studies were found that contained the basal areas of individual canopy species. Therefore, the total basal areas for each species sampled during this study were included for future reference.

The total canopy tree basal areas of the forest community for each Watts Bar study island was compared to basal areas of 50 year old bottomland forest communities (Smith et al., 1975) (Table 4-1). The Mann-Whitney "U" Test (Brower et al., 1990) showed that the two communities were different at a critical value of 43 and a significance level of 0.01. When the five largest basal areas of the study islands forest communities (#23, #55, #101, #168, and #171) were compared with the basal areas of the 50 year old bottomland forest communities (Smith, et al., 1975), the two communities had similar basal areas at a critical value of 14 and a significance level of 0.10.

The canopy tree basal areas of the forest communities for the islands were also compared to the Watts Bar Reservoir riparian shoreline forest community basal areas (Amundsen, 1994) (Table 4-1). The Mann-Whitney "U" Test (Brower et al., 1990) showed that the basal areas of the two communities were different at a critical value of 131 and a significance level of 0.05. When the three smallest basal areas of the forest

Table 4-1. Watts Bar islands, Watts Bar shorelines (Amundsen, 1994), and 50 year old bottomland (Smith et al., 1975) forest community basal areas.

Island #	Island (m^2/ha)	Shoreline (m^2/ha)	Bottomland (m^2/ha)
11	6.938	25.54	36.736*
14	9.796	15.50	32.603**
23	18.440	31.86	31.685***
36	3.283	11.50	
55	16.515	21.24	
88	8.217	15.21	
94	6.600	16.65	
101	36.686	31.46	
149	12.466	19.52	
168	24.033	12.92	
171	20.699	14.64	
266	8.861	19.52	
277	5.031		
300	13.575		
301	9.415		
TOTAL	200.556	235.56	101.024

Notes: * = Wet flat sites in North Carolina, Tennessee, and Virginia. ** = Red River bottom sites in North Carolina, Tennessee, and Virginia. *** = Bottomland sites in North Carolina, Tennessee, and Virginia.

Sources:

Amundsen, C. C. 1994. Reservoir Riparian Zone Characteristics in the Upper Tennessee River Valley. Water, Air and Soil Pollution 77:469-493.

Smith, H. D., W. L. Hafley, D. L. Holley, and R. C. Kellison. 1975. Yields of Mixed Hardwood Stands Occurring Naturally on a Variety of Sites in the Southeastern United States. Technical Report No. 55. School of Forest Resources, North Carolina State University, North Carolina.

communities of the study islands (#36, #94, and #277) were omitted and the data then compared to the shoreline forest data, the basal area of the two communities were similar at a critical value of 102 and a significance level of 0.01.

2. SPECIES DIVERSITY

The number of species found in a sample habitat is related to the area of the sample habitat (MacArthur and Wilson, 1967). As the area of a habitat increases, so does the number of species. A general trend from low to high species diversity (Appendix F) can be observed from the lesser to more areally extensive islands in the canopy (Figure 4-1) and subcanopy (Figure 4-2) as predicted. However, an inconclusive trend was observed for the species diversity of the shrub strata (Figure 4-3). Island #266 (Doc Smith Island) had the lowest amount of species diversity present in the canopy. This island contained a canopy where *Pinus virginiana* was most prevalent, indicating possible disturbance combined with a poor, dry, and rocky substrate.

The cumulative number of each canopy species observed on the islands (Appendix G), cumulative number of each subcanopy species (Appendix H), and cumulative number of each shrub strata species (Appendix I) was plotted against the number of islands sampled in a species-richness curve (Brower et al., 1990) (Figure 4-4). For all strata the number of new species encountered on the islands tended to increase downstream as the impoundment changed from the primary inflow area, which is generally riverine in nature, to the transition zone where water velocity decreases due to increased cross-sectional area of the reservoir (Dycus and Meinert,

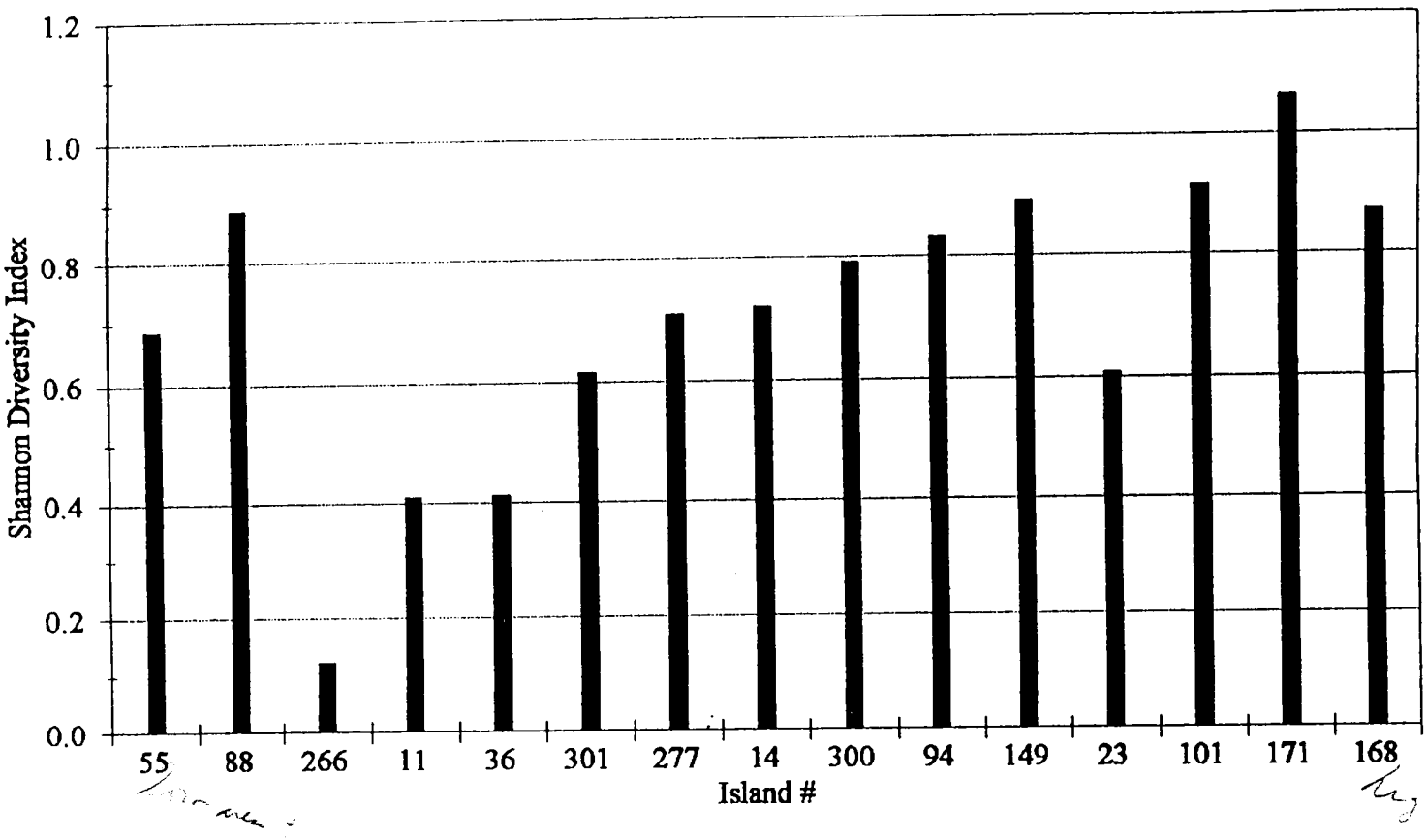

Figure 4-1. Watts Bar Reservoir small island Shannon Diversity Indices for the canopy forest communities by islands from the least to greatest in areal extent.

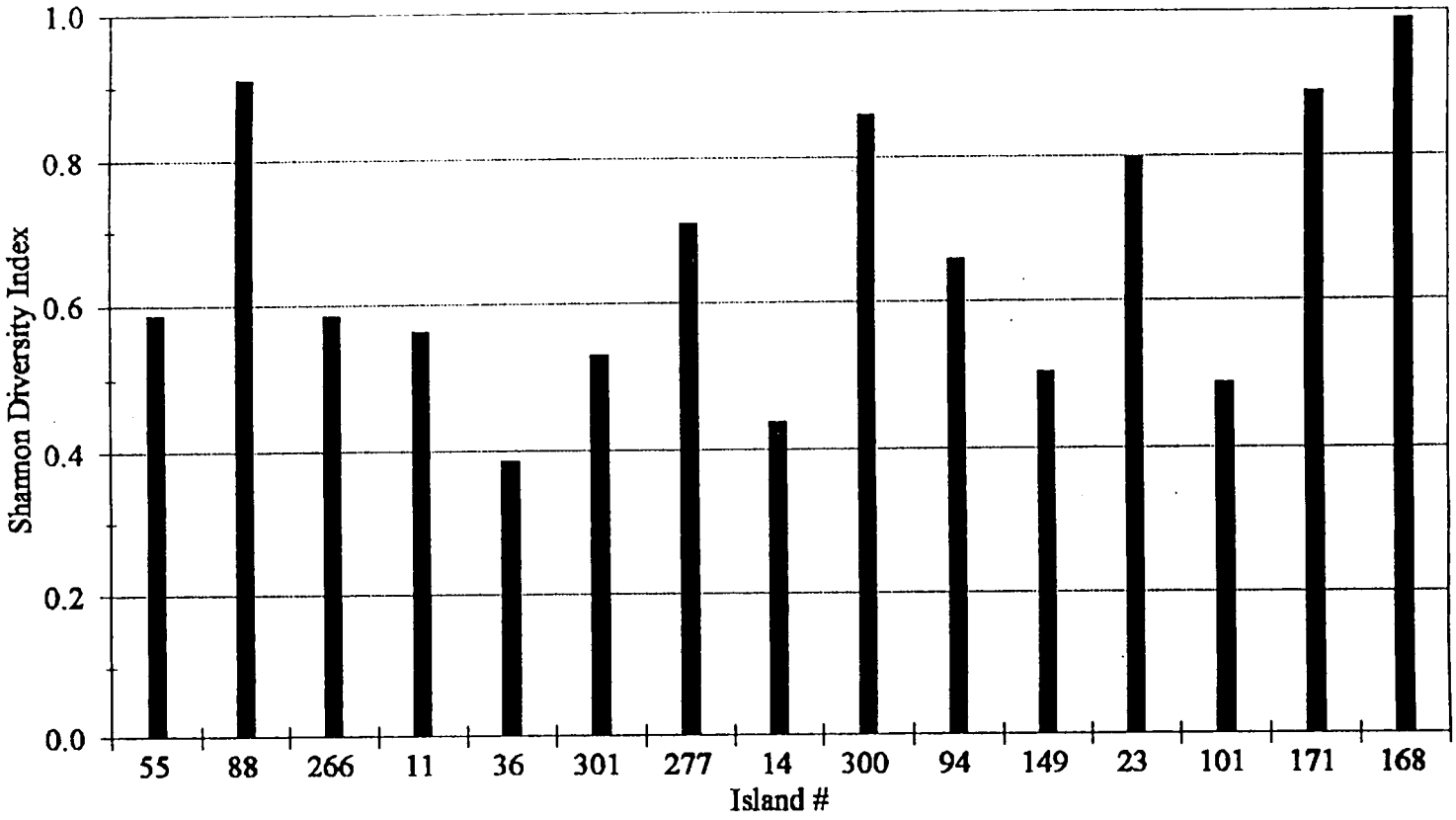

Figure 4-2. Watts Bar Reservoir small island Shannon Diversity Indices for the subcanopy forest communities by islands from the least to greatest in areal extent.

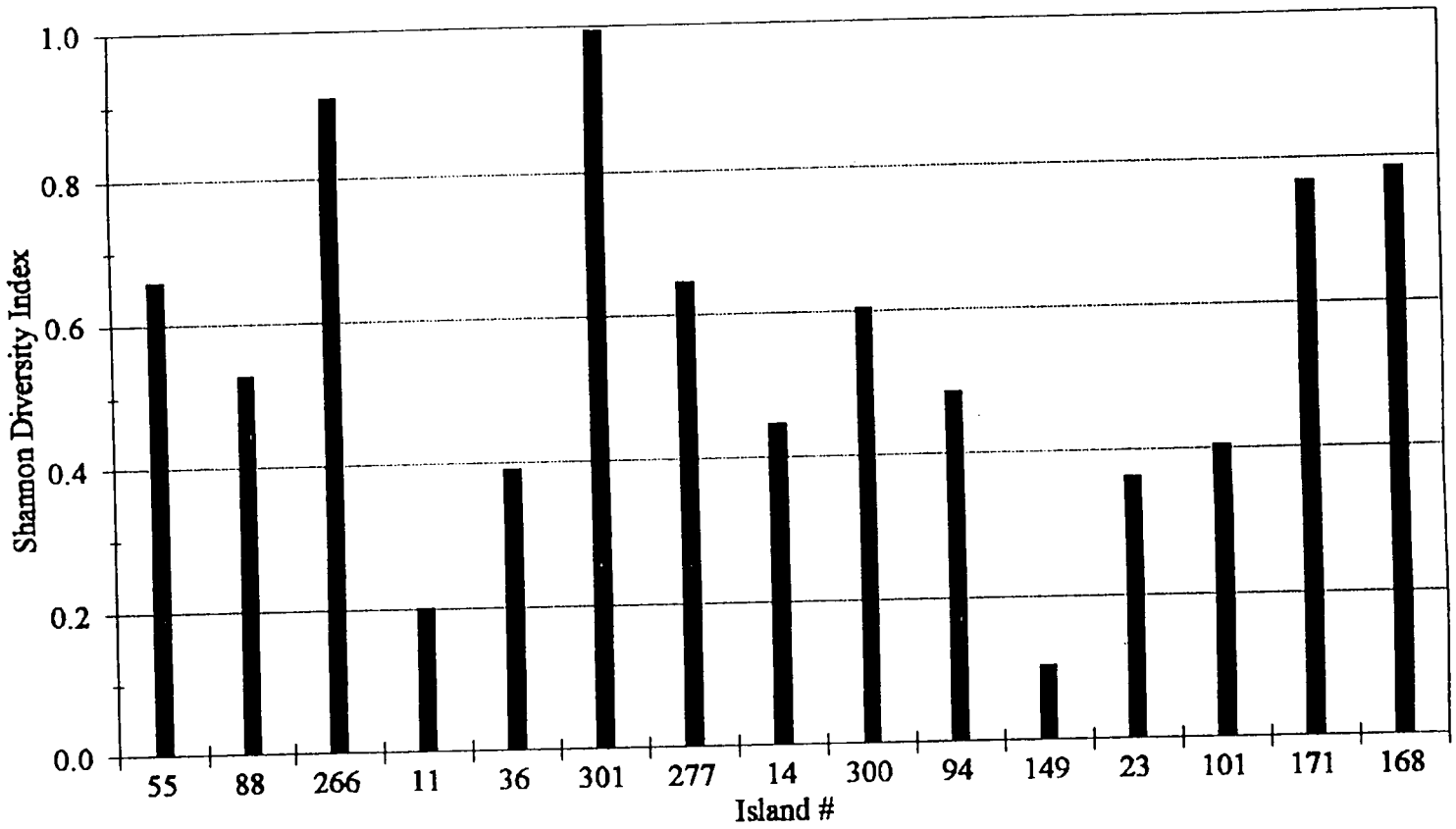

Figure 4-3. Watts Bar Reservoir small island Shannon Diversity Indices for the shrub forest communities by islands from the least to greatest in areal extent.

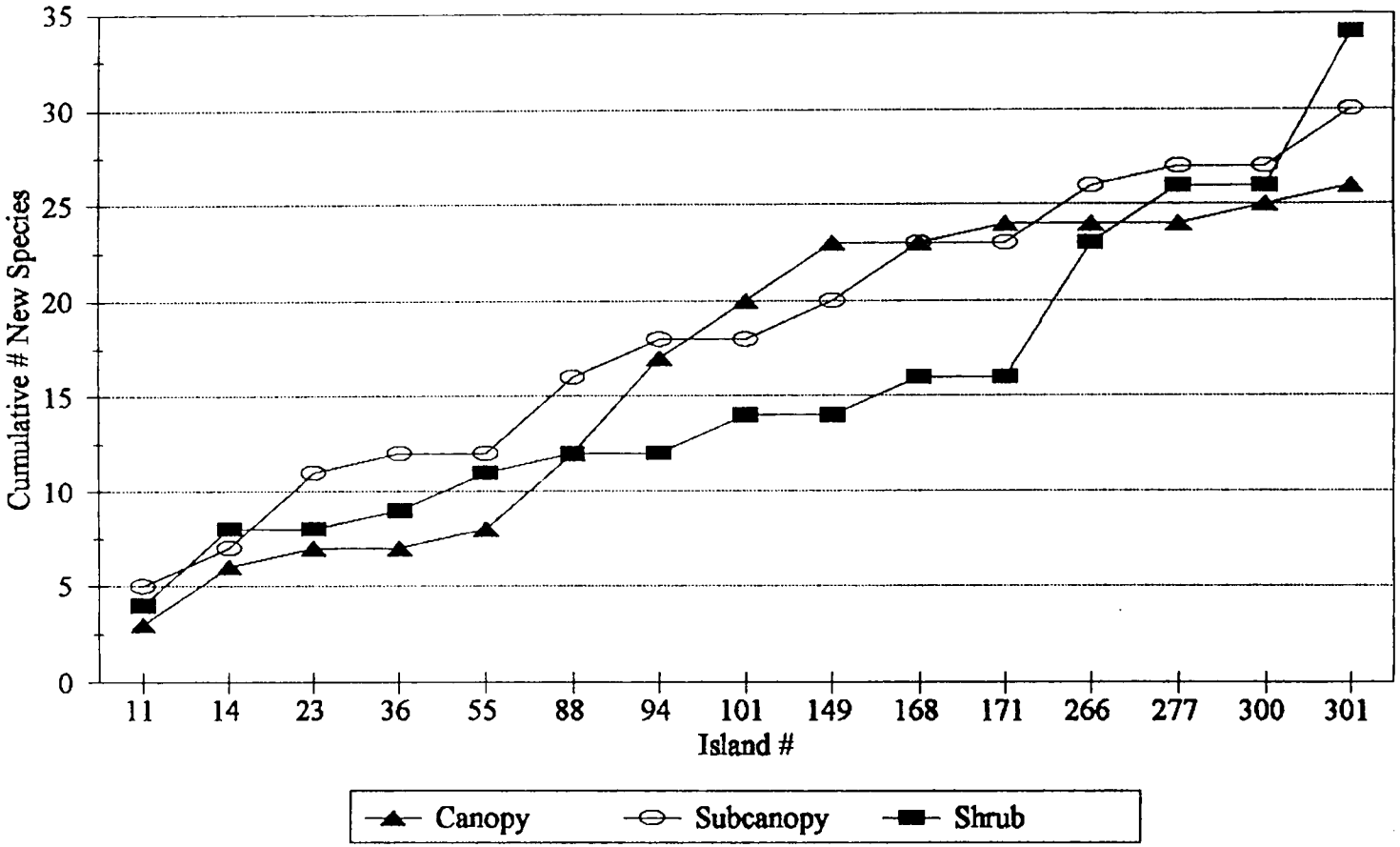

Figure 4-4. Watts Bar Reservoir small islands species-richness curve for the canopy, subcanopy, and shrub forest communities.

1994) after Island #36.

3. SPECIES IMPORTANCE

Importance values for all canopy and subcanopy species by island are shown in Table 4-2 and Appendix J, respectively. The three most important canopy species represented for all island communities were *Acer saccharinum*, *Platanus occidentalis*, and *Fraxinus pennsylvanica* at 13.8%, 10.3%, and 10.0%, respectively (Figure 4-5). Important subcanopy species represented were *Acer saccharinum*, *Ligustrum sinense*, and *Acer rubrum* at 13.6%, 13.5%, and 8.1%, respectively. *Acer saccharinum*, although a very important canopy and subcanopy species, accounted for only 1.4% of the total shrub strata species sampled, indicating that this species is infrequently reproduced. *Platanus occidentalis* and *Fraxinus pennsylvanica*, although important in the canopy strata, were shown to be important in the forest communities on only two islands in the subcanopy strata. *Fraxinus pennsylvanica* accounted for only 2% of the shrub strata sampled and *Platanus occidentalis* was not recorded at any of the shrub sample centers, also indicating very low reproductive success. *Ligustrum sinense* is an introduced species that is typically found in low-lying woods and waste areas and may be dispersed by small birds. *Ligustrum sinense* was shown to be important in the subcanopy species of the island forest communities along the impoundment and included 55.8% of the total shrub strata sampled, which is much greater than any other shrub strata species, indicating prolific reproductive success. *Acer rubrum* was classified as a riparian species by the riparian species list (Table 3-1) and was shown to be important at 4.9% of the total canopy species and 8.1% of the total subcanopy

Table 4-2. Watts Bar Reservoir small island forest communities: Importance values for each canopy species sampled by island.

Island #	11	14	23	36	55
SPECIES	IMPORTANCE VALUE				
Acer saccharinum	42.860	22.135	17.510	38.801	36.064
Fraxinus pennsylvanica	10.684	8.828	12.945	16.324	8.455
Platanus occidentalis	36.138	5.208	43.153	23.284	18.926
None	10.317	13.889	9.477	21.591	5.897
Acer negundo		22.896	12.028		3.220
Robinia pseudoacacia		7.778			
Ulmus americana		19.267			5.763
Betula nigra			4.886		2.449
Salix nigra					19.226
Acer rubrum					
Diospyros virginiana					
Liquidambar styraciflua					
Ulmus alata					
Celtis occidentalis					
Juniperus virginiana					
Maclura pomifera					
Pinus virginiana					
Prunus serotina					
Gleditsia triacanthos					
Liriodendron tulipifera					
Quercus alba					
Amorpha fruticosa					
Quercus rubra					
Cercis canadensis					
Asimina triloba					
Cornus florida					
Quercus muehlenbergii					
TOTAL	100	100	100	100	100

Note: None = The importance of not having an arboreal species represented in two of the point-quarter centers at the end of the longest axis of each island and any other center that did not contain an arboreal representative.

Table 4-2. (continued)

Island #	88	94	101	149	168	171
SPECIES	IMPORTANCE VALUE					
Acer saccharinum	4.444	4.718	25.930		5.541	8.816
Fraxinus pennsylvanica	23.952	31.712	10.107	5.259		9.309
Platanus occidentalis	6.387					12.312
None	11.111	11.429	5.802	9.259	5.714	9.054
Acer negundo			16.706	3.732	23.979	
Robinia pseudoacacia				10.628		5.772
Ulmus americana	7.792	7.373	2.208			3.619
Betula nigra		6.406	4.706			
Salix nigra	10.459		9.662			
Acer rubrum	8.398		2.536		9.302	
Diospyros virginiana	5.267	5.019		7.504	3.687	7.550
Liquidambar styraciflua	14.263				2.197	2.908
Ulmus alata	7.927					
Celtis occidentalis		4.088	5.818	32.049	3.811	2.624
Juniperus virginiana		7.077				
Maclura pomifera		4.772				
Pinus virginiana		7.539	7.965			
Prunus serotina		9.867		14.089	14.311	13.539
Gleditsia triacanthos			2.449	5.007	2.527	7.917
Liriodendron tulipifera			2.204		22.928	9.571
Quercus alba			3.910			
Amorpha fruticosa				4.543		
Quercus rubra				3.806		
Cercis canadensis				4.123	6.003	2.752
Asimina triloba						4.257
Cornus florida						
Quercus muehlenbergii						
TOTAL	100	100	100	100	100	100

Table 4-2. (continued)

Island #	266	277	300	301		
SPECIES	IMPORTANCE VALUE				TOTAL	PERCENT
Acer saccharinum					206.820	13.788
Fraxinus pennsylvanica				13.164	150.737	10.049
Platanus occidentalis		8.631			154.039	10.269
None	17.857	14.394	9.477	10.000	165.270	11.018
Acer negundo			11.173		93.735	6.249
Robinia pseudoacacia					24.178	1.612
Ulmus americana		12.707	19.331	9.477	87.537	5.836
Betula nigra		9.611			28.058	1.871
Salix nigra					39.348	2.623
Acer rubrum	13.124	31.337	8.157		72.854	4.857
Diospyros virginiana		12.366			41.392	2.759
Liquidambar styraciflua					19.368	1.291
Ulmus alata					7.927	0.528
Celtis occidentalis		10.953	20.662		80.005	5.334
Juniperus virginiana			4.756	27.478	39.311	2.621
Maclura pomifera					4.772	0.318
Pinus virginiana	69.019				84.523	5.635
Prunus serotina			4.604		56.410	3.761
Gleditsia triacanthos					17.900	1.193
Liriodendron tulipifera					34.703	2.314
Quercus alba					3.910	0.261
Amorpha fruticosa					4.543	0.303
Quercus rubra				35.815	39.620	2.641
Cercis canadensis			17.947		30.825	2.055
Asimina triloba					4.257	0.284
Cornus florida			3.894		3.894	0.260
Quercus muehlenbergii				4.067	4.067	0.271
TOTAL	100	100	100	100	1500	100

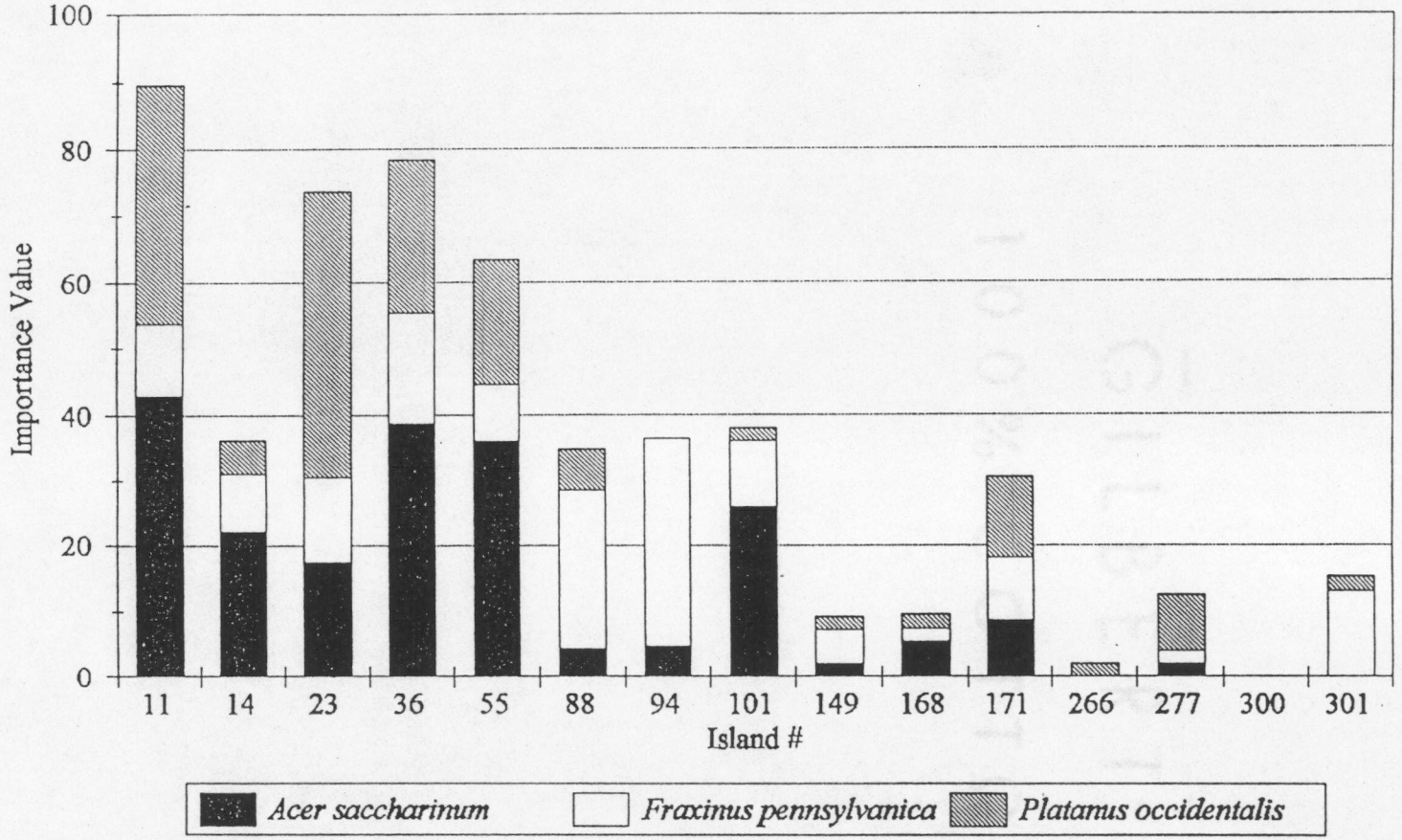

Figure 4-5. Importance values for the three most important canopy species in the Watts Bar Reseroir small island forest communities.

species. *Acer rubrum* accounted for 1.1% of the total shrub strata species sampled.

4. COMMUNITY SIMILARITIES

The Watts Bar island riparian species list was compared for similarity to the list of Smith et al. (1975) and Mann and Bierner (1975) (Table 4-3) individual wet habitat lists. Sørensen Coefficients of Similarity were 0.776 and 0.744, respectively. The Watts Bar island riparian species list was also compared to the hydrologically managed, reservoir shoreline forest community species lists along the Watts Bar Reservoir (Amundsen, 1994) and the Tellico Reservoir (Amundsen et al., 1996) (Table 4-4). *Hypericum*, *Ilex*, *Morus*, *Rhododendron*, *Vaccinium*, and *Viburnum* spp. were omitted from the Watts Bar island riparian list for these calculations because the Watts Bar and Tellico shoreline studies included only canopy and subcanopy tree information. Sørensen Coefficients of Similarity were 0.811 and 0.857, respectively.

5. EROSION

Islands occurring in natural, free-flowing river systems with no human intervention usually receive the greatest erosional impact from the water current at the upstream end. The downstream end of the island tends to aggrade by the deposition of sediments. In a natural lake system with minimal human involvement, such erosional processes would be diminished due to limited water movement. However, in human manipulated reservoir systems such as Watts Bar, erosional forces can act on the entire perimeter of islands. Erosional components include seasonal and more regular, engineered fluctuations in pool levels; inflow current scouring; and boat waves, which tend to be the most destructive force (Amundsen, 1994). Amundsen

errata

The Watts Bar Islands arboreal species presented in this thesis was further compared with species listed in Amundsen (1994), Amundsen et al. (1996), Smith et al. (1975) and Mann and Bierner (1975). In conversations with Amundsen, it was decided that primarily hydric and mesic species represented in the data would be excluded from the similarity quotients so that only riparian species would be compared. These corrections affect text on page v, 41, and 49. The following table should replace tables 4-3 on p. 42 and 4-4 on p. 44.

WB Islands	WB Shoreline	Tellico	Smith et al.	Mann et al.
meets DBH criteria	(C)	(C)	(C, Su)	(C, Su, & Sh)
Acer negundo	X			X
Acer rubrum	X	X	X	X
Acer saccharinum	X			
Amelanchier arborea	na	na		
Amorpha fruticosa				
Asimina triloba				
Betula nigra	X	X	X	
Bumelia lycioides *	na	na	na	
	Carpinus caroliniana	X	X	X
				Catalpa speciosa
Celtis occidentalis	X	X	X	
Diospyros virginiana				
Fraxinus pennsylvanica	X	X	X	
Gleditsia triacanthos				
Ilex sp.	na	na	X	X
Liquidambar styraciflua	X	X	X	X
Liriodendron tulipifera	X		X	
Maclura pomifera				
Nyssa sp.	X	X	X	
Platanus occidentalis	X	X	X	X
Populus sp. *			X	
Quercus sp. - white	X	X	X	X
Rhus sp.	na	na	na	
Robinia pseudoacacia				
Salix sp.	X	X	X	X
Sassafras albidum			X	
Taxodium distichum	na	na	X	
			Tilia sp.	
Ulmus sp.	X	X	X	

Notes: C = Canopy, Su = Subcanopy, Sh = shrub, na = not applicable, * = Uncommon

Sørensen quotients of similarity:

Watts Bar Islands (s1), Watts Bar Shoreline (s2): CCs = 0.743
Watts Bar Islands (s1), Tellico Shoreline (s2): CCs = 0.625
Watts Bar Islands (s1), Smith et al. (1975) (s2): CCs = 0.732
Watts Bar Islands (s1), Mann and Bierner (1975) (s2): CCs = 0.400

Corrections were made by Stephenie L. (Hammons) Baxter on December 1, 1997.

Table 4-3. Watts Bar Reservoir small island riparian arboreal species list compared to the Smith et al. (1975) and Mann and Bierner (1975) wet habitat species lists.

Watts Bar Islands	Smith et al. (1975)	Mann and Bierner (1975)
Acer negundo		X
Acer rubrum	X	X
Alnus serrulata		X
Betula nigra	X	
	Carpinus caroliniana	X
	Carya	X
		Catalpa speciosa
Celtis occidentalis	X	
Cornus		X
Fagus grandifolia	X	
Fraxinus pennsylvanica	X	
Hypericum		X
Ilex	X	X
Liquidambar styraciflua	X	X
Liriodendron tulipifera	X	
	Magnolia	
Morus	X	
Nyssa	X	
Pinus	X	
Platanus occidentalis	X	X
Populus	X	
Quercus - white	X	X
Quercus - red	X	X
Rhododendron		X
Salix	X	X
Sassafras albidum	X	
Taxodium distichum	X	
	Tilia	
Ulmus	X	
Vaccinium		X
Viburnum		X

Sources: Mann, L. K. and M. W. Bierner. 1975. Oak Ridge, Tennessee, Flora: Habitats of the Vascular Plants--Revised Inventory. Environmental Sciences Division Publication No. 775, Oak Ridge National Laboratory, Tennessee.

Table 4-3. (continued)

Sources: Smith, H. D., W. L. Hafley, D. L. Holley, and R. C. Kellison. 1975. Yields of Mixed Hardwood Stands Occurring Naturally on a Variety of Sites in the Southeastern United States. Technical Report No. 55. School of Forest Resources, North Carolina State University, North Carolina.

Table 4-4. Watts Bar Reservoir small island riparian forest species list compared to the Watts Bar shoreline (Amundsen, 1994) and the Tellico Reservoir shoreline (Amundsen, 1996) riparian forest species lists.

Watts Bar Islands	Watts Bar Shoreline	Tellico Shoreline
Acer negundo	X	
Acer rubrum	X	X
Alnus serrulata	X	X
Betula nigra	X	X
	Carpinus caroliniana	X
	Carya	
Celtis occidentalis	X	X
Cornus	X	X
Fagus grandifolia		X
Fraxinus pennsylvanica	X	X
Liquidambar styraciflua	X	
Liriodendron tulipifera	X	X
Nyssa	X	X
Pinus	X	X
Platanus occidentalis	X	X
Populus		
Quercus - white	X	X
Quercus - red		X
Salix	X	
Sassafras albidum		
Taxodium distichum		
Ulmus	X	X

Sources: Amundsen, C. C. 1994. Reservoir Riparian Zone Characteristics in the Upper Tennessee River Valley. Water, Air and Soil Pollution 77:469-493.

Amundsen, C. C., C. C. Loy, P. B. Inklebarger, R. A. Hanahan, S. L. Hammons, and J. M. Young. 1996. Upper Tennessee Valley Reservoir Riparian Vegetation Studies I. Primary Production, Habitat Stability and Effects on Aquatic Environments. Sixth Tennessee Water Resources Symposium. American Water Resources Association, Nashville, Tennessee. p. 89-92.

(1994) reported that the Watts Bar summer riparian shoreline may erode at a rate of up to two meters annually due to pool fluctuation, scouring, and boat wave actions.

The consequences of erosion occurring on each of the island in the Watts Bar Reservoir (Appendix A) and contributing tributaries was evaluated cartographically from 1942 to 1953. During this time, USGS quadrangle maps delineated 165 islands along the impoundment. The embayments of the Clinch River to river mile 9.6 and of the Emory River to river mile 5.0 were included. The total number of islands depicted increased to 247 on the 1966 to 1974 USGS map editions. The 1976 to 1990 map editions depicted the same 247 islands with no detectable increase or decrease in flat surface area. Schmidt (1996) revealed that this result is possible due to the timing of data collection for revision efforts. Revision surveys are performed during the winter months when the pool level is low and island area uncertain due to mud flat exposure. Of those 247 islands depicted from 1976 to 1990, 23 were a part of the shore and 16 were shown as attached to another island on the 1942 to 1953 editions. This update indicates erosional fragmentation of the land surrounding the impoundment and of islands within the impoundment. Twenty-four islands represented from 1966 to 1990 were not depicted from 1942 to 1953. These islands were in locations that did not indicate previous attachment to the shore. This change indicates that either the field examiner overlooked the islands in the 1942 to 1953 editions or that sufficient sedimentation occurred, resulting in an unlikely formation of new islands. The 1976 to 1990 editions depicted 39 islands which had a reduction in size, possibly due to erosional forces. Only four islands showed an increase in size, which could be due to

sedimentation. Seventeen islands depicted from 1942 to 1953 were not depicted on the revised versions, indicating complete erosional elimination from the reservoir. Four islands depicted from 1942 to 1953 were attached to the shore in the revised editions indicating sedimentation processes. Four islands depicted in the 1942 to 1953 editions were incorporated into reservoir management structures, including the Tellico Dam, road improvements, and the Ash Dump near the Kingston steam plant. Originally islands #78, #219, and #235 were cartographically selected for this study, but were eliminated through field investigations. Island #78 had been fragmented into two islands. Islands #219 and #235 were eliminated from the reservoir.

The channel side of the islands had a higher riparian scarp height and depth than the side away from the channel (Table 4-5), which was expected due to the increased amount of boat traffic along the channel. The upstream and downstream ends of the islands had approximately equal scarp height, while the downstream ends appeared to have slightly greater scarp depths. This implied that the upstream and downstream island ends receive approximately the same amount of erosional forces.

Table 4-5. Watts Bar small islands' riparian scarp height and scarp depth ranges.

Scarp (m)	0.0-0.49	0.5-1.0	>1.0
	Number of Islands		
HEIGHT			
Channel Side	5	8	2
Side away from Channel	12	2	1
Upstream End	7	7	1
Downstream End	7	7	1
DEPTH			
Channel Side	10	4	1
Side away from Channel	14	1	0
Upstream End	11	4	0
Downstream End	10	2	3

V. CONCLUSIONS

Islands delineated on the most recent USGS quadrangle maps of the Watts Bar Reservoir and contributing tributaries have increased 1.5 times the original number post-impoundment in 1942, therefore, the original hypothesis was rejected. The increase in island number is primarily due to fragmentation of the existing islands and surrounding shoreline. The most recent USGS map editions depicted four previous islands attached to the shoreline (indicating sedimentation), 23 islands detached from the shoreline, and 16 islands detached from another island (indicating erosional fragmentation). These maps also show the erosional elimination of 17 islands from the reservoir and include 24 islands not previously depicted (possibly due to human error rather than sedimentation).

The flat surface area of islands depicted are also decreasing, which rejects the original hypothesis, although recent map delineations may include false perimeter boundaries due to the inclusion of mud flat terrain. The most recent USGS map editions depicted 39 islands with a reduction in flat surface area indicating erosion as opposed to only four islands with an increase in flat surface area indicating sedimentation. However, sedimentation processes are unlikely due to the erosional forces that occur on the entire perimeter of the islands.

The existing island forest community contains primarily riparian species and frequent remnant mesic species. A general trend from low to high arboreal species diversity was observed from lesser to more aerially extensive islands in the canopy and subcanopy strata. Arboreal species richness for the canopy, subcanopy, and shrub

strata was shown to increase from the upstream to the downstream end of the Watts Bar Reservoir. The importance of the included species was not identical as originally hypothesized. *Acer saccharinum*, *Platanus occidentalis*, and *Fraxinus pennsylvanica* were the three most important canopy species. *Acer saccharinum*, *Ligustrum sinense*, and *Acer rubrum* were the three most important subcanopy species. *Acer saccharinum* was shown to be of greater importance in the inflow and transition zone where there is less species diversity. *Fraxinus pennsylvanica* and *Platanus occidentalis* were classified as riparian species and were shown to be important along the entire reservoir. *Ligustrum sinense* was prolific in the subcanopy and shrub strata along the entire reservoir. *Acer rubrum* was classified as a riparian species and has greater importance in the island forest communities of the reservoir from the transition zone to the downstream end.

Based on this study, the riparian forest community species of the Watts Bar study islands were comparable to the naturally occurring, unmanaged, bottomland forest community species of similar age by more than 70%. The riparian forest community species observed on study islands were also comparable to other Tennessee impoundment shoreline forest community species by more than 80%. The forest communities of the more areally extensive islands studied are comparable in basal area to forest communities on the Watts Bar shoreline. However, the forest communities of the islands with a less extensive area are disturbed to the point that a comparable habitat is no longer exhibited and these will continue to diminish in area until erosion forces prevail.

BIBLIOGRAPHY

BIBLIOGRAPHY

Amundsen, C. C. 1994. Reservoir Riparian Zone Characteristics in the Upper Tennessee River Valley. *Water, Air and Soil Pollution* 77: 469-493.

Amundsen, C. C., C. C. Loy, P. B. Inklebarger, R. A. Hanahan, S. L. Hammons, and J. M. Young. 1996. Upper Tennessee Valley Reservoir Riparian Vegetation Studies I. Primary Production, Habitat Stability and Effects on Aquatic Environments. Sixth Tennessee Water Resources Symposium. American Water Resources Association, Nashville, Tennessee. p. 89-92.

Brower, J. E., J. H. Zar, and C. N. von Ende. 1977. Field and Laboratory Methods for General Ecology. 3rd ed. Wm. C. Brown Publishers, Dubuque, Iowa.

Curtis, H. 1979. Biology. 3rd ed. Worth Publishers, Inc., New York, New York.

Dycus, D. L. and D. L. Meinert. 1994. Tennessee Valley Reservoir and Stream Quality - 1993 Summary of Vital Signs and Use Suitability Monitoring. Tennessee Valley Authority Resource Group Water Management, Chattanooga, Tennessee.

Gregory, S. V., F. J. Swanson, W. A. McKee, and K. W. Cummins. 1991. An Ecosystem Perspective of Riparian Zones. *Bioscience* **41(8)**: 540-551.

MacArthur, R. H. and E. O. Wilson. 1967. The Theory of Island Biogeography. Princeton University Press, Princeton, New Jersey.

Mann, L. K. and M. W. Bierner. 1975. Oak Ridge, Tennessee, Flora: Habitats of the Vascular Plants--Revised Inventory. Environmental Sciences Division Publication No. 775, Oak Ridge National Laboratory, Tennessee.

Moore, H. L. 1949. A Geologic Trip Across Tennessee by Interstate 40. Outdoor Tennessee Series. The University of Tennessee Press, Knoxville, Tennessee.

Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and Methods of Vegetation Ecology. John C. Wiley & Sons, New York.

Odum, E. P. 1978. Ecological Importance of the Riparian Zone. Opening Address, National Symposium on Strategies for Protection and Management of Floodplain Wetlands and Other Riparian Ecosystems. Calloway Gardens, Georgia.

Olson, G. T. 1938. Effects of the Proposed Watts Bar Reservoir: A Preliminary Report on Local Conditions, Taking Line Policy and Needs for Further Study. Tennessee Valley Authority Department of Forestry Relations, Forest Products Planning Division.

Radford, A. E., H. E. Ahles, and C. R. Bell. 1964. Manual of the Vascular Flora of the Carolinas. The University of North Carolina Press, Chapel Hill.

Schmidt, E. A. 1996. Senior Library Assistant. University of Tennessee Cartographic Resources Center, Knoxville, Tennessee.

Smith, H. D., W. L. Hafley, D. L. Holley, and R. C. Kellison. 1975. Yields of Mixed Hardwood Stands Occurring Naturally on a Variety of Sites in the Southeastern United States. Technical Report No. 55. School of Forest Resources, North Carolina State University, North Carolina.

Sørensen, T. 1948. A Method of Establishing Groups of Equal Amplitude in Plant Sociology Based on Similarity of Species Content and Its Application to Analyses of the Vegetation on Danish Commons. Biol. Skr. (K. Danske. Vidensk. Selsk. N. S.) 5:1-34.

Springer, M. E. and J. A. Elder. 1980. Soils of Tennessee. The University of Tennessee Agricultural Experiment Station, Knoxville and the United States Department of Agriculture Soil Conservation Service, Bulletin 596.

Swift, B. L. 1984. Status of Riparian Ecosystems in the United States. Water Resources Bulletin, American Water Resources Association. 20(2).

Tanner, J. T. 1978. Guide to the Study of Animal Populations. The University of Tennessee Press, Knoxville, Tennessee.

Tennessee Valley Authority (TVA). 1949. The Watts Bar Project: A Comprehensive Report on the Planning, Design, Construction, and Initial Operations of the Watts Bar Project. Technical Report No. 9. United States Government Printing Office, Washington, D. C.

Tennessee Valley Authority (TVA). 1980a. Great Valley/Zone II: Climatic Data Base, Chattanooga, Tennessee. Solar Outreach and Technology Group, Architectural Design Branch, Knoxville, Tennessee.

Tennessee Valley Authority (TVA). 1980b. TVA Water Control Projects and Other Major Hydro Developments in the Tennessee and Cumberland Valleys. TVA Technical Monographs 55.

Tennessee Valley Authority (TVA). 1988 rev. 1992. Watts Bar Reservoir Land Management Plan. TVA Reservoir Lands Planning, Norris, Tennessee. Sheets 1 and 2.

Tennessee Valley Authority (TVA). 1995. TVA River Pulse: A Report on the Condition of the Tennessee River and Its Tributaries in 1994. TVA Resource Group, Chattanooga, Tennessee.

Tiner, R. W. 1991. The Concept of a Hydrophyte for Wetland Identification. Bioscience 41(4):236-247.

[USGS.] 1:24,000. Decatur Quadrangle, TN. Reston, VA, Field Examination (FE) 1935, 1942, 1943, and 1973a.

[USGS.] 1:24,000. Harriman Quadrangle, TN. Reston, VA, FE 1935, 1941, 1952, 1953, 1968, and 1968 photorevised (PR) 1980a.

[USGS.] 1:24,000. Lenoir City Quadrangle, TN. Reston, VA, FE 1935, 1940, 1953, 1968, and 1968 PR 1986.

[USGS.] 1:24,000. Philadelphia Quadrangle, TN. Reston, VA, FE 1935, 1940, 1952, and 1974.

[USGS.] 1:24,000. Rockwood Quadrangle, TN. Reston, VA, FE 1935, FE 1939, 1952, 1969, and 1969 PR 1980.

[USGS.] 1:24,000. Loudon Quadrangle, TN. Reston, VA, FE 1935 and 1936, 1940, 1952, and 1952 PR 1984.

[USGS.] 1:24,000. Spring City Quadrangle, TN. Reston, VA, FE 1935 and 1936, 1940, 1966, and 1966 PR 1980.

[USGS.] 1:24,000. Ten Mile Quadrangle, TN. Reston, VA, FE 1935 and 1936, 1940, 1952, and 1973b.

[USGS.] 1:24,000. Bacon Gap Quadrangle, TN. Reston, VA, FE 1936, FE 1940, 1952, 1968, and 1968 PR 1980b.

[USGS.] 1:24,000. Cave Creek Quadrangle, TN. Reston, VA, FE 1936, 1940, 1953, 1968, and 1968 PR 1989.

[USGS.] 1:24,000. Roddy Quadrangle, TN. Reston, VA, FE 1936, 1946, 1947, 1973, and 1973 PR 1976.

[USGS.] 1:24,000. Concord Quadrangle, TN. Reston, VA, 1940, 1953, 1968, and 1968 PR 1984.

[USGS.] 1:24,000. Elverton Quadrangle, TN. Reston, VA, 1941, 1953, 1968, and 1968 PR 1990.

[USGS.] 1:250,000. Chattanooga Sheet, Tennessee and North Carolina, Reston, VA, 1957 PR 1972.

Wofford, B. E. 1989. Guide to the Vascular Plants of the Blue Ridge. The University of Georgia Press, Athens and London.

APPENDICES

APPENDIX A

USGS CHRONOLOGICAL AND DYNAMIC TOPOGRAPHIC STATUS OF ISLANDS DELINEATED ON AVAILABLE QUADRANGLE MAPS FROM 1935 TO 1990 IN THE WATTS BAR RESERVOIR AREA

The following components are included for each island:

1. USGS quadrangle where an island was delineated.
2. The approximate original Tennessee River mile where an island from 1935 to 1942 was delineated.
3. The original name of an island.
4. The original latitude and longitude where an island from 1935 to 1942 was delineated.
5. The approximate flat surface area of an island for each year of depiction.
6. The approximate current Tennessee River mile where an island from 1952 to 1990 was delineated.
7. The current latitude and longitude where an island from 1952 to 1990 was delineated.
8. The elevation of an island.
9. Notes pertaining to an island's precise location, topographic name changes, or selection as a study island.

Notes:
Att to #__ = Island was attached to another island. Attached = Island was attached to the main shoreline. FE = Field examination. FL Dam = An island was incorporated into Fort Loudoun Dam. No Record = An island was not depicted on a quadrangle map. PR = "Photo revised" for USGS map revision.

Sources:
[USGS.] 1:24,000. Decatur Quad, TN. Reston, VA, FE 1935, 1942, 1943, and 1973. [USGS.] 1:24,000. Harriman Quad, TN. Reston, VA, FE 1935, 1941, 1952, 1953, 1968, and 1968 PR 1980. [USGS.] 1:24,000. Lenoir City Quad, TN. Reston, VA, FE 1935, 1940, 1953, 1968, and 1968 PR 1986. [USGS.] 1:24,000. Philadelphia Quad, TN. Reston, VA, FE 1935, 1940, 1952, and 1974. [USGS.] 1:24,000. Rockwood Quad, TN. Reston, VA, FE 1935, FE 1939, 1952, 1969, and 1969 PR 1980. [USGS.] 1:24,000. Loudon Quad, TN. Reston, VA, FE 1935 and 1936, 1940, 1952, and 1952 PR 1984. [USGS.] 1:24,000. Spring City Quad, TN. Reston, VA, FE 1935 and 1936, 1940, 1966, and 1966 PR 1980. [USGS.] 1:24,000. Ten Mile Quad, TN. Reston, VA, FE 1935 and 1936, 1940, 1952, and 1973. [USGS.] 1:24,000. Bacon Gap Quad, TN. Reston, VA, FE 1936, FE 1940, 1952, 1968, and 1968 PR 1980. [USGS.] 1:24,000. Cave Creek Quad, TN. Reston, VA, FE 1936, 1940, 1953, 1968, and 1968 PR 1989. [USGS.] 1:24,000. Roddy Quad, TN. Reston, VA, FE 1936, 1946, 1947, 1973, and 1973 PR 1976. [USGS.] 1:24,000. Concord Quad, TN. Reston, VA, 1940, 1953, 1968, and 1968 PR 1984. [USGS.] 1:24,000. Elverton Quad, TN. Reston, VA, 1941, 1953, 1968, and 1968 PR 1990.

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1935 area (ha)	1940 area (ha)	1953 area (ha)	1968 area (ha)
1	Concord	602.6	Belle Canton	354717	841422	No Ed	8.130	FL Dam	FL Dam
2	Concord	602.3	Belle Canton	354722	841437	No Ed	6.388	FL Dam	FL Dam
3	Concord	602.2	Belle Canton	354727	841437	No Ed	9.292	FL Dam	FL Dam
4	Concord	601.2	Bussell	354630	841515	No Ed	62.140	62.140	127.183
5	Lenoir City	601.0		354655	841537	2.323	3.484	0.581	No Record
6	Lenoir City	597.3	Browder	354607	841737	3.484	4.065	2.904	2.904
								1952	
7	Loudon	594.0	Carmichael	354422	841822	30.779	30.779	23.811	No Ed
8	Loudon		Harrison					0.581	0.581
9	Loudon		Harrison					0.581	0.581
10	Loudon		Harrison					0.581	0.581
11	Loudon		Harrison					1.161	1.161
								1953	
12	Lenoir City	591.0	Harrison	354530	842000	23.230	23.230	6.969	6.388
								1952	
13	Loudon							0.581	No Ed
						FE 1936		**1953**	
14	Cave Creek	584.4	Sweetwater	354540	842245	9.873	9.873	1.161	1.161
15	Cave Creek							Attached	0.581
16	Cave Creek							Attached	3.484
17	Cave Creek							Attached	0.581
18	Cave Creek	583.7	Bogart	354609	842322	1.161	1.161	No Record	
19	Cave Creek	583.0	Bogart	354612	842330	18.584	13.357	5.227	4.065
20	Cave Creek						6.388	No Record	0.581

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1936 area (ha)	1940 area (ha)	1953 area (ha)	1968 area (ha)
21	Cave Creek							No Record	0.581
22	Cave Creek							1.742	1.742
23	Cave Creek							1.742	1.742
24	Cave Creek							1.742	1.161
25	Cave Creek							1.742	1.161
26	Cave Creek								0.581
27	Cave Creek							0.581	0.581
28	Cave Creek							1.161	1.161
29	Cave Creek							2.323	2.323
30	Cave Creek							4.646	4.646
31	Cave Creek							5.227	4.065
32	Cave Creek								0.581
33	Cave Creek							1.742	1.742
						FE 1935		**1952**	**1974**
34	Philadelphia							Attached	0.581
35	Philadelphia							2.904	2.323
						FE 1936		**1953**	**1968**
36	Cave Creek							1.161	1.161
37	Cave Creek								0.581
38	Cave Creek	577.0	Wilson	354630	842637	31.360	31.360	5.807	4.646
39	Cave Creek		Huffine					20.907	19.165
40	Cave Creek							0.581	0.581
41	Cave Creek							1.742	1.161
42	Cave Creek							1.161	1.161

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1936 area (ha)	1940 area (ha)	1953 area (ha)	1968 area (ha)
43	Cave Creek							1.161	0.581
44	Cave Creek							4.065	3.484
45	Cave Creek							Attached	0.581
46	Cave Creek							Att to #47	0.581
47	Cave Creek							4.065	3.484
48	Cave Creek	575.1	Seven	354738	842800	15.680	16.261	2.904	2.904
49	Cave Creek	575.0	Seven	354730	842800	6.969	5.227	No Record	
50	Cave Creek							Att to #51	1.161
51	Cave Creek							2.904	0.581
52	Cave Creek							Att to #51	0.581
53	Cave Creek							1.161	1.161
54	Cave Creek							0.581	0.581
55	Cave Creek	574.0	Seven	354752	842907	52.267	38.910	3.484	1.452
56	Cave Creek		Seven					Att to #55	0.581
57	Cave Creek		Seven					Att to #55	0.581
58	Cave Creek							Attached	2.904
59	Cave Creek		Seven			Att to #55	8.711	0.581	No Record
60	Cave Creek		Seven				Att to #56	0.581	0.581
61	Cave Creek							Attached	2.904
62	Cave Creek							Att to #61	0.581
63	Cave Creek							0.581	0.581
64	Cave Creek	572.8		354840	842952	9.873	9.873	No Record	
65	Cave Creek	572.7	Hart	354852	842949	1.742	2.323	No Record	
66	Cave Creek	572.5	Round	354900	843000	84.208	84.208	No Record	

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1936 area (ha)	1940 area (ha)	1953 area (ha)	1968 area (ha)
67	Cave Creek		Long				Att to #83	2.904	2.323
68	Cave Creek		Long				Att to #83	11.034	8.711
69	Cave Creek		Long				Att to #83	4.065	3.484
70	Cave Creek		Long				Att to #83	2.904	2.904
71	Cave Creek							0.581	0.581
72	Cave Creek							0.581	Attached
73	Cave Creek							Attached	0.581
74	Cave Creek							Attached	0.581
75	Cave Creek							Attached	0.581
76	Cave Creek							Attached	0.581
								1952	
77	Bacon Gap		Long				Att to #83	1.742	1.161
78	Bacon Gap		Long				Att to #83	Att to #77	1.161
79	Bacon Gap		Long				Att to #83	1.161	0.581
80	Bacon Gap							Attached	0.581
81	Bacon Gap		Long				Att to #83	0.581	No Record
82	Bacon Gap		Long				Att to #83	1.161	0.581
83	BG/CC	572.0	Long	354930	843000	198.615	198.615	27.876	25.553
84	Bacon Gap								0.581
85	Bacon Gap							5.227	4.065
86	Bacon Gap							Att to #85	1.161
87	Bacon Gap							0.581	0.581
88	Bacon Gap							1.452	1.452
89	Bacon Gap							1.742	0.581

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1936 area (ha)	1940 area (ha)	1952 area (ha)	1968 area (ha)
90	Bacon Gap							Att to #89	1.161
91	Bacon Gap	570.3	Ebben	355000	843115	10.453	No Record		
92	Bacon Gap							0.581	0.581
93	Bacon Gap							1.161	1.161
94	Bacon Gap							1.161	1.161
95	Bacon Gap							2.904	2.904
96	Bacon Gap							0.581	
97	Bacon Gap							Attached	0.581
98	Bacon Gap							Attached	1.742
99	Bacon Gap							0.581	No Record
100	Bacon Gap							Att to #101	0.581
101	Bacon Gap							2.904	1.742
102	Bacon Gap							5.227	5.227
103	Bacon Gap								0.581
104	Bacon Gap							0.581	0.581
								1953	
105	Elverton							0.581	No Record
								1952	
106	Harriman							Attached	4.646
107	Harriman							1.161	1.161
108	Harriman							1.161	
109	Harriman							2.323	
110	Harriman							2.323	No Record
111	Harriman							3.484	No Record

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1936 area (ha)	1940 area (ha)	1952 area (ha)	1968 area (ha)
112	Harriman							1.161	0.581
113	Harriman							No Record	0.581
								1953	
114	Elverton							Att to #115	0.581
115	Elverton							1.742	1.161
116	Elverton							1.742	1.161
117	Elverton							1.161	0.581
118	Elverton							1.161	0.581
119	Elverton							0.581	0.581
120	Elverton							1.742	No Record
121	Elverton							1.161	No Record
122	Elverton							0.581	No Record
123	Elverton							1.161	No Record
124	Elverton							Att to #125	0.581
125	Elverton							Attached	2.904
126	Elverton							Attached	0.581
127	Elverton							0.581	No Record
							1941		
128	Elverton	568.0	Brashear	355508	842600		16.261	2.904	2.904
								1952	
129	Bacon Gap							Attached	0.581
130	Bacon Gap							1.161	1.161
131	Bacon Gap							1.161	Attached

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1936 area (ha)	1940 area (ha)	1952 area (ha)	1968 area (ha)
132	Bacon Gap	563.2		355016	843503	No Record	0.581	No Record	
133	Bacon Gap	563.1		355018	843507	No Record	1.742	No Record	
134	Bacon Gap	563.0		355020	843514	No Record	0.581	No Record	
135	Bacon Gap	563.0		355021	843516	No Record	0.581	No Record	
136	Bacon Gap	562.5	Caney Creek	355030	843515	26.134	26.134	No Record	
137	Harriman							No Record	1.742
138	Harriman							No Record	0.581
139	Harriman							No Record	0.581
140	Harriman							No Record	0.581
141	Harriman							No Record	0.581
142	Bacon Gap							No Record	0.581
143	Bacon Gap							Attached	0.581
144	Bacon Gap							Attached	0.581
145	Bacon Gap							5.807	5.807
146	Bacon Gap							0.581	No Record
147	Bacon Gap							3.484	2.904
148	Bacon Gap							0.581	0.581
149	Bacon Gap							1.161	1.161
150	Bacon Gap							2.323	1.742
151	Bacon Gap							1.742	1.742
152	Bacon Gap							0.581	0.581
153	Bacon Gap							0.581	0.581
154	Bacon Gap							No Record	0.581
155	Bacon Gap							1.742	1.742

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1936 area (ha)	1940 area (ha)	1952 area (ha)	1968 area (ha)
156	Bacon Gap							5.807	5.227
									1969
157	Bacon Gap							0.581	0.581
158	Bacon Gap							1.742	1.742
159	Bacon Gap							0.581	0.581
160	Bacon Gap							2.323	2.323
161	Bacon Gap							Attached	0.581
162	Bacon Gap							No Record	0.581
163	Bacon Gap							0.581	0.581
164	Bacon Gap							0.581	No Record
165	Bacon Gap							5.227	5.227
166	Bacon Gap							5.227	5.227
167	Bacon Gap							1.742	1.742
168	Bacon Gap							2.323	2.323
169	Bacon Gap							0.581	0.581
170	Bacon Gap							0.581	0.581
171	Bacon Gap							1.742	1.742
172	Rockwood		Thief Neck					312.578	312.578
173	Bacon Gap							0.581	0.581
174	Bacon Gap							0.581	0.581
175	Rockwood							0.581	0.581
176	Rockwood							0.581	No Record
						1935	1939		
177	Rockwood	550.7		354700	844020	8.711	8.711	No Record	

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1935 area (ha)	1939 area (ha)	1952 area (ha)	1969 area (ha)
178	Rockwood	550.4		354653	844015	4.065	3.484	No Record	
179	Rockwood	550.0	Half Moon	354630	844000	225.428	225.428	No Record	
180	Rockwood							1.742	2.323
181	Rockwood							19.165	19.165
								1952	**1973**
182	Ten Mile							0.581	0.581
183	Ten Mile							0.581	0.581
184	Ten Mile							0.581	0.581
185	Ten Mile							0.581	0.581
186	Ten Mile							0.581	0.581
187	Ten Mile							53.428	53.428
188	Ten Mile							No Record	0.581
189	Ten Mile							No Record	0.581
									1969
190	Rockwood							6.969	6.388
									1973
191	Ten Mile							0.581	0.581
192	Ten Mile							0.581	0.581
193	Rockwood							8.711	8.711
194	Rockwood							40.652	41.233
195	Rockwood							0.581	0.581
196	Rockwood							2.323	2.323
197	Rockwood							3.484	1.742
198	Rockwood							1.742	1.742

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1935 area (ha)	1939 area (ha)	1952 area (ha)	1973 area (ha)
199	Rockwood							4.065	4.646
200	Rockwood							0.581	0.581
201	Rockwood							No Record	0.581
202	Rockwood							No Record	0.581
203	Rockwood							0.581	0.581
204	Rockwood							1.161	0.581
205	Rockwood							Att to #204	0.581
206	Rockwood							1.161	0.581
207	Rockwood							0.581	0.581
208	Rockwood							0.581	No Record
209	Rockwood							Attached	0.581
210	Rockwood							Attached	1.161
211	Rockwood	544.5		354503	844319	1.161	No Record		
212	Rockwood	544.5		354500	844315	0.581	No Record		
							1940		
213	Ten Mile	544.1		354445	844304	2.323	2.904	No Record	
214	Ten Mile							0.581	0.581
215	Ten Mile							0.581	0.581
216	Ten Mile							No Record	0.581
217	Ten Mile	543.8	Morris	354438	844300	8.130	7.550	No Record	
218	Ten Mile							No Record	0.581
219	Ten Mile							No Record	1.161
220	Ten Mile							1.161	1.161
221	Ten Mile							2.323	2.323

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1935 area (ha)	1940 area (ha)	1952 area (ha)	1973 area (ha)
222	Ten Mile							0.581	Attached
223	Ten Mile							3.484	2.904
224	Ten Mile							1.742	1.742
225	Ten Mile							2.904	2.904
226	Ten Mile							4.646	4.646
227	Ten Mile							1.161	1.161
228	Ten Mile							31.360	31.941
229	Ten Mile							0.581	Att to #228
230	Ten Mile							No Record	0.581
231	Ten Mile							1.161	1.161
232	Ten Mile							No Record	0.581
233	Ten Mile							0.581	0.581
234	Ten Mile							No Record	0.581
235	Ten Mile							1.161	1.161
236	Ten Mile							0.581	Attached
237	Ten Mile							0.581	No Record
238	Ten Mile							1.161	0.581
239	Ten Mile							3.484	2.323
240	Ten Mile							0.581	0.581
241	Ten Mile							0.581	0.581
242	Ten Mile							171.395	171.395
									1966
243	Spring City							No Ed	1.161

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1935 area (ha)	1940 area (ha)	1952 area (ha)	1973 area (ha)
244	Ten Mile							0.581	0.581
									1966
245	Spring City	537.0		354143	844506	1.742	1.742	No Ed	No Record
246	Spring City	537.0	Preston	354145	844515	18.584	18.584	No Ed	No Record
									1973
247	Ten Mile							1.161	1.161
248	Ten Mile							1.161	1.161
									1966
249	Spring City							No Ed	37.748
250	Spring City							No Ed	3.484
251	Spring City							No Ed	0.581
252	Spring City							No Ed	8.130
253	Spring City							No Ed	0.581
254	Spring City							No Ed	0.581
255	Spring City	533.5	Fouchee	354030	844645	26.714	26.714	No Ed	No Record
256	Spring City							No Ed	2.323
257	Spring City		Barker					No Ed	1.742
258	Spring City	532.4	Pinhook	353920	844654	Att to #293	0.581	No Ed	No Record
259	Spring City	532.4	Pinhook	353917	844652	Att to #293	1.161	No Ed	No Record
260	Spring City							No Ed	1.742
261	Spring City							No Ed	1.742
262	Spring City	532.3		354023	844815	No Record	1.161	No Ed	No Record
263	Spring City							No Ed	1.742
264	Spring City							No Ed	4.065

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1935 area (ha)	1940 area (ha)	1952 area (ha)	1966 area (ha)
265	Spring City							No Ed	1.161
266	Spring City							No Ed	1.161
267	Spring City	532.3		354019	844923	3.484	No Record	No Ed	
268	Spring City							No Ed	0.581
269	Spring City							No Ed	2.904
270	Spring City							No Ed	9.873
271	Spring City							No Ed	15.099
272	Spring City							No Ed	2.323
273	Spring City							No Ed	0.581
274	Spring City							No Ed	2.323
275	Spring City							No Ed	2.904
276	Spring City							No Ed	1.742
277	Spring City							No Ed	1.161
278	Spring City							No Ed	2.323
279	Spring City							No Ed	0.581
280	Spring City							No Ed	0.581
281	Spring City							No Ed	0.581
282	Spring City							No Ed	0.581
283	Spring City							No Ed	0.581
284	Spring City							No Ed	0.581
285	Spring City							No Ed	0.581
286	Spring City							No Ed	0.581
287	Spring City							No Ed	0.581
288	Spring City							No Ed	0.581

APPENDIX A (continued)

#	Quadrangle	Original Mile	Cartographic Name	Original Latitude	Original Longitude	FE 1935 area (ha)	1940 area (ha)	1952 area (ha)	1966 area (ha)
289	Spring City							No Ed	0.581
290	Spring City							No Ed	0.581
291	Spring City							No Ed	0.581
292	Spring City							No Ed	0.581
293	Spring City	532.0	Pinhook	353852	844652	45.298	44.137	No Ed	No Record
294	Spring City							No Ed	30.779
295	Spring City							No Ed	0.581
296	Spring City							No Ed	8.711
297	Spring City							No Ed	9.873
298	Spring City							No Ed	1.161
299	Spring City							No Ed	0.581
300	Spring City							No Ed	1.161
301	Spring City							No Ed	1.161
302	Spring City							No Ed	0.581
303	Spring City							No Ed	0.581
						1935	1942		
304	Decatur	529.9	Watt	353715	844649	13.357	WB Dam		

#	PR 1984 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
1	FL Dam	602.3				
2	FL Dam	602.3				
3	FL Dam	602.3				
4	127.183	602.0	354700	841500	256.0	
	PR 1986					
5	No Record	601.0	354655	841537	231.6	
6	2.904	597.2	354604	841736	231.6	
	PR 1984					
7	23.811	594.0	354422	841822	231.6	
8	0.581	591.3	354450	841954	231.6	Name changed to Blair, 1968.
9	0.581	591.2	354452	841954	231.6	Name changed to Blair, 1968.
10	0.581	591.2	354453	841954	231.6	Name changed to Blair, 1968.
11	1.161	591.1	354500	841954	231.6	Name changed to Blair, 1968. Selected for study.
	PR 1986					
12	6.388	590.9	354513	841954	231.6	Name changed to Blair, 1968.
	PR 1984					
13	0.581	585.5	354454	842209	231.6	
	PR 1989					
14	1.161	584.3	354545	842251	231.6	Selected for study.
15	0.581	584.2	354558	842251	231.6	
16	3.484	584.0	354605	842300	231.6	
17	0.581	583.9	354608	842306	231.6	
18						1895 USGS Ed spelling was Bogard. Name changed to Matlock, 1940.
19	4.065	583.5	354610	842330	231.6	1895 USGS Ed spelling was Bogard. Name changed to Matlock, 1940.
20	0.581	582.8	354627	842407	231.6	

APPENDIX A (continued)

#	PR 1989 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
21	0.581	582.5	354644	842422	231.6	
22	1.742	582.4	354645	842430	231.6	
23	1.742	582.2	354645	842437	231.6	Water depth > 1.7 m. Selected for study.
24	1.161	582.1	354645	842445	231.6	
25	1.161	581.8	354638	842508	231.6	
26	0.581	581.7	354635	842511	231.6	
27	0.581	581.6	354631	842516	231.6	
28	1.161	581.4	354620	842526	231.6	
29	2.323	581.0	354600	842536	231.6	
30	4.646	580.5	354530	842521	231.6	
31	4.065	580.3	354507	842530	231.6	
32	0.581	580.1	354512	842541	231.6	
33	1.742	580.0	354505	842549	231.6	
34	No Ed	579.6	354459	842600	231.6	
35	No Ed	579.5	354459	842608	231.6	
36	1.161	578.6	354520	842643	231.6	Water depth > 1.8 m. Selected for study.
37	0.581	577.9	354556	842629	231.6	
38	4.646	577.0	354643	842638	231.6	
39	19.165	575.5	354722	842830	231.6	
40	0.581	575.5	354549	842904	231.6	Paint Rock Creek, mile 2.0
41	1.161	575.5	354541	842937	231.6	Paint Rock Creek, mile 2.0
42	1.161	575.5	354538	842937	231.6	Paint Rock Creek, mile 2.1

APPENDIX A (continued)

#	PR 1989 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
43	0.581	575.5	354535	842937	231.6	Paint Rock Creek, mile 2.1
44	3.484	575.4	354702	842808	231.6	
45	0.581	575.4	354743	842744	231.6	
46	0.581	575.2	354703	842821	231.6	
47	3.484	575.0	354706	842822	231.6	
48	2.904	575.0	354737	842800	231.6	1895 USGS Ed = No name.
49						1895 USGS Ed = No name. Name changed to Bush, 1968.
50	1.161	574.8	354707	842837	231.6	
51	0.581	574.8	354710	842836	231.6	
52	0.581	574.7	354710	842841	231.6	
53	1.161	574.7	354713	842841	231.6	
54	0.581	574.7	354710	842845	231.6	
55	1.161	574.7	354737	842823	231.6	1895 USGS Ed = No name. Selected for study.
56	0.581	574.7	354737	842825	231.6	1895 USGS Ed = No name.
57	0.581	574.5	354740	842834	231.6	1895 USGS Ed = No name.
58	2.904	574.5	354715	842849	231.6	
59						1895 USGS Ed = No name.
60	0.581	574.3	354744	842847	231.6	1895 USGS Ed = No name.
61	2.904	574.3	354722	842904	231.6	
62	0.581	574.3	354727	842904	231.6	
63	0.581	574.0	354737	842914	231.6	
64						1893 USGS Ed name was Seven Islands. (Originally there were 7 islands.)
65						1893 USGS Ed name was Seven Islands.
66						1893 USGS Ed name was Seven Islands.

APPENDIX A (continued)

#	PR 1989 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
67	2.323	572.1	354912	842934	231.6	
68	8.711	572.0	354915	842952	231.6	
69	3.484	571.8	354930	842953	231.6	
70	2.904	571.8	354917	843000	231.6	
71	0.581	571.6	354814	842948	231.6	
72		571.6	354851	842939	231.6	
73	0.581	571.5	354952	843100	231.6	Stamp Creek
74	0.581	571.5	354952	843059	231.6	Stamp Creek
75	0.581	571.5	354953	843058	231.6	Stamp Creek
76	0.581	571.5	354953	843057	231.6	Stamp Creek
	PR 1980					
77	1.161	571.4	354928	843007	231.6	
78	1.161	571.4	354933	843008	231.6	Field Observation = Fragmented into 2 islands.
79	0.581	571.3	354935	843011	231.6	
80	0.581	571.3	354806	843104	231.6	1893 USGS Ed name was Seven Islands.
81		571.3	354943	843014	231.6	
82	0.581	571.2	354944	843017	231.6	
83	25.553	571.2	354923	843015	231.6	
84	0.581	571.0	355013	843119	231.6	
85	4.065	571.0	355000	843129	231.6	
86	1.161	571.0	354957	843136	231.6	
87	0.581	570.5	354946	843109	231.6	
88	1.452	570.4	354947	843116	231.6	Selected for study.
89	0.581	570.4	354949	843114	231.6	

APPENDIX A (continued)

#	PR 1980 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
90	1.161	570.3	354953	843117	231.6	
91					225.5	1893 USGS Ed name was Seven Islands.
92	0.581	570.2	354954	843129	231.6	
93	1.161	570.0	355003	843136	231.6	
94	1.161	570.0	354953	843148	231.6	Selected for study.
95	2.904	570.0	354936	843155	231.6	Riley Creek
96		570.0	354904	843218	231.6	Riley Creek. Incorporated into a road, 1968.
97	0.581	570.0	354907	843220	231.6	Riley Creek
98	1.742	570.0	354902	843228	231.6	Riley Creek
99		570.0	354902	843239	231.6	Riley Creek
100	0.581	569.6	355017	843154	231.6	
101	1.742	569.6	355020	843156	231.6	Water depth > 1.8 m. Selected for study.
102	5.227	569.0	355011	843141	231.6	
103	0.581	569.0	355010	843146	231.6	
104	0.581	569.0	354953	843153	231.6	
	PR 1990					
105		568.0	355357	842938	231.6	Clinch River, mile 4.4
	PR 1980					
106	4.646	568.0	355422	843004	237.7	Emory River, mile 2.0
107	1.161	568.0	355440	843017	231.6	Emory River, mile 2.3
108		568.0	355441	843026	231.6	Emory River, mile 2.3. Incorporated into the Ash Area, 1968.
109		568.0	355439	843020	231.6	Emory River, mile 2.3. Incorporated into the Ash Area, 1968.
110		568.0	355456	843038	231.6	Emory River, mile2.4
111		568.0	355450	843030	231.6	Emory River, mile2.4

APPENDIX A (continued)

#	PR 1980 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
112	0.581	568.0	355453	843028	231.6	Emory River, mile 2.5
113	0.581	568.0	355459	843032	231.6	Emory River, mile 2.5
	PR 1990					
114	0.581	568.0	355500	842950	231.6	Emory River, mile 2.9
115	1.161	568.0	355502	842945	231.6	Emory River, mile 3.0
116	1.161	568.0	355510	842949	231.6	Emory River, mile 3.1
117	0.581	568.0	355520	842905	231.6	Emory River, mile 3.9
118	0.581	568.0	355528	842902	231.6	Emory River, mile 4.1
119	0.581	568.0	355532	842903	231.6	Emory River, mile 4.2
120		568.0	355538	842858	231.6	Emory River, mile 4.3
121		568.0	355545	842858	231.6	Emory River, mile 4.4
122		568.0	355555	842902	231.6	Emory River, mile 4.6
123		568.0	355601	842901	231.6	Emory River, mile 4.7
124	0.581	568.0	355608	842903	231.6	Emory River, mile 4.8
125	2.904	568.0	355615	842900	231.6	Emory River, mile 5.0
126	0.581	568.0	355318	842728	231.6	Clinch River, mile 6.5
127		568.0	355442	842611	231.6	Clinch River, mile 9.1
128	2.904	568.0	355503	842608	231.6	Clinch River, mile 9.6
129	No Ed	566.1	355102	843249	231.6	
130	No Ed	566.0	355100	843253	231.6	
131	No Ed	564.2	354940	843412	231.6	

APPENDIX A (continued)

#	PR 1990 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
132						
133						
134						
135						
136						
137	1.742	562.4	355321	843636	231.6	
138	0.581	562.4	355324	843632	231.6	
139	0.581	562.4	355325	843631	231.6	
140	0.581	562.4	355326	843630	231.6	
141	0.581	562.4	355327	843631	231.6	
142	No Ed	559.4	354841	843622	231.6	
143	No Ed	559.0	354814	843614	231.6	
144	No Ed	558.9	354811	843621	231.6	
145	No Ed	558.8	354708	843710	231.6	
146	No Ed	558.8	354706	843706	231.6	
147	No Ed	558.5	354803	843715	237.7	
148	No Ed	558.5	354803	843724	231.6	
149	No Ed	558.4	354757	843713	231.6	Selected for study.
150	No Ed	558.2	354735	843638	237.7	
151	No Ed	558.0	354738	843726	231.6	
152	No Ed	557.5	354658	843728	231.6	
153	No Ed	557.5	354654	843717	231.6	
154	No Ed	557.5	354650	843710	231.6	
155	No Ed	557.5	354648	843723	231.6	

APPENDIX A (continued)

#	PR 1990 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
156	No Ed	557.4	354642	843723	231.6	
157	0.581	557.2	354653	843734	231.6	
158	1.742	556.9	354642	843749	231.6	
159	0.581	556.9	354641	843755	231.6	
160	2.323	556.7	354638	843808	231.6	
161	0.581	556.7	354635	843806	231.6	
162	0.581	556.5	354603	843820	231.6	Bolden Branch
163	0.581	556.4	354638	843832	231.6	
164		556.1	354717	843840	231.6	
165	5.227	555.8	354728	843845	237.7	
166	5.227	555.8	354730	843919	231.6	
167	1.742	555.8	354756	843926	231.6	
168	2.323	555.4	354740	843848	231.6	Selected for study.
169	0.581	555.4	354743	843915	231.6	
170	0.581	555.3	354746	843839	231.6	
171	1.742	555.2	354752	843845	231.6	Water depth > 1.8 m. Selected for study.
172	312.578	555.0	354730	844000	304.8	
173	0.581	554.8	354912	843904	231.6	
174	0.581	554.8	354913	843906	231.6	
175	0.581	551.7	354718	843944	231.6	
176		551.4	354716	844134	231.6	
177					225.5	

APPENDIX A (continued)

#	PR 1990 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
178					225.5	
179					225.5	
180	2.323	548.2	354500	843949	231.6	
181	19.165	548.2	354500	844015	280.4	
182	No Ed	547.7	354417	844004	231.6	
183	No Ed	547.7	354418	844004	231.6	
184	No Ed	547.7	354418	844003	231.6	
185	No Ed	547.7	354419	844003	231.6	
186	No Ed	547.7	354420	844003	231.6	
187	No Ed	547.4	354445	844030	292.6	
188	No Ed	547.4	354343	844027	231.6	
189	No Ed	547.4	354345	844029	231.6	
190	6.388	547.0	354518	844122	256.0	
191	No Ed	546.8	354441	844138	231.6	
192	No Ed	546.7	354446	844143	231.6	
193	8.711	546.3	354530	844152	256.0	
194	41.233	545.0	354507	844245	262.1	
195	0.581	544.9	354533	844357	231.6	Whites Creek, mile 0.3
196	2.323	544.8	354523	844352	237.7	Whites Creek, mile 0.3
197	1.742	544.7	354630	844418	231.6	Whites Creek, mile 4.1
198	1.742	544.7	354645	844415	231.6	Whites Creek, mile 4.6

APPENDIX A (continued)

#	PR 1990 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
199	4.646	544.7	354618	844421	231.6	Whites Creek, mile 4.6
200	0.581	544.7	354650	844417	231.6	Whites Creek, mile 4.7
201	0.581	544.7	354650	844430	231.6	Whites Creek, mile 4.7
202	0.581	544.7	354650	844428	231.6	Whites Creek, mile 4.7
203	0.581	544.7	354654	844425	231.6	Whites Creek, mile 4.7
204	0.581	544.7	354657	844425	231.6	Whites Creek, mile 4.8
205	0.581	544.7	354655	844425	231.6	Whites Creek, mile 4.8
206	0.581	544.7	354702	844422	231.6	Whites Creek, mile 4.9
207	0.581	544.7	354700	844420	231.6	Whites Creek, mile 4.9
208		544.7	354702	844420	231.6	Whites Creek, mile 4.9
209	0.581	544.7	354708	844428	231.6	Whites Creek, mile 5.0
210	1.161	544.7	354715	844432	231.6	Whites Creek, mile 5.2
211					225.5	
212					225.5	
213					231.6	
214	No Ed	544.0	354444	844244	231.6	
215	No Ed	543.9	354440	844234	231.6	
216	No Ed	543.9	354443	844228	231.6	
217	No Ed				231.6	
218	No Ed	543.8	354432	844229	231.6	
219	No Ed	543.7	354428	844230	231.6	Field Observation = No island.
220	No Ed	542.7	354339	844255	231.6	
221	No Ed	542.3	354322	844308	231.6	

APPENDIX A (continued)

#	PR 1990 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
222	No Ed	541.9	354310	844330	231.6	
223	No Ed	541.8	354207	844307	237.7	
224	No Ed	541.6	354244	844308	237.7	
225	No Ed	541.4	354234	844312	243.8	
226	No Ed	541.4	354230	844304	243.8	
227	No Ed	541.0	354203	844234	237.7	Rowden Branch
228	No Ed	540.5	354145	844245	268.2	Rowden Branch
229	No Ed	540.4	354130	844248	231.6	Rowden Branch
230	No Ed	540.4	354143	844251	231.6	
231	No Ed	540.4	354140	844210	231.6	Rowden Branch
232	No Ed	540.3	354139	844257	231.6	
233	No Ed	540.2	354125	844252	231.6	
234	No Ed	540.2	354128	844250	231.6	
235	No Ed	539.8	354052	844258	231.6	Field Observation = No island.
236	No Ed	539.2	354042	844308	231.6	
237	No Ed	539.1	354052	844339	231.6	
238	No Ed	538.6	354117	844433	231.6	
239	No Ed	538.5	354053	844445	231.6	
240	No Ed	538.4	353915	844445	231.6	
241	No Ed	538.4	353913	844444	231.6	
242	No Ed	538.0	354130	844415	274.3	
	PR 1980					
243	1.161	537.6	354117	844504	237.7	

APPENDIX A (continued)

#	PR 1980 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
244	No Ed	537.0	354158	844440	231.6	
245					225.5	
246					225.5	Name changed to Hardwick, 1940.
247	No Ed	536.9	354243	844422	231.6	
248	No Ed	536.8	354230	844448	231.6	
249	37.748	535.5	354145	844538	262.1	
250	3.484	535.0	354110	844602	231.6	
251	0.581	534.9	354105	844611	231.6	
252	8.130	534.8	354105	844622	256.0	
253	0.581	534.0	354035	844609	231.6	
254	0.581	533.5	354012	844657	231.6	
255					225.5	Spelling changed to Foushee, 1940.
256	2.323	533.3	354003	844657	237.7	
257	1.742	532.8	353935	844657	231.6	
258					225.5	(1893 USGS Ed Piney Is. approx. mile 534.) Name changed to Piney, 1940.
259					225.5	(1893 USGS Ed Piney Is. approx. mile 534.) Name changed to Piney, 1940.
260	1.742	532.3	353932	844804	237.7	Piney River, mile 0.9
261	1.742	532.3	353939	844755	237.7	Piney River, mile 1.0
262					225.5	Piney River, mile 2.1
263	1.742	532.3	354034	844813	231.6	Piney River, mile 2.2
264	4.065	532.3	354040	844822	237.7	Piney River, mile 2.3

APPENDIX A (continued)

#	PR 1980 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
265	1.161	532.3	354054	844820	231.6	Piney River, mile 2.3
266	1.161	532.3	354008	844916	231.6	Piney River, mile 3.2. Selected for study.
267					225.5	Piney River, mile 3.3
268	0.581	532.3	353958	844925	231.6	Piney River, mile 3.3
269	2.904	532.3	354045	844949	237.7	Piney River, mile 4.0
270	9.873	532.3	354100	844952	243.8	Piney River, mile 4.3
271	15.099	532.3	354010	845034	237.7	Piney River, mile 4.5
272	2.323	532.3	354010	845049	237.7	Piney River, mile 4.6
273	0.581	532.3	354035	845033	231.6	Piney River, mile 4.7
274	2.323	532.3	354032	845045	231.6	Piney River, mile 4.8
275	2.904	532.3	354107	845022	237.7	Piney River, mile 4.8
276	1.742	532.3	354027	845053	231.6	Piney River, mile 4.9
277	1.161	532.3	354024	845059	231.6	Piney River, mile 4.9. Water depth > 1.8 m. Selected for study.
278	2.323	532.3	354040	845100	231.6	Piney River, mile 5.1
279	0.581	532.3	354042	845106	231.6	Piney River, mile 5.2
280	0.581	532.3	354038	845108	231.6	Piney River, mile 5.2
281	0.581	532.3	354057	845106	231.6	Piney River, mile 5.4
282	0.581	532.3	355103	845110	231.6	Piney River, mile 5.5
283	0.581	532.3	355107	845110	231.6	Piney River, mile 5.5
284	0.581	532.3	354104	845111	231.6	Piney River, mile 5.6
285	0.581	532.3	354108	845111	231.6	Piney River, mile 5.6
286	0.581	532.3	354115	845105	231.6	Piney River, mile 5.6
287	0.581	532.3	354117	845102	231.6	Piney River, mile 5.6
288	0.581	532.3	354116	845101	231.6	Piney River, mile 5.6

APPENDIX A (continued)

#	PR 1980 area (ha)	Current Mile	Current Latitude	Current Longitude	Elevation (m)	Notes
289	0.581	532.3	354117	845059	231.6	Piney River, mile 5.6
290	0.581	532.3	354120	845058	231.6	Piney River, mile 5.6
291	0.581	532.3	354122	845058	231.6	Piney River, mile 5.6
292	0.581	532.3	354121	845057	231.6	Piney River, mile 5.6
293		532.0			225.5	Name changed to Piney, 1940.
294	30.779	531.5	353852	844752	262.1	
295	0.581	531.4	353834	844723	231.6	
296	8.711	531.1	353825	844737	249.9	Lowe Branch
297	9.873	531.0	353815	844745	249.9	Lowe Branch
298	1.161	531.0	353822	844814	231.6	Lowe Branch
299	0.581	531.0	353835	844817	231.6	Lowe Branch
300	1.161	531.0	353820	844759	231.6	Lowe Branch. Selected for study.
301	1.161	531.0	353828	844830	231.6	Lowe Branch. Water depth > 1.8 m. Selected for study.
302	0.581	531.0	353755	844907	231.6	Lowe Branch
303	0.581	531.0	353755	844906	231.6	Lowe Branch
304						

APPENDIX B

WATTS BAR RESERVOIR SMALL ISLANDS: ISLAND CHARACTERIZATION.

Island #	Characterization
11	Length = approximately (approx) 50 m. Canopy height (ht) = approx 14.1 m. Largest DBH tree ht = 10.6 m. Channel side, away from channel side, and upstream end of the island = 0.5-1 m scarp ht and 0-0.49 m scarp depth. Downstream end scarp ht and depth = 0-0.49 m. Upstream orientation = S 180'. Downstream orientation = NE 10'. The east side of the upstream end of the island had previously been mowed and metal debris was observed in the water. Campfire sites observed. The next island was 7 m away and was separated by a rock and sand bar with a channel of 0.5-1 m in depth.
14	Length = approx 55 m. Canopy ht = approx 18 m. Largest DBH tree ht = 16.6 m. Channel side scarp ht and depth = > 1 m. Side away from the channel = 0-0.49 m scarp ht and depth. Upstream end scarp ht = > 1 m and depth = 0.5-1 m. Downstream end scarp ht = 0.5-1 m and depth = > 1 m. Upstream orientation = SE 130'. Downstream orientation = NW 320'. Numerous potholes on the island were the substrate beneath the island had been eroded away. Water was visible in some of the potholes. Bird boxes observed. Numerous bird eggs observed lying on the ground.
23	Length = approx 100 m. Canopy ht = approx 17 m. Largest DBH tree ht = 15.1 m. Channel side scarp ht = >1 m, depth = 0.5-1 m. Side away from the channel and the upstream end = 0-0.49 m scarp ht and depth. Downstream end scarp ht = 0.5-1 m, depth = 0-0.49m. Upstream orientation = SE 100'. Downstream orientation = SW 260'.
36	Length = approx 60 m. Canopy ht = approx 13 m. Largest DBH tree ht = 10.6 m. Channel side scarp ht and depth = 0.5-1 m. Side away from the channel scarp ht and depth = 0-0.49 m. Upstream and downstream ends scarp ht = 0.5-1 m and depth = 0-0.49 m. Upstream orientation = SE 160'. Downstream orientation = NW 330'. Two water snakes were found, one observed and one collected for identification. Two very small islands off of the upstream end offer protection from erosion. Eight m from the downstream end, the island is only 1.5 m wide.
55	Length = approx 110 m. Canopy ht = approx 15.1 m. Largest DBH tree ht = 12.4 m. Channel side, side away from the channel, and the upstream end = 0-0.49 m scarp ht and depth. Downstream end scarp ht = 0-0.49 m, depth = 0.5-1 m. Upstream orientation = SE 140'. Downstream orientation = NW 280'. Bird boxes, bird flats, and bird eggs observed. Skeletons of a fish and small mammal observed. Three Bald Cypress trees (possibly planted?) were observed near the downstream end. A sand beach was located on the side away from the channel.

APPENDIX B (continued)

Island #	Characterization
88	Length = approx 45 m. Canopy ht = approx 23.3 m. Largest DBH tree ht = 18.6 m. Channel side, side away from the channel, and the downstream end = 0-0.49 m scarp ht and depth. Upstream end scarp ht and depth = 0.5-1 m. Upstream orientation = SE 130'. Downstream orientation = NW 310'. Pawpaw tree cut down near upstream end. Channel side of the island protected by a small island.
94	Length = approx 75 m. Canopy ht = approx 13.6 m. Largest DBH tree ht = 12.6 m. Channel side and side away from the channel = 0.5-1 m scarp ht and 0-0.49 m scarp depth. Upstream end scarp ht and depth = 0.5-1 m. Downstream end scarp ht and depth = 0-0.49 m. Upstream orientation = NE 60'. Downstream orientation = NW 280'. Rock and sand bar extends from downstream end to the NW - rock jets up on both sides.
101	Length = approx 130 m. Canopy ht = approx 15.2 m. Largest DBH tree ht = 10.1 m. Channel side = 0.5-1 m scarp ht and depth. Side away from the channel, upstream end, and downstream end scarp ht and depth = 0-0.49 m. Upstream orientation = SE 160'. Downstream orientation = NW 340'. A turtle, shed snake skins, bird egg shells, and deer tracks were observed. Four barrels that had been welded together were found approx 40 m from the upstream end near the middle of the island.
149	Length = approx 60 m. Canopy ht = approx 16.9 m. Largest DBH tree ht = 16.9 m. Channel side and the downstream end = 0.5-1 m scarp ht and 0-0.49 m scarp depth. Side away from the channel and the upstream end scarp ht and depth = 0-0.49 m. Upstream orientation = NE 60'. Downstream orientation = SW 210'. Rock defended on the upstream and downstream ends. An area where trees had been cut down in the middle of the island, bird egg shells, and campfire areas were observed.
168	Length = approx 160 m. Canopy ht = approx 18.5 m. Largest DBH tree ht = 18.5 m. Channel side, upstream end, and the downstream end = 0.5-1 m scarp ht, 0-0.49 m scarp depth. Side away from the channel scarp ht and depth = 0-0.49 m. Upstream orientation = SW 210'. Downstream orientation = NE 30'.
171	Length = approx 115 m. Canopy ht = approx 12.4 m. Largest DBH tree ht = 12.4 m. Channel side and the downstream end = 0.5-1 m scarp ht and depth. Side away from the channel scarp ht and depth = 0-0.49 m. Upstream end scarp ht = 0.5-1 m, scarp depth = 0-0.49 m. Upstream orientation = NW 280'. Downstream orientation = NE 40'. Duck blind observed on the downstream end. The downstream end area had been mowed and campfire ashes were observed. Near the downstream end, the trees appeared mangled as if a tornado had passed across the end of the island. Mangled trees were also observed along the shoreline across from the island.

APPENDIX B (continued)

Island #	Characterization
266	Length = approx 78 m. Canopy ht = approx 15.1 m. Largest DBH tree ht = 12.1 m. Channel side = 0.5-1 m scarp ht, 0-0.49 m scarp depth. Side away from the channel scarp ht = > 1 m, depth = 0.5-1 m. Upstream end scarp ht and depth = 0-0.5 m. Downstream end scarp ht and depth = > 1 m. Upstream orientation = SW 210'. Downstream orientation = NE 60'. Gravel bar located on the downstream end.
277	Length = approx 60 m. Canopy ht = approx 12.1 m. Largest DBH tree ht = 12.1 m. Channel side, side away from the channel, upstream end, and downstream end scarp ht and depth = 0-0.49 m. Upstream orientation = SW 210'. Downstream orientation = NE 60'.
300	Length = approx 83 m. Canopy ht = approx 13.6 m. Largest DBH tree ht = 6.8 m. Channel side and side away from the channel scarp ht and depth = 0-0.49 m. Upstream end scarp ht and depth = 0.5-1 m. Downstream end scarp ht = 0.5-1 m and depth = > 1 m. Upstream orientation = SW 200'. Downstream orientation = NE 70'.
301	Length = approx 100 m. Canopy ht = approx 14.5 m. Largest DBH tree ht = 11.6 m. Channel side, side away from the channel, upstream end, and downstream end scarp ht and depth = 0-0.49 m. Upstream orientation = SW 230'. Downstream orientation = NE 50'. Eastern Red Cedars cut down, possibly for Christmas trees or fish cover? Campfire area observed in approx the middle of the island. Island rock defended on all sides.

APPENDIX C

WATTS BAR RESERVOIR SMALL ISLAND FOREST COMMUNITIES: WOODY FLORA SPECIES LIST BY ISLAND

CODE #:
- 1 = Species encountered in Strata 1: Canopy (Species with a DBH of 12.5 cm or greater.)
- 2 = Species encountered in Strata 2: Subcanopy (Species with a DBH of 2.5 cm to 12.49 cm.)
- 3 = Species encountered in Strata 3: Shrub (Species with a DBH of 2.49 cm or less and approximately 1 to 2 m in height within a 3 m radius circle plot.)
- E = Species encountered on the ends of the longest axis of the islands.
- B = Species with the largest DBH.
- O = Other species encountered on the islands that were not sampled in the methods listed above.

	Island #	11	14	23
SCIENTIFIC NAME	COMMON NAME	CODE #		
Acer negundo	Boxelder		1	1
Acer rubrum	Red Maple			
Acer saccharinum	Silver Maple	1,2,E,B	1,E	1,2,B
Albizia julibrissin	Mimosa			
Alnus serrulata	Smooth Alder	O	2,3	2,3,E
Amelanchier arborea	Serviceberry			
Amorpha fruticosa	Amorpha	2,3		2,3
Asimina triloba	Pawpaw		O	
Berchemia scandens	Berchemia			
Betula nigra	River Birch			1,2
Bumelia lycioides	Buckthorn			
Campsis radicans	Trumpet Creeper	O		
Celtis occidentalis	Hackberry		O	
Cephalanthus occidentalis	Buttonbush	2,3	O	
Cercis canadensis	Redbud			
Cornus amomum	Silky Cornel	2,3	3	3
Cornus florida	Flowering Dogwood			
Crataegus intricata	Biltmore Hawthorn			
Diospyros virginiana	Persimmon			
Fagus grandifolia	American Beech			
Fraxinus pennsylvanica	Green Ash	1,E	1	1,2,E
Gleditsia triacanthos	Honey Locust		3	
Hypericum prolificum	St. John's-wort	O		
Ilex cornuta	Cultivated' Holly			
Ilex opaca	American Holly			
Juglans nigra	Black Walnut			
Juniperus virginiana	Eastern Red Cedar		3	O
Ligustrum sinense	Privet	2,3	2,3,E	2,3
Liquidambar styraciflua	Sweetgum			
Liriodendron tulipifera	Tulip Poplar			
Maclura pomifera	Osage-orange			
Morus alba	White Mulberry			
Morus rubra	Red Mulberry			
Nyssa sylvatica	Black Gum			
Pinus taeda	Loblolly Pine			
Pinus virginiana	Virginia Pine			

APPENDIX C (continued)

Island #	36	55	88	94	101	149
SCIENTIFIC NAME	CODE #					
Acer negundo		1	2		1,2	1,2
Acer rubrum		3	1,2,E		1	
Acer saccharinum	1,2,3,E	1,2,3,B	1,2,3	1,2	1,B	O
Albizia julibrissin	2			O		
Alnus serrulata	2,3	2,3	2,3	E	3	
Amelanchier arborea						
Amorpha fruticosa	3	E	2,3	2,3,E	3	1,3,E
Asimina triloba		O	O		O	
Berchemia scandens						
Betula nigra	O	1		1	1,3	
Bumelia lycioides						O
Campsis radicans	O	O		O	O	O
Celtis occidentalis				1	1	1,2,B
Cephalanthus occidentalis	O	O	O	O	2,3,E	
Cercis canadensis						1
Cornus amomum	3	2,3,E	2,E	2,3	3	2,3
Cornus florida						
Crataegus intricata						
Diospyros virginiana			1	1		1
Fagus grandifolia						
Fraxinus pennsylvanica	1	1	1	1	1,3	1
Gleditsia triacanthos				O	1	1
Hypericum prolificum						O
Ilex cornuta						
Ilex opaca						
Juglans nigra						
Juniperus virginiana			3	1,2,3		O
Ligustrum sinense		2,3	2,3	2,3	2,3	2,3,E
Liquidambar styraciflua			1,2,3		O	
Liriodendron tulipifera		O			1	
Maclura pomifera				1		
Morus alba		O				
Morus rubra		O				
Nyssa sylvatica						
Pinus taeda						
Pinus virginiana				1,B	1	

APPENDIX C (continued)

Island #	168	171	266	277	300	301
SCIENTIFIC NAME	CODE #					
Acer negundo	1,2,3	2			1,2	
Acer rubrum	1,2	2,E	1,2,3	1,2,3,E,B	1,2,E	
Acer saccharinum	1,2,3,E	1,2,3,E		O		
Albizia julibrissin			3,E	3		
Almus serrulata	3	2,3		2,3		
Amelanchier arborea			2,3			
Amorpha fruticosa	2,3	2,3	O		O	
Asimina triloba		1				O
Berchemia scandens				3	3	3
Betula nigra	2			1,3,E		
Bumelia lycioides						
Campsis radicans					O	
Celtis occidentalis	1,2,E	1,2		1	1,2	3
Cephalanthus occidentalis		3				O
Cercis canadensis	1	1			1,B	2,3,E
Cornus amomum	2,3	2,3	3	2,3	2,3	3
Cornus florida			3		1	
Crataegus intricata						3
Diospyros virginiana	1,2	1	O	1,2		2
Fagus grandifolia			3			
Fraxinus pennsylvanica	O	1,3		O		1,2
Gleditsia triacanthos	1	1				
Hypericum prolificum						
Ilex cornuta		O				
Ilex opaca				O		
Juglans nigra				2	O	
Juniperus virginiana	3	3	3,E	3	1,2,3	1,2,3,E,B
Ligustrum sinense	3	2,3		3	2,3	
Liquidambar styraciflua	1	1	2,3			
Liriodendron tulipifera	1,B	1,B		3	O	
Maclura pomifera						
Morus alba				O		
Morus rubra						O
Nyssa sylvatica			2,3			
Pinus taeda					O	
Pinus virginiana			1,3,B			

APPENDIX C (continued)

	Island #	11	14	23
SCIENTIFIC NAME	COMMON NAME	CODE #		
Platanus occidentalis	Eastern Sycamore	1	1,B	1,2
Populus deltoides	Eastern Cottonwood			
Prunus serotina	Black Cherry			
Quercus alba	White Oak			
Quercus falcata	Southern Red Oak			
Quercus muehlenbergii	Chinkapin Oak			
Quercus phellos	Willow Oak			
Quercus rubra	Northern Red Oak			
Rhamnus caroliniana	Carolina Buckthorn			
Rhododendron periclymenoides	Wild Azalea			
Rhus copallina	Winged sumac			
Rhus glabra	Smooth Sumac		O	
Robinia pseudoacacia	Black Locust		1,2	
Salix nigra	Black Willow	O		2
Sassafras albidum	Sassafras			
Taxodium distichum	Bald Cypress			
Ulmus alata	Winged Elm			
Ulmus americana	American Elm		1,3	
Ulmus rubra	Slippery Elm			
Vaccinium arboreum	Farkleberry			
Vaccinium pallidum	Lowbush Blueberry			
Viburnum acerifolium	Maple-leaf Arrowwood			
Viburnum cassinoides	Wild Raisin			
Viburnum prunifolium	Viburnum			

APPENDIX C (continued)

Island #	36	55	88	94	101	149
SCIENTIFIC NAME	CODE #					
Platanus occidentalis	1,B	1	1		O	O
Populus deltoides		O				
Prunus serotina				1,2		1
Quercus alba					1	
Quercus falcata						
Quercus muehlenbergii		O				O
Quercus phellos						
Quercus rubra		O				1,2
Rhamnus caroliniana						
Rhododendron periclymenoides						
Rhus copallina						
Rhus glabra						O
Robinia pseudoacacia						1
Salix nigra	O	1	1		1,2	
Sassafras albidum	O					
Taxodium distichum		3				
Ulmus alata			1			
Ulmus americana		1,3	1,2,3,B	1,3	1	O
Ulmus rubra		O				
Vaccinium arboreum						
Vaccinium pallidum						
Viburnum acerifolium						
Viburnum cassinoides						
Viburnum prunifolium						

APPENDIX C (continued)

Island #	168	171	266	277	300	301
SCIENTIFIC NAME	CODE #					
Platanus occidentalis	O	1	O	1	O	2
Populus deltoides						
Prunus serotina	1,2	1	2	3	1,2,3	3
Quercus alba			2			
Quercus falcata			O			
Quercus muehlenbergii						1,2,3
Quercus phellos			O	O		
Quercus rubra	O				O	1
Rhamnus caroliniana						3
Rhododendron periclymenoides			O			
Rhus copallina			O			
Rhus glabra						
Robinia pseudoacacia		1	3			
Salix nigra		O			O	3
Sassafras albidum	2,3	O	O		O	
Taxodium distichum						
Ulmus alata	2					3
Ulmus americana	O	1,2		1,2	1,2	1
Ulmus rubra						
Vaccinium arboreum			O			
Vaccinium pallidum			O			
Viburnum acerifolium			O			
Viburnum cassinoides						2
Viburnum prunifolium						3

APPENDIX D

WATTS BAR RESERVOIR SMALL ISLAND FOREST COMMUNITIES: BASAL AREA FOR EACH CANOPY SPECIES SAMPLED BY ISLAND.

Island #	11	14	23	36
SPECIES	BASAL AREA			
Acer saccharinum	3056.893	2096.736	2274.236	1396.617
Fraxinus pennsylvanica	3227.041	1288.248	1602.172	600.460
Platanus occidentalis	654.472	224.317	11533.342	1286.018
Acer negundo		3136.925	2179.651	
Robinia pseudoacacia		489.782		
Ulmus americana		2560.184		
Betula nigra			850.122	
Salix nigra				
Acer rubrum				
Diospyros virginiana				
Liquidambar styraciflua				
Ulmus alata				
Celtis occidentalis				
Juniperus virginiana				
Maclura pomifera				
Pinus virginiana				
Prunus serotina				
Gleditsia triacanthos				
Liriodendron tulipifera				
Quercus alba				
Amorpha fruticosa				
Quercus rubra				
Cercis canadensis				
Asimina triloba				
Cornus florida				
Quercus muehlenbergii				
TOTAL	6938.406	9796.192	18439.523	3283.095

APPENDIX D (continued)

Island #	55	88	94	101
SPECIES	BASAL AREA			
Acer saccharimum	7005.879	136.848	128.680	12572.408
Fraxinus pennsylvanica	1044.806	3028.571	2474.827	4736.960
Platanus occidentalis	3945.947	615.752		
Acer negundo	547.391			5171.968
Robinia pseudoacacia				
Ulmus americana	759.040	962.112	637.939	153.938
Betula nigra	165.130		452.389	2903.332
Salix nigra	3046.368	661.093		1972.141
Acer rubrum		700.834		514.718
Diospyros virginiana		339.794	186.265	
Liquidambar styraciflua		777.025		
Ulmus alata		995.381		
Celtis occidentalis			213.824	1850.876
Juniperus virginiana			581.068	
Maclura pomifera			138.929	
Pinus virginiana			669.661	4213.948
Prunus serotina			1116.278	
Gleditsia triacanthos				419.096
Liriodendron tulipifera				149.571
Quercus alba				2026.828
Amorpha fruticosa				
Quercus rubra				
Cercis canadensis				
Asimina triloba				
Cornus florida				
Quercus muehlenbergii				
TOTAL	16514.561	8217.410	6599.860	36685.784

APPENDIX D (continued)

Island #	149	168	171	266
SPECIES	BASAL AREA			
Acer saccharinum		1077.039	1145.746	
Fraxinus pennsylvanica	754.767		2247.713	
Platanus occidentalis			4112.640	
Acer negundo	183.854	5529.646		
Robinia pseudoacacia	1031.431		698.446	
Ulmus americana			804.247	
Betula nigra				
Salix nigra				
Acer rubrum		3187.434		1669.135
Diospyros virginiana	1074.809	598.135	1155.328	
Liquidambar styraciflua		124.690	363.050	
Ulmus alata				
Celtis occidentalis	5406.456	687.419	186.265	
Juniperus virginiana				
Maclura pomifera				
Pinus virginiana				7192.356
Prunus serotina	2325.696	3279.804	3431.606	
Gleditsia triacanthos	660.519	363.050	2030.103	
Liriodendron tulipifera		7776.205	3057.285	
Quercus alba				
Amorpha fruticosa	486.954			
Quercus rubra	211.241			
Cercis canadensis	330.063	1409.891	265.904	
Asimina triloba			1200.724	
Cornus florida				
Quercus muehlenbergii				
TOTAL	12465.790	24033.313	20699.057	8861.491

APPENDIX D (continued)

Island #	277	300	301
SPECIES	BASAL AREA		
Acer saccharinum			
Fraxinus pennsylvanica			893.562
Platanus occidentalis	530.929		
Acer negundo		1256.298	
Robinia pseudoacacia			
Ulmus americana	831.657	1850.381	636.840
Betula nigra	678.866		
Salix nigra			
Acer rubrum	1642.604	593.517	
Diospyros virginiana	465.819		
Liquidambar styraciflua			
Ulmus alata			
Celtis occidentalis	881.412	2625.458	
Juniperus virginiana		572.555	3289.072
Maclura pomifera			
Pinus virginiana			
Prunus serotina		510.705	
Gleditsia triacanthos			
Liriodendron tulipifera			
Quercus alba			
Amorpha fruticosa			
Quercus rubra			4466.791
Cercis canadensis		5944.674	
Asimina triloba			
Cornus florida		221.671	
Quercus muehlenbergii			128.680
TOTAL	5031.288	13575.258	9414.945

APPENDIX D (continued)

SPECIES	TOTAL	PERCENT
Acer saccharinum	30891.081	15.403
Fraxinus pennsylvanica	21899.129	10.919
Platanus occidentalis	22903.417	11.420
Acer negundo	18005.732	8.978
Robinia pseudoacacia	2219.659	1.107
Ulmus americana	9196.337	4.585
Betula nigra	5049.839	2.518
Salix nigra	5679.602	2.832
Acer rubrum	8308.241	4.143
Diospyros virginiana	3820.150	1.905
Liquidambar styraciflua	1264.765	0.631
Ulmus alata	995.381	0.496
Celtis occidentalis	11851.711	5.909
Juniperus virginiana	4442.695	2.215
Maclura pomifera	138.929	0.069
Pinus virginiana	12075.966	6.021
Prunus serotina	10664.088	5.317
Gleditsia triacanthos	3472.769	1.732
Liriodendron tulipifera	10983.061	5.476
Quercus alba	2026.828	1.011
Amorpha fruticosa	486.954	0.243
Quercus rubra	4678.032	2.333
Cercis canadensis	7950.532	3.964
Asimina triloba	1200.724	0.599
Cornus florida	221.671	0.111
Quercus muehlenbergii	128.680	0.064
TOTAL	200555.972	100.000

APPENDIX E

WATTS BAR RESERVOIR SMALL ISLAND FOREST COMMUNITIES:
BASAL AREA FOR EACH SUBCANOPY SPECIES SAMPLED BY ISLAND.

Island #	11	14	23	36
SPECIES	BASAL AREA			
Acer saccharinum	466.243		235.721	276.643
Cornus amomum	26.751			
Ligustrum sinense	13.273	140.563	4.909	
Cephalanthus occidentalis	10.752			
Amorpha fruticosa	7.548		33.387	
Robinia pseudoacacia		174.044		
Alnus serrulata		44.893	11.883	55.300
Fraxinus pennsylvanica			77.550	
Betula nigra			89.920	
Platanus occidentalis			22.062	
Salix nigra			50.265	
Albizia julibrissin				34.212
Ulmus americana				
Acer rubrum				
Liquidambar styraciflua				
Acer negundo				
Juniperus virginiana				
Prunus serotina				
Celtis occidentalis				
Quercus rubra				
Diospyros virginiana				
Ulmus alata				
Sassafras albidum				
Quercus alba				
Nyssa sylvatica				
Amelanchier arborea				
Juglans nigra				
Quercus muehlenbergii				
Viburnum cassinoides				
Cercis canadensis				
TOTAL	524.567	359.500	525.697	366.155

APPENDIX E (continued)

Island #	55	88	94	101	149
SPECIES	BASAL AREA				
Acer saccharinum	103.955	63.617	30.191		
Cornus amomum	24.473	8.042	16.855		28.628
Ligustrum sinense	45.718	38.492	65.816	75.453	79.474
Cephalanthus occidentalis				38.728	
Amorpha fruticosa		7.069	11.341		
Robinia pseudoacacia					
Almus serrulata	25.777	18.292			
Fraxinus pennsylvanica					
Betula nigra					
Platanus occidentalis					
Salix nigra				47.784	
Albizia julibrissin					
Ulmus americana		44.721			
Acer rubrum		162.499			
Liquidambar styraciflua		124.548			
Acer negundo		8.553		80.385	58.308
Juniperus virginiana			76.867		
Prunus serotina			86.590		
Celtis occidentalis					56.745
Quercus rubra					41.854
Diospyros virginiana					
Ulmus alata					
Sassafras albidum					
Quercus alba					
Nyssa sylvatica					
Amelanchier arborea					
Juglans nigra					
Quercus muehlenbergii					
Viburnum cassinoides					
Cercis canadensis					
TOTAL	199.923	475.833	287.660	242.350	265.009

APPENDIX E (continued)

Island #	168	171	266	277	300
SPECIES	BASAL AREA				
Acer saccharinum	99.667	29.225			
Cornus amomum	5.726	4.909		11.035	17.703
Ligustrum sinense		43.008			15.237
Cephalanthus occidentalis					
Amorpha fruticosa	9.621	9.817			
Robinia pseudoacacia					
Alnus serrulata		35.374		20.884	
Fraxinus pennsylvanica					
Betula nigra	9.621				
Platanus occidentalis					
Salix nigra					
Albizia julibrissin					
Ulmus americana		118.823		21.237	105.683
Acer rubrum	9.621	122.718	45.200	106.751	42.137
Liquidambar styraciflua			7.069		
Acer negundo	64.167	163.810			117.660
Juniperus virginiana					7.069
Prunus serotina	74.896		15.904		17.349
Celtis occidentalis	5.726	78.540			257.925
Quercus rubra					
Diospyros virginiana	15.205			95.033	
Ulmus alata	9.621				
Sassafras albidum	8.553				
Quercus alba			6.158		
Nyssa sylvatica			8.042		
Amelanchier arborea			8.553		
Juglans nigra				5.309	
Quercus muehlenbergii					
Viburnum cassinoides					
Cercis canadensis					
TOTAL	312.424	606.224	90.926	260.249	580.763

APPENDIX E (continued)

Island #	301		
SPECIES	BASAL AREA	TOTAL	PERCENT
Acer saccharimum		1305.262	22.952
Cornus amomum		144.121	2.534
Ligustrum sinense		521.943	9.178
Cephalanthus occidentalis		49.480	0.870
Amorpha fruticosa		78.783	1.385
Robinia pseudoacacia		174.044	3.060
Almus serrulata		212.403	3.735
Fraxinus pennsylvanica	98.520	176.070	3.096
Betula nigra		99.541	1.750
Platanus occidentalis	22.902	44.964	0.791
Salix nigra		98.049	1.724
Albizia julibrissin		34.212	0.602
Ulmus americana		290.464	5.108
Acer rubrum		488.926	8.597
Liquidambar styraciflua		131.617	2.314
Acer negundo		492.883	8.667
Juniperus virginiana	170.251	254.187	4.470
Prunus serotina		194.739	3.424
Celtis occidentalis		398.936	7.015
Quercus rubra		41.854	0.736
Diospyros virginiana	70.882	181.120	3.185
Ulmus alata		9.621	0.169
Sassafras albidum		8.553	0.150
Quercus alba		6.158	0.108
Nyssa sylvatica		8.042	0.141
Amelanchier arborea		8.553	0.150
Juglans nigra		5.309	0.093
Quercus muehlenbergii	186.870	186.870	3.286
Viburnum cassinoides	31.141	31.141	0.548
Cercis canadensis	9.079	9.079	0.160
TOTAL	589.645	5686.925	100.000

APPENDIX F

WATTS BAR RESERVOIR SMALL ISLAND FOREST COMMUNITIES: SHANNON DIVERSITY INDICES FOR THE CANOPY, SUBCANOPY, AND SHRUB STRATA BY ISLAND.

Island #	Flat Surface Area (ha)	Canopy	Subcanopy	Shrub
55	0.871*	0.689	0.588	0.659
88	0.871*	0.889	0.912	0.528
266	1.161	0.125	0.586	0.909
11	1.161	0.410	0.564	0.202
36	1.161	0.413	0.386	0.391
301	1.161	0.615	0.530	0.995
277	1.161	0.709	0.709	0.647
14	1.161	0.719	0.439	0.447
300	1.161	0.791	0.860	0.604
94	1.161	0.834	0.656	0.487
149	1.161	0.894	0.504	0.105
23	1.742	0.608	0.799	0.364
101	1.742	0.917	0.488	0.406
171	1.742	1.063	0.889	0.769
168	2.323	0.872	0.988	0.786

Note: * = Island flat surface area of two English Grid dots, both occurring on the boundary (labeled 1.161/2).

APPENDIX G

WATTS BAR RESERVOIR SMALL ISLAND FOREST COMMUNITIES:
NUMBER OF INDIVIDUALS FOR EACH CANOPY SPECIES
SAMPLED BY ISLAND.

Island #	11	14	23	36	55	88	94	101	149	168	171
SPECIES	NUMBER OF INDIVIDUALS										
Acer saccharinum	10	4	4	6	14	1	1	10		2	3
Fraxinus pennsylvanica	2	1	3	2	3	3	7	4	1		3
Platanus occidentalis	8	1	9	2	7	1					3
Acer negundo		4	3		1			7	1	11	
Robinia pseudoacacia		2							3		2
Ulmus americana		3			2	1	1	1			1
Betula nigra			1		1		1	1			
Salix nigra					8	2		5			
Acer rubrum						2		1		3	
Diospyros virginiana						1	1		2	2	3
Liquidambar styraciflua						4				1	1
Ulmus alata						1					
Celtis occidentalis							1	2	6	2	1
Juniperus virginiana							1				
Maclura pomifera							1				
Pinus virginiana							1	2			
Prunus serotina							1		3	6	4
Gleditsia triacanthos								1	1	1	2
Liriodendron tulipifera								1		6	2
Quercus alba								1			
Amorpha fruticosa									1		
Quercus rubra									1		
Cercis canadensis									1	2	1
Asimina triloba											1
Cornus florida											
Quercus muehlenbergii											
TOTAL	20	15	20	10	36	16	16	36	20	36	27

APPENDIX G

Island #	266	277	300	301		
SPECIES	NUMBER OF INDIVIDUALS				TOTAL	PERCENT
Acer saccharinum					55	17.405
Fraxinus pennsylvanica				4	33	10.443
Platanus occidentalis		1			32	10.127
Acer negundo			3		30	9.494
Robinia pseudoacacia					7	2.215
Ulmus americana		2	5	2	18	5.696
Betula nigra		1			5	1.582
Salix nigra					15	4.747
Acer rubrum	1	4	2		13	4.114
Diospyros virginiana		3			12	3.797
Liquidambar styraciflua					6	1.899
Ulmus alata					1	0.316
Celtis occidentalis		1	6		19	6.013
Juniperus virginiana			1	5	7	2.215
Maclura pomifera					1	0.316
Pinus virginiana	11				14	4.430
Prunus serotina			1		15	4.747
Gleditsia triacanthos					5	1.582
Liriodendron tulipifera					9	2.848
Quercus alba					1	0.316
Amorpha fruticosa					1	0.316
Quercus rubra				8	9	2.848
Cercis canadensis			1		5	1.582
Asimina triloba					1	0.316
Cornus florida			1		1	0.316
Quercus muehlenbergii				1	1	0.316
TOTAL	12	12	20	20	316	100.000

APPENDIX H

WATTS BAR RESERVOIR SMALL ISLAND FOREST COMMUNITIES: NUMBER OF INDIVIDUALS FOR EACH SUBCANOPY SPECIES SAMPLED BY ISLAND.

Island #	11	14	23	36	55	88	94	101	149	168
SPECIES	NUMBER OF INDIVIDUALS									
Acer saccharinum	8		2	7	5	1	1			3
Cornus amomum	4				3	1	2		2	1
Ligustrum sinense	2	6	1		5	2	6	9	10	
Cephalanthus occidentalis	1							3		
Amorpha fruticosa	1		6			1	1			1
Robinia pseudoacacia		4								
Almus serrulata		2	2	4	3	2				
Fraxinus pennsylvanica			2							
Betula nigra			1							1
Platanus occidentalis			1							
Salix nigra			1					1		
Albizia julibrissin				1						
Ulmus americana						3				
Acer rubrum						3				1
Liquidambar styraciflua						2				
Acer negundo						1		3	2	3
Juniperus virginiana							5			
Prunus serotina							1			2
Celtis occidentalis									1	1
Quercus rubra									1	
Diospyros virginiana										1
Ulmus alata										1
Sassafras albidum										1
Quercus alba										
Nyssa sylvatica										
Amelanchier arborea										
Juglans nigra										
Quercus muehlenbergii										
Viburnum cassinoides										
Cercis canadensis										
TOTAL	16	12	16	12	16	16	16	16	16	16

APPENDIX H

Island #	171	266	277	300	301		
SPECIES	NUMBER OF INDIVIDUALS					TOTAL	PERCENT
Acer saccharinum	1					28	12.500
Cornus amomum	1		2	3		19	8.482
Ligustrum sinense	1			2		44	19.643
Cephalanthus occidentalis						4	1.786
Amorpha fruticosa	2					12	5.357
Robinia pseudoacacia						4	1.786
Almus serrulata	3		4			20	8.929
Fraxinus pennsylvanica					1	3	1.339
Betula nigra						2	0.893
Platanus occidentalis					1	2	0.893
Salix nigra						2	0.893
Albizia julibrissin						1	0.446
Ulmus americana	1		1	1		6	2.679
Acer rubrum	2	7	3	2		18	8.036
Liquidambar styraciflua		1				3	1.339
Acer negundo	4			3		16	7.143
Juniperus virginiana				1	5	11	4.911
Prunus serotina		1		1		5	2.232
Celtis occidentalis	1			3		6	2.679
Quercus rubra						1	0.446
Diospyros virginiana			1		1	3	1.339
Ulmus alata						1	0.446
Sassafras albidum						1	0.446
Quercus alba		1				1	0.446
Nyssa sylvatica		1				1	0.446
Amelanchier arborea		1				1	0.446
Juglans nigra			1			1	0.446
Quercus muehlenbergii					5	5	2.232
Viburnum cassinoides					2	2	0.893
Cercis canadensis					1	1	0.446
TOTAL	16	12	12	16	16	224	100.000

APPENDIX I

WATTS BAR RESERVOIR SMALL ISLAND FOREST COMMUNITIES: NUMBER OF INDIVIDUALS FOR EACH SHRUB STRATA SPECIES SAMPLED BY ISLAND.

Island #	11	14	23	36	55	88	94	101	149	168
SPECIES	NUMBER OF INDIVIDUALS									
Ligustrum sinense	185	88	5		10	4	51	90	353	8
Cornus amomum	25	12	3	2	6		33	50	14	7
Cephalanthus occidentalis	2							2		
Amorpha fruticosa	2		11	11		31	4	2	6	1
Alnus serrulata		22	52	50	16	7		1		2
Ulmus americana		6			1	1	4			
Gleditsia triacanthos		2								
Juniperus virginiana		1				1	5			1
Acer saccharinum				9	4	4				2
Acer rubrum					1					
Taxodium distichum					1					
Liquidambar styraciflua						1				
Betula nigra								2		
Fraxinus pennsylvanica								2		
Sassafras albidum										8
Acer negundo										3
Albizia julibrissin										
Amelanchier arborea										
Cornus florida										
Pinus virginiana										
Nyssa sylvatica										
Fagus grandifolia										
Robinia pseudoacacia										
Liriodendron tulipifera										
Berchemia scandens										
Prunus serotina										
Salix nigra										
Cercis canadensis										
Viburnum prunifolium										
Rhamnus caroliniana										
Celtis occidentalis										
Quercus muehlenbergii										
Crataegus intricata										
Ulmus alata										
TOTAL	214	131	71	72	39	49	97	149	373	32

APPENDIX I (continued)

Island #	171	266	277	300	301		
SPECIES	NUMBER OF INDIVIDUALS					TOTAL	PERCENT
Ligustrum sinense	6		6	12		818	55.836
Cornus amomum	3	2	31	2	7	197	13.447
Cephalanthus occidentalis	2					6	0.410
Amorpha fruticosa	1					69	4.710
Alnus serrulata	7		49			206	14.061
Ulmus americana						12	0.819
Gleditsia triacanthos						2	0.137
Juniperus virginiana	1	2	1	3	4	19	1.297
Acer saccharimum	1					20	1.365
Acer rubrum		14	1			16	1.092
Taxodium distichum						1	0.068
Liquidambar styraciflua		10				11	0.751
Betula nigra			4			6	0.410
Fraxinus pennsylvanica	1					3	0.205
Sassafras albidum						8	0.546
Acer negundo						3	0.205
Albizia julibrissin		5	3			8	0.546
Amelanchier arborea		4				4	0.273
Cornus florida		1				1	0.068
Pinus virginiana		3				3	0.205
Nyssa sylvatica		3				3	0.205
Fagus grandifolia		1				1	0.068
Robinia pseudoacacia		5				5	0.341
Liriodendron tulipifera			1			1	0.068
Berchemia scandens			3	6	3	12	0.819
Prunus serotina			5	3	3	11	0.751
Salix nigra					1	1	0.068
Cercis canadensis					5	5	0.341
Viburnum prunifolium					3	3	0.205
Rhamnus caroliniana					5	5	0.341
Celtis occidentalis					1	1	0.068
Quercus muehlenbergii					2	2	0.137
Crataegus intricata					1	1	0.068
Ulmus alata					1	1	0.068
TOTAL	22	50	104	26	36	1465	100.000

APPENDIX J

WATTS BAR RESERVOIR SMALL ISLAND FOREST COMMUNITIES
IMPORTANCE VALUES FOR EACH SUBCANOPY SPECIES
SAMPLED BY ISLAND.

Island #	11	14	23	36	55
SPECIES	IMPORTANCE VALUE				
Acer saccharinum	53.217		22.724	52.312	33.999
Cornus amomum	16.059				14.636
Ligustrum sinense	9.305	38.866	4.200		24.289
Cephalanthus occidentalis	4.914				
Amorpha fruticosa	4.710		21.006		
None	11.795	15.000	11.111	16.667	12.222
Robinia pseudoacacia		34.471			
Almus serrulata		11.663	6.309	21.674	14.853
Fraxinus pennsylvanica			12.695		
Betula nigra			9.591		
Platanus occidentalis			5.288		
Salix nigra			7.076		
Albizia julibrissin				9.348	
Ulmus americana					
Acer rubrum					
Liquidambar styraciflua					
Acer negundo					
Juniperus virginiana					
Prunus serotina					
Celtis occidentalis					
Quercus rubra					
Diospyros virginiana					
Ulmus alata					
Sassafras albidum					
Quercus alba					
Nyssa sylvatica					
Amelanchier arborea					
Juglans nigra					
Quercus muehlenbergii					
Viburnum cassinoides					
Cercis canadensis					
TOTAL	100.000	100.000	100.000	100.001	99.999

APPENDIX J (continued)

Island #	88	94	101	149	168
SPECIES	IMPORTANCE VALUE				
Acer saccharinum	8.504	8.195			20.078
Cornus amomum	4.611	8.317		12.062	4.500
Ligustrum sinense	8.411	26.718	36.489	39.484	
Cephalanthus occidentalis			17.734		
Amorpha fruticosa	4.543	6.011			4.915
None	11.429	12.727	14.074	11.795	11.111
Robinia pseudoacacia					
Alnus serrulata	6.996				
Fraxinus pennsylvanica					
Betula nigra					4.915
Platanus occidentalis					
Salix nigra			11.943		
Albizia julibrissin					
Ulmus americana	12.895				
Acer rubrum	21.145				4.915
Liquidambar styraciflua	16.820				
Acer negundo	4.647		19.760	15.796	14.068
Juniperus virginiana		23.301			
Prunus serotina		14.731			15.769
Celtis occidentalis				11.368	4.500
Quercus rubra				9.495	
Diospyros virginiana					5.511
Ulmus alata					4.915
Sassafras albidum					4.801
Quercus alba					
Nyssa sylvatica					
Amelanchier arborea					
Juglans nigra					
Quercus muehlenbergii					
Viburnum cassinoides					
Cercis canadensis					
TOTAL	100.001	100.000	100.000	100.000	99.998

APPENDIX J (continued)

Island #	171	266	277	300	301
SPECIES	IMPORTANCE VALUE				
Acer saccharinum	5.357				
Cornus amomum	4.020		10.708	10.461	
Ligustrum sinense	6.115			8.652	
Cephalanthus occidentalis					
Amorpha fruticosa	8.040				
None	10.833	14.394	13.462	11.111	11.111
Robinia pseudoacacia					
Almus serrulata	13.195		18.700		
Fraxinus pennsylvanica					9.458
Betula nigra					
Platanus occidentalis					5.184
Salix nigra					
Albizia julibrissin					
Ulmus americana	10.283		7.368	9.955	
Acer rubrum	14.248	43.275	27.615	10.196	
Liquidambar styraciflua		7.705			
Acer negundo	19.840			16.198	
Juniperus virginiana				4.295	26.847
Prunus serotina		10.944		4.885	
Celtis occidentalis	8.069			24.248	
Quercus rubra					
Diospyros virginiana			16.819		7.898
Ulmus alata					
Sassafras albidum					
Quercus alba		7.371			
Nyssa sylvatica		8.062			
Amelanchier arborea		8.249			
Juglans nigra			5.327		
Quercus muehlenbergii					25.564
Viburnum cassinoides					9.538
Cercis canadensis					4.402
TOTAL	100.000	100.000	99.999	100.001	100.002

APPENDIX J (continued)

SPECIES	TOTAL	PERCENT
Acer saccharinum	204.386	13.626
Cornus amomum	85.374	5.692
Ligustrum sinense	202.529	13.502
Cephalanthus occidentalis	22.648	1.510
Amorpha fruticosa	49.225	3.282
None ?	188.842	12.589
Robinia pseudoacacia	34.471	2.298
Alnus serrulata	93.390	6.226
Fraxinus pennsylvanica	22.153	1.477
Betula nigra	14.506	0.967
Platanus occidentalis	10.472	0.698
Salix nigra	19.019	1.268
Albizia julibrissin	9.348	0.623
Ulmus americana	40.501	2.700
Acer rubrum	121.394	8.093
Liquidambar styraciflua	24.525	1.635
Acer negundo	90.309	6.021
Juniperus virginiana	54.443	3.630
Prunus serotina	46.329	3.089
Celtis occidentalis	48.185	3.212
Quercus rubra	9.495	0.633
Diospyros virginiana	30.228	2.015
Ulmus alata	4.915	0.328
Sassafras albidum	4.801	0.320
Quercus alba	7.371	0.491
Nyssa sylvatica	8.062	0.537
Amelanchier arborea	8.249	0.550
Juglans nigra	5.327	0.355
Quercus muehlenbergii	25.564	1.704
Viburnum cassinoides	9.538	0.636
Cercis canadensis	4.402	0.293
TOTAL	1500.001	100.000

VITA

Stephenie L. Hammons was born in Lexington, Kentucky on September 15, 1972. She attended school in the Lincoln County public system, where she graduated from Lincoln County High School, Stanford, Kentucky in May, 1990. She entered Western Kentucky University, Bowling Green, Kentucky during August, 1990 where in May, 1994 she received the Bachelor of Science in Biology and Chemistry and teaching certification in secondary education. She then entered the Master's program in Botany at The University of Tennessee, Knoxville in August, 1994 where she was awarded a graduate teaching assistantship. In April, 1996, she was honored by a Chancellor's Teaching Award, which recognized her teaching efforts in the General Biology and General Botany undergraduate laboratories. She officially received the Master's of Science degree in May, 1996. She is presently pursuing employment in one of the East Tennessee secondary school systems.