

**CRAYFISH  
SURVEYS FOR  
CATAWBA-WATEREE  
RELICENSING**

**Prepared for**

**Duke Power Company  
Charlotte, NC**

by

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## Table of Contents

Introduction.....	1
Methods.....	2
Results and Discussion .....	3
Acknowledgements.....	5
References.....	5
Figures.....	6
Tables .....	16

## **Introduction**

The Catawba River originates on the eastern side of the Blue Ridge Mountains in western North Carolina, with the resulting river initially flowing east, then south through the Piedmont of North and South Carolina. South of Great Falls, South Carolina, the Catawba River merges with several creeks to form the Wateree River, which flows through the Sandhills and upper Coastal Plain of South Carolina until it joins the Congaree River. The resulting Cooper/Santee rivers enter the Atlantic Ocean near Charleston, South Carolina.

Land use in the Catawba River Basin (12,266 km<sup>2</sup>) transitions from forest in the mountainous Blue Ridge escarpment headwaters region to increasingly agricultural and urban as the river flows south. Population growth in the watershed is rapidly expanding; the 2000 census numbers totaled 1,494,485. Charlotte Metropolitan Area, the major urban area in the watershed, is the second fastest growing region in the country behind only Las Vegas, Nevada.

Land use in the Wateree River Basin is dominated by silviculture and agriculture with limited urbanization.

Beginning with Lake Wylie in 1904 and concluding with Lake Norman in 1963, Duke Power Company (hereafter referred to as Duke) constructed eleven reservoirs and thirteen powerhouses on the Catawba River. In North Carolina, these reservoirs are, from north to south: Lake James, Lake Rhodhiss, Lake Hickory, Lookout Shoals Lake, Lake

Norman, Mountain Island Lake, and a part of Lake Wylie in North Carolina. The South Carolina Catawba River reservoirs are a section of Lake Wylie, Fishing Creek Reservoir, Great Falls-Dearborn Reservoir, Cedar Creek Reservoir, and Lake Wateree (Figure 1). These reservoirs and their associated tailwaters exhibit a wide range of morphometric, hydrological, and water quality characteristics, especially in such characteristics as elevation, surface area, depth, morphology, retention time, and trophic status.

Clearly, the Catawba-Wateree River Basin is a working landscape. Urbanization, agriculture, silviculture, and reservoirs are dominant landscape features. Within this working landscape, native species continue to exist, some successfully and some with great difficulty. To assess potential impacts from hydroelectric facilities on freshwater crayfish, Duke contracted with Alderman Environmental Services, Inc. to report on incidental crayfish collected by Duke personnel and other contracted individuals completing aquatic surveys within the Catawba and Wateree rivers and selected tributaries.

### **Methods**

Crayfish were collected from twenty-six areas of North and South Carolina incidental to other survey activities completed by Duke personnel and other contracted individuals (Figure 2 and Table 1). In general, crayfish were collected by hand, dip net, or during electrofishing sampling.

## **Results and Discussion**

Eight freshwater crayfish species were documented as extant within the areas surveyed for this project: *Cambarus (Cambarus) bartonii*, *Cambarus (Cambarus) howardi*, *Orconectes (Gremicambarus) virilis* (**exotic species**), *Cambarus (Puncticambarus) acuminatus* complex, *Cambarus (Puncticambarus)* species, *Procambarus (Ortmannicus) acutus*, *Procambarus (Scapulicambarus) clarki* (**exotic species**), and *Procambarus (Depressicambarus) latimanus*. Table 1 provides a list of species collected at each survey site, and figures 3 – 10 document collection locations for each species.

Although the Catawba-Wateree River Basin may provide habitat for approximately 20 crayfish species (Table 2), about half are largely restricted to the Coastal Plain or lower Wateree River Basin. As seen in Table 2, most of these taxa are considered currently secure by the conservation community (Taylor et al. 1996). Of these 20 species, 3 are of conservation concern in North or South Carolina (Clamp et al. 1999, SCDNR 2004): *Cambarus (Cambarus) howardi*, *Cambarus (Puncticambarus) hobbsorum*, and *Procambarus (Ortmannicus) blandingii*. *Procambarus (Ortmannicus) blandingii* should exist in the Coastal Plain of the Wateree River Basin. *Cambarus (Cambarus) howardi* was documented from 4 locations within the study area, and *Cambarus (Puncticambarus) hobbsorum* has been collected from the Fishing Creek Subbasin in South Carolina during other studies (Price 2005). None of these 3 species is state listed endangered, threatened, or of special concern in North or South Carolina.

As a result of these surveys, a species of taxonomic interest was discovered in Grannie's Quarter Creek. According to Dr. John Cooper (personal communication 2005), a potentially undescribed species, *Cambarus (Puncticambarus)* sp., exists in this creek. More specimens will be acquired to determine the appropriate classification of this taxon.

Currently, one of the most significant threats to native crayfish species in the Catawba-Wateree River Basin is the introduction and expansion of exotic crayfish species. To date, 2 exotic species, *Orconectes (Gremicambarus) virilis* and *Procambarus (Scapulicambarus) clarki*, are now known from this basin in North Carolina. Cooper (2003b) considers both species to be competitive threats to native crayfish taxa. As a result of this study, the first record of *P. clarki* was documented from the basin in Mountain Island Lake. Also, during the past, *O. virilis* was only known from Linville River in Burke County and Long Creek in Gaston County. As a result of this study, we now know the species is widely dispersed within the upper Catawba River Basin in North Carolina. It appears that there has been a significant population expansion since the species was first discovered in the Linville River in 1993. Because we have a very limited understanding about past distributions and abundances of native crayfish taxa within this river basin, we will never fully understand the ongoing and future impacts from introductions of exotic crayfish species.

## **Acknowledgements**

Gene Vaughan coordinated the collection of specimens for this study. Significant taxonomic assistance, particularly for South Carolina specimens, was provided by Dr. John E. Cooper.

## **References**

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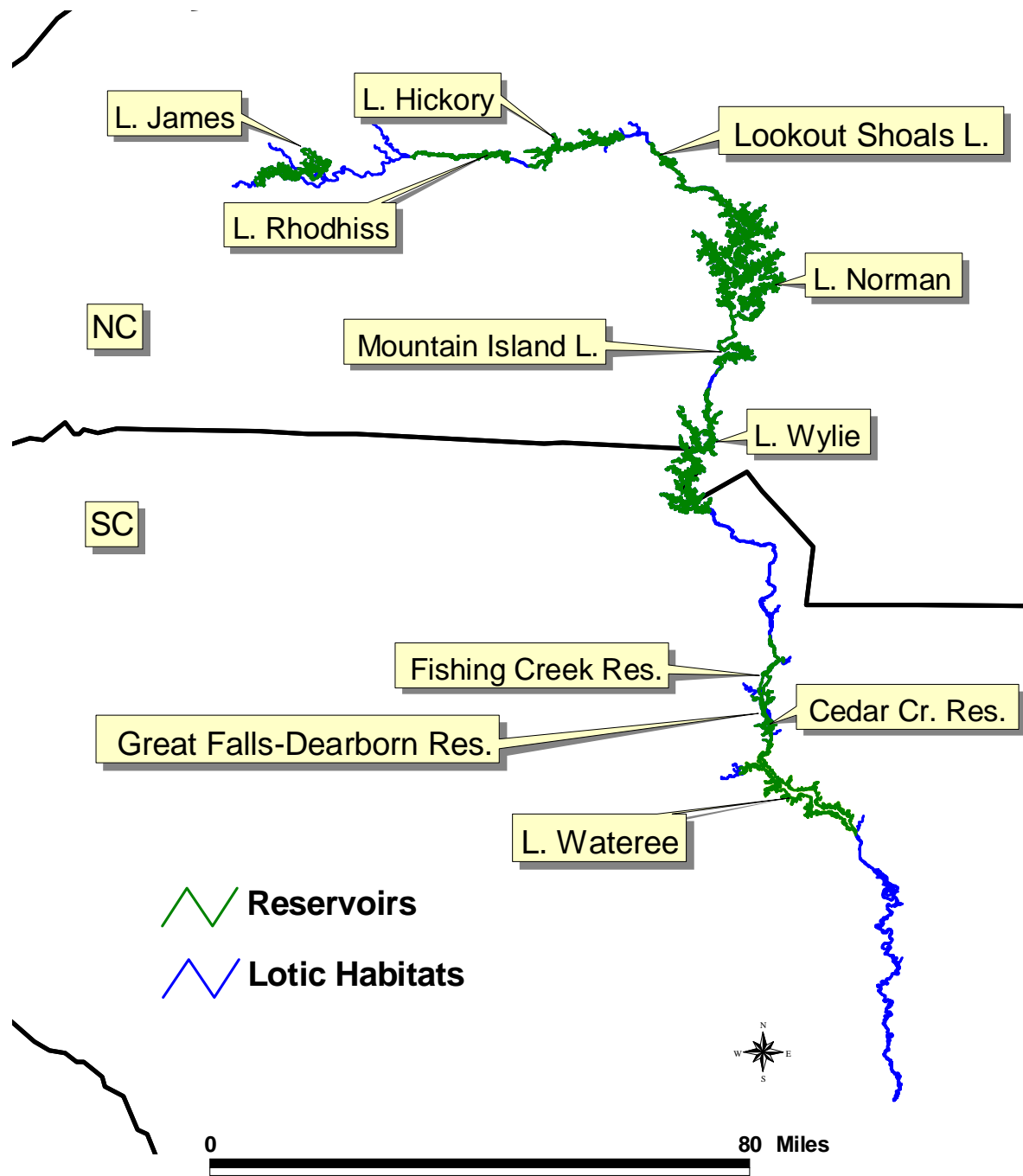
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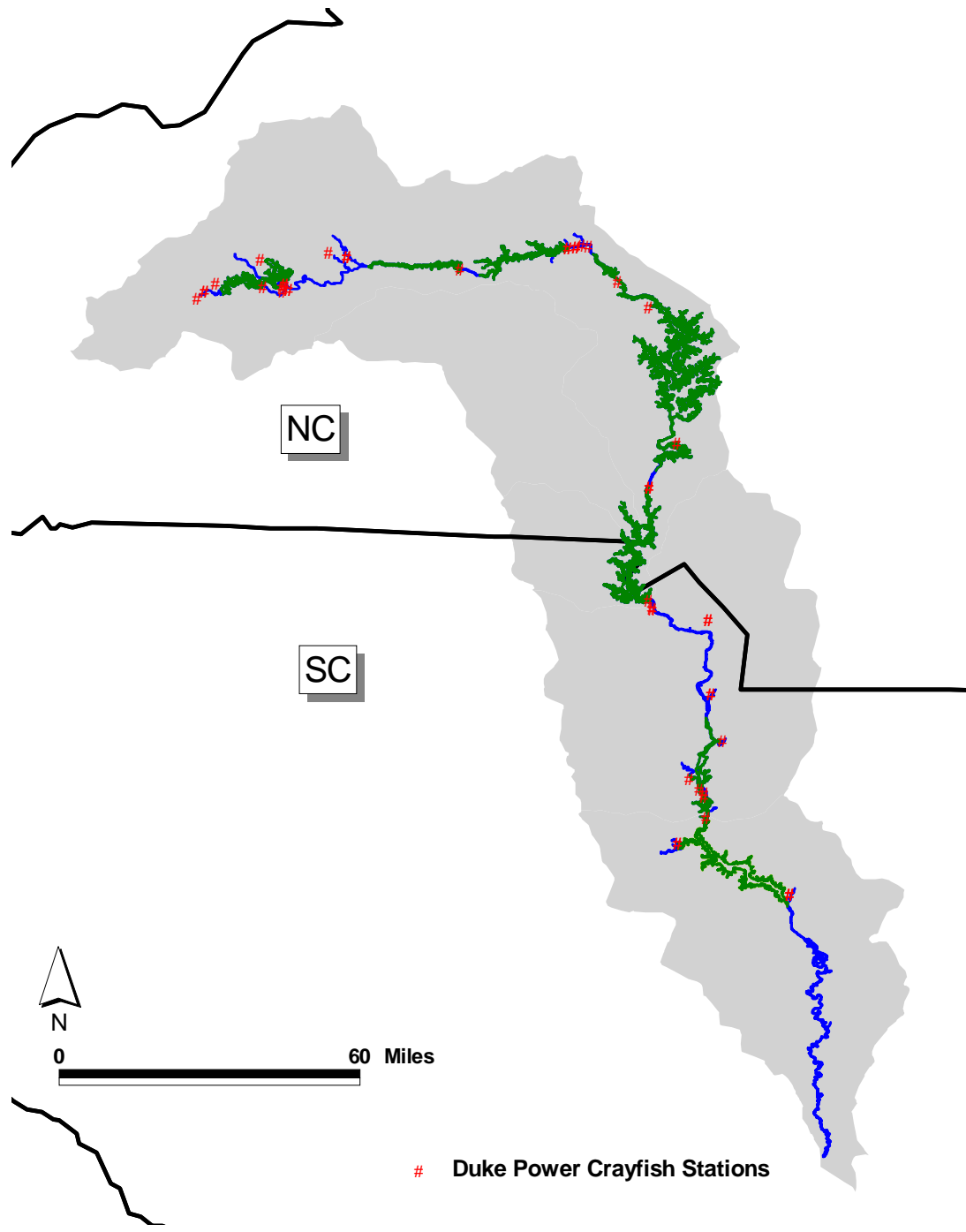
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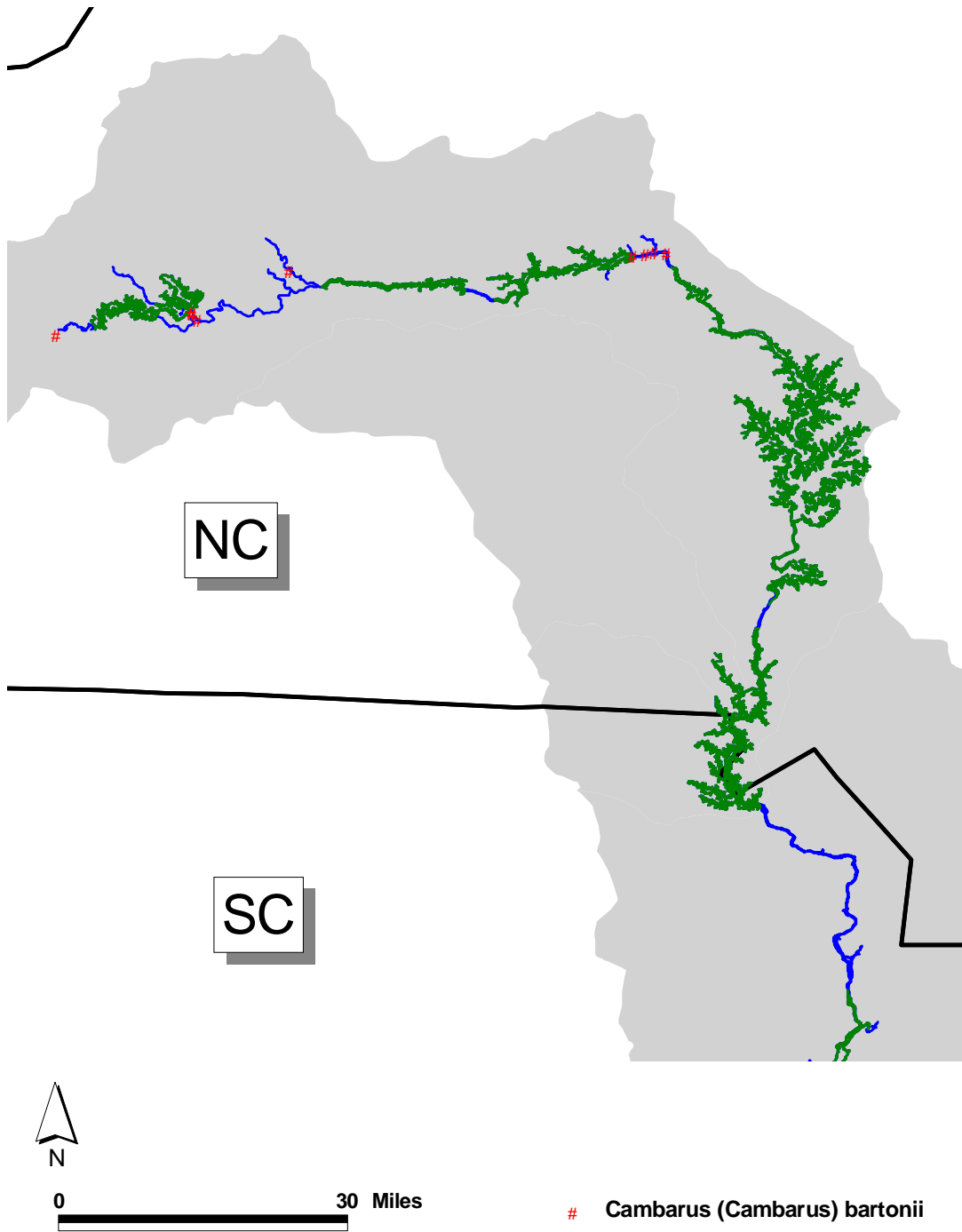
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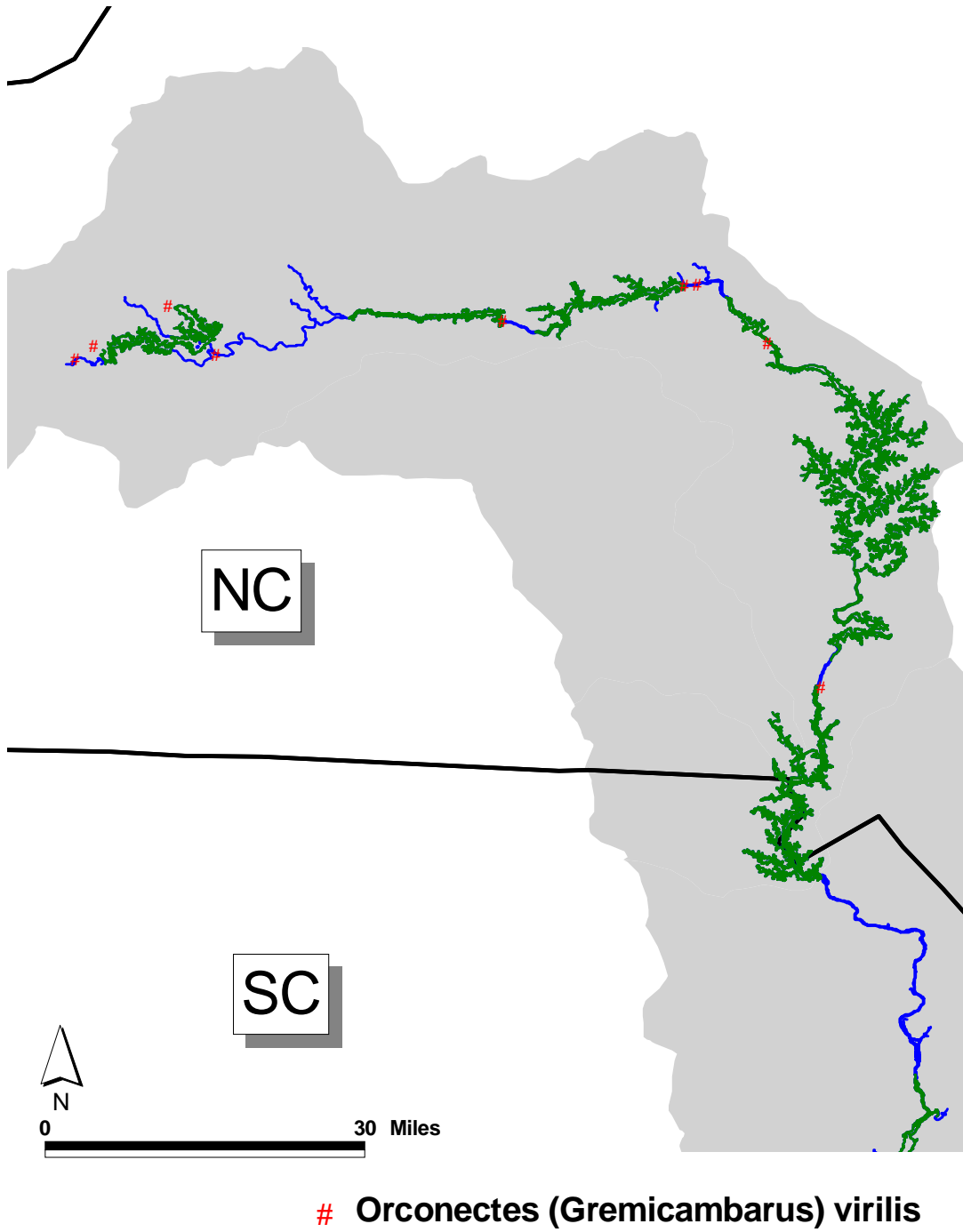
**Figure 1.** Lakes and reservoirs in the North and South Carolina study area



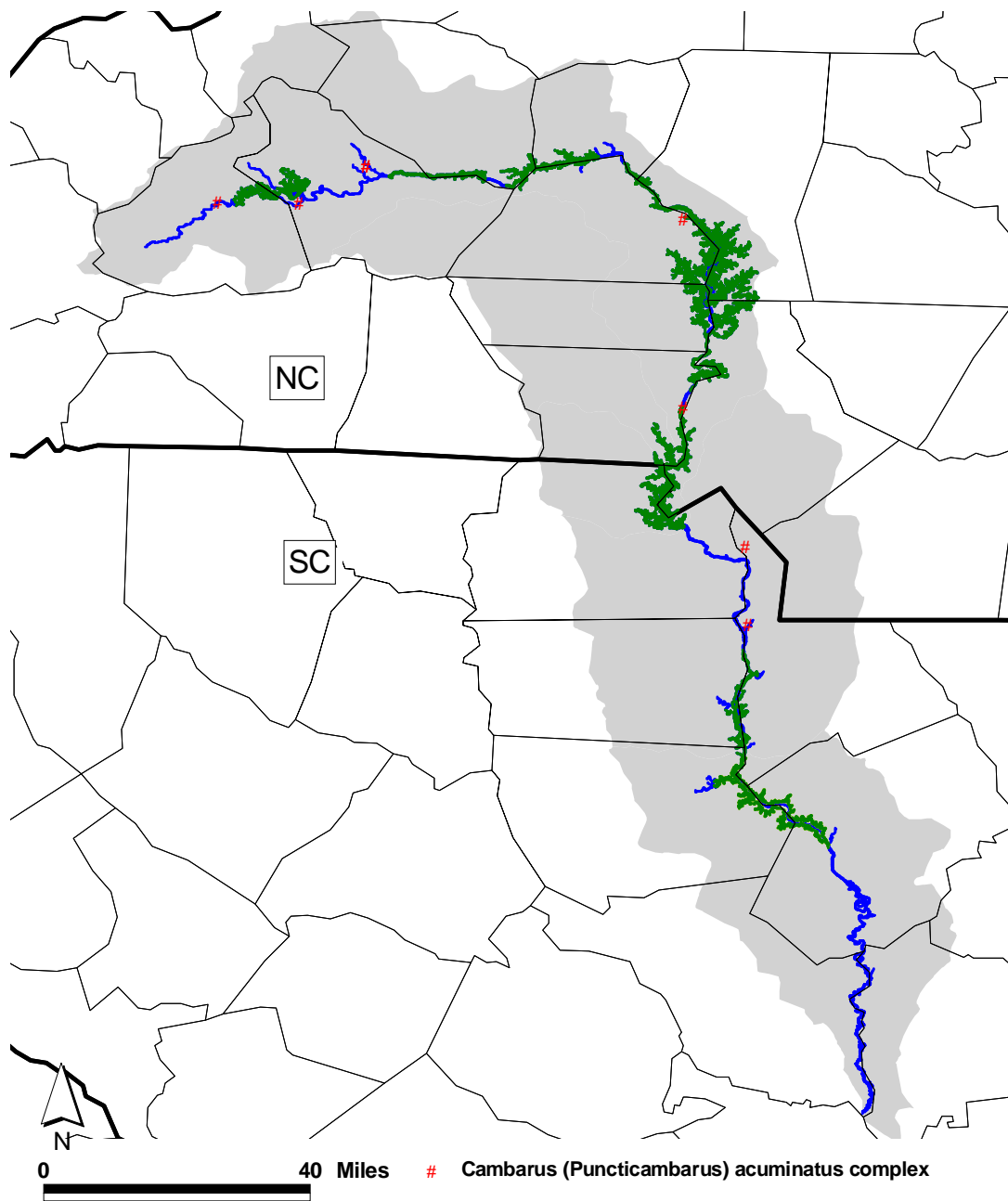
**Figure 2.** Freshwater crayfish survey areas within the North and South Carolina study area



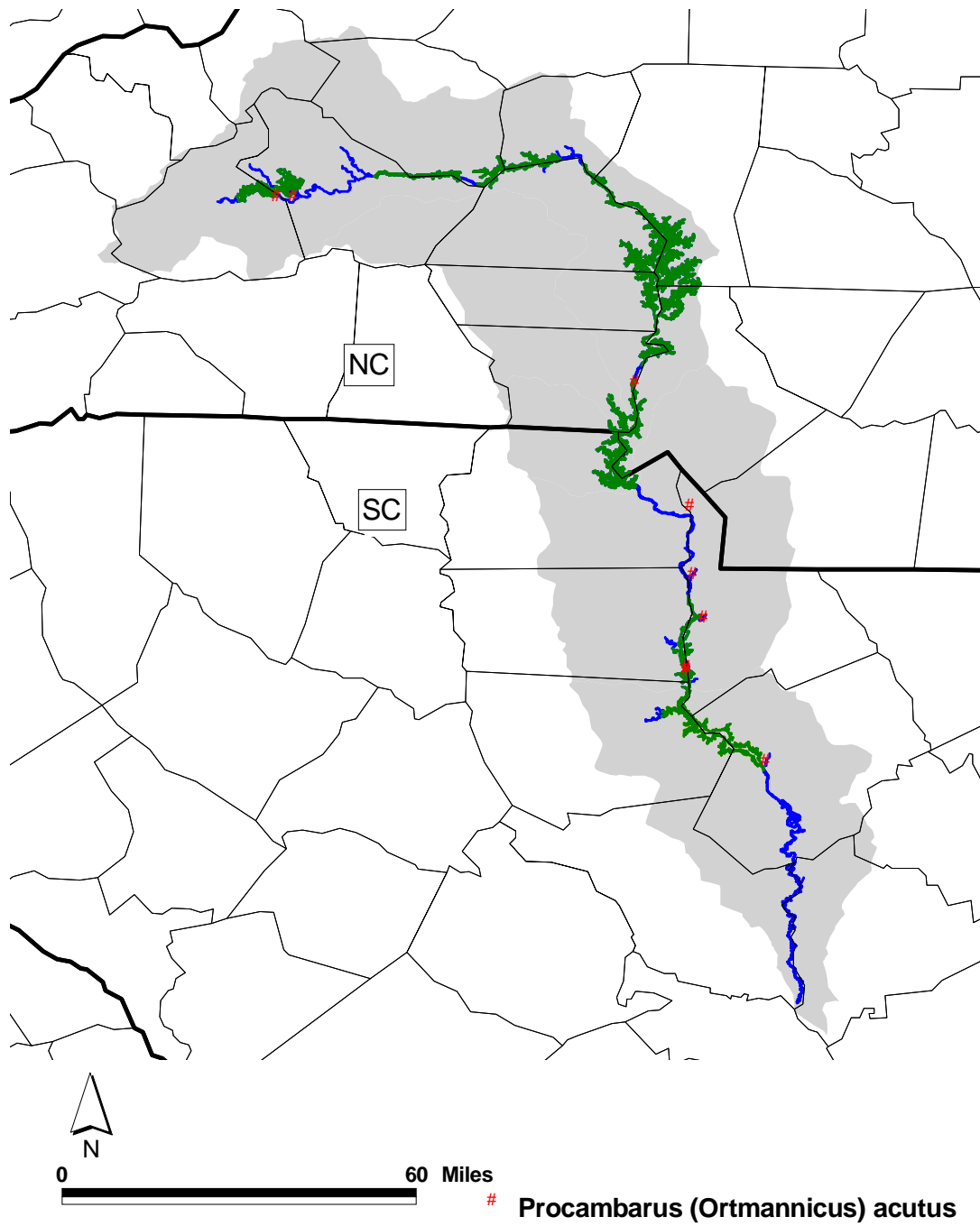
**Figure 3.** Freshwater crayfish survey areas with *Cambarus (Cambarus) bartonii* present



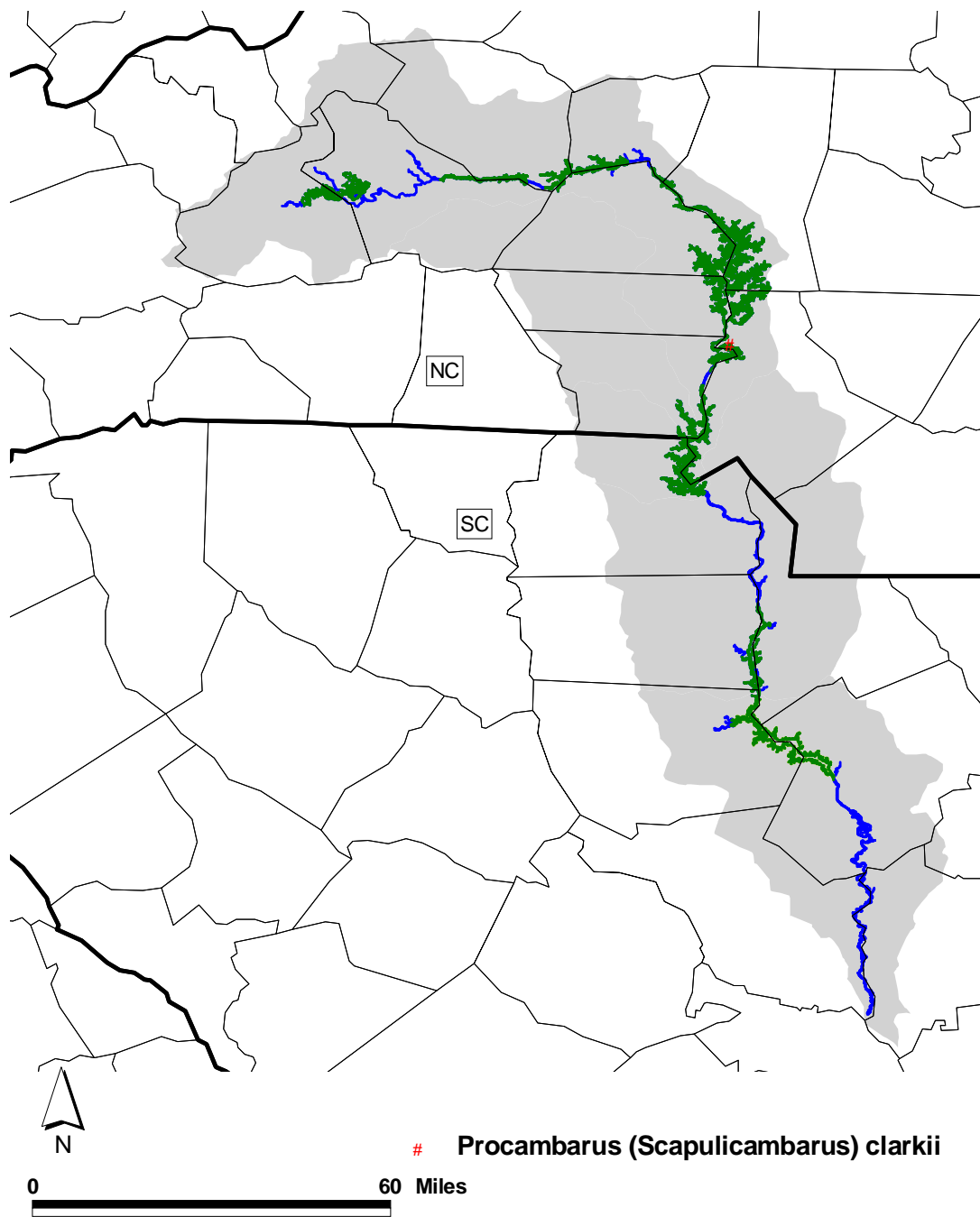
**Figure 4.** Freshwater crayfish survey areas with *Orconectes (Gremicambarus) virilis* present



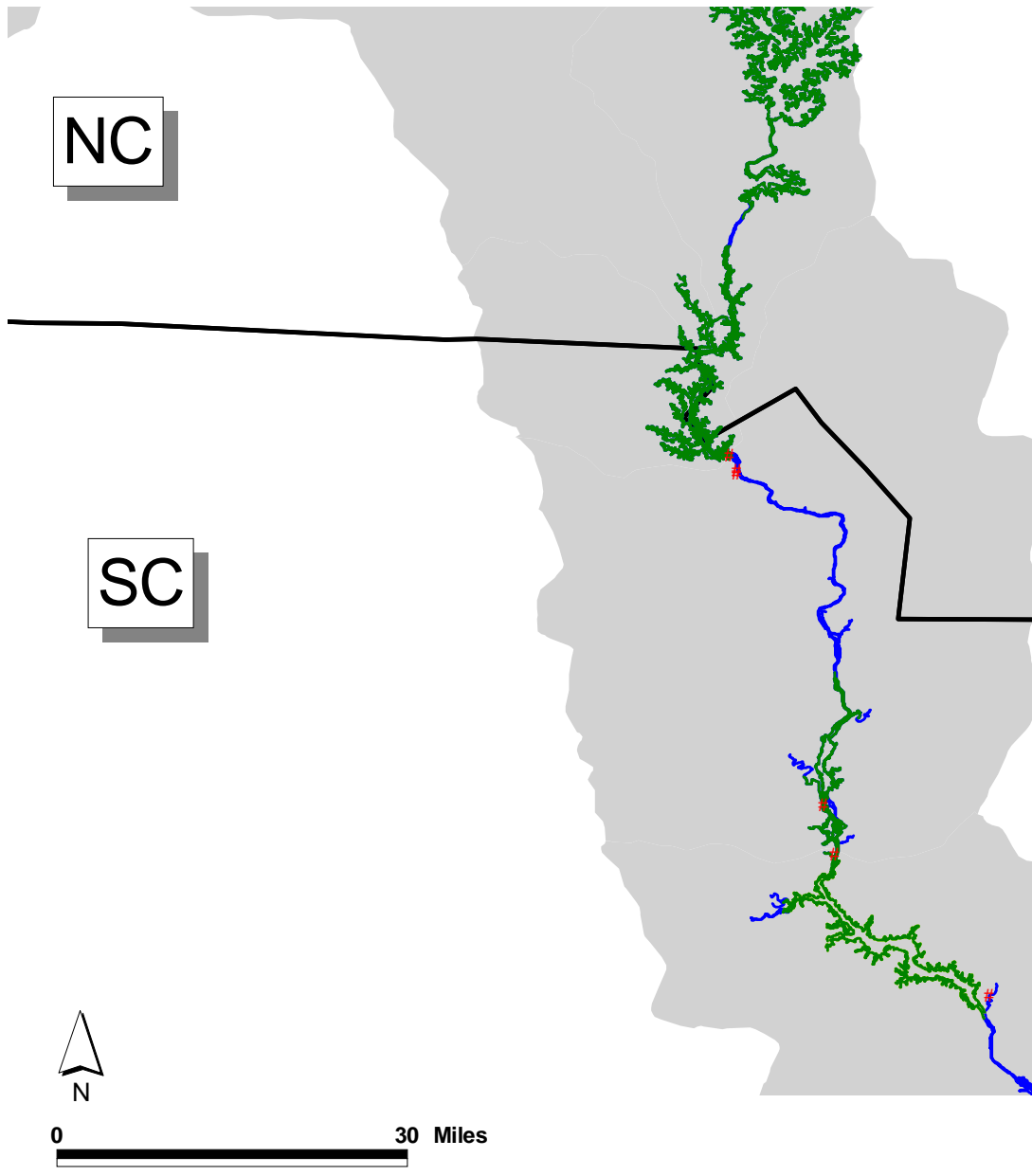
**Figure 5.** Freshwater crayfish survey areas with *Cambarus (Puncticambarus) acuminatus* complex present



**Figure 6.** Freshwater crayfish survey areas with *Procambarus (Ortmannicus) acutus* present

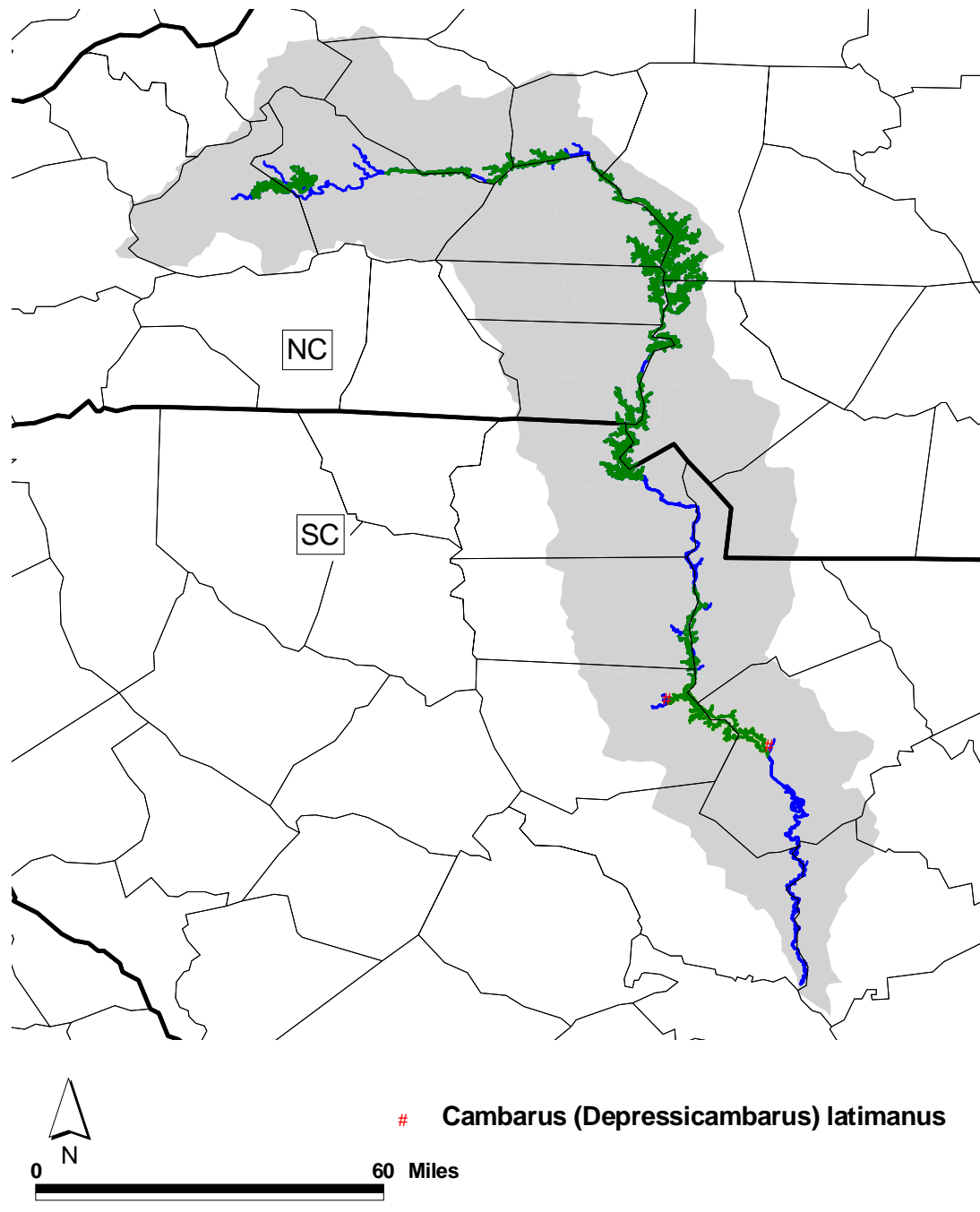


**Figure 7.** Freshwater crayfish survey areas with *Procambarus (Scapulicambarus) clarkii* present

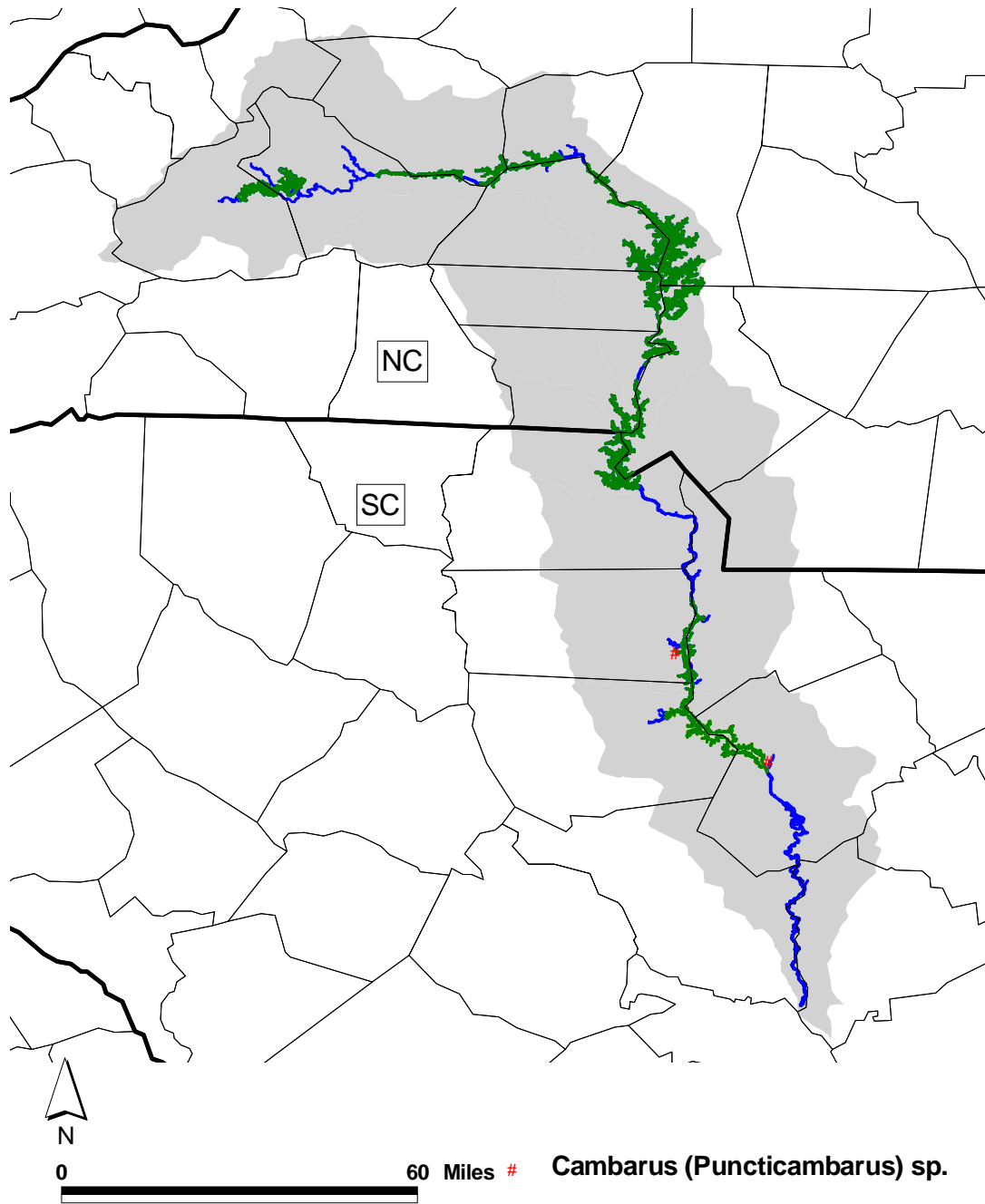


# **Cambarus (Cambarus) howardi**

**Figure 8.** Freshwater crayfish survey areas with *Cambarus (Cambarus) howardi* present



**Figure 9.** Freshwater crayfish survey areas with *Cambarus (Depressicambarus) latimanus* present



**Figure 10.** Freshwater crayfish survey areas with *Cambarus (Puncticambarus) sp.* present

Table 1. Crayfish survey results

Date	Stream Name	County	State	River Mile	Species	No.
20040715	Catawba R.	McDowell	NC	298.4	<i>Cambarus (C.) bartonii</i>	1
20040407	Catawba R.	McDowell	NC	296	<i>Orconectes (G.) virilis</i>	12
20040407	Catawba R.	McDowell	NC	296	<i>Cambarus (P.) acuminatus</i> complex	2
20040713	N Fk Catawba R	McDowell	NC	1.5	<i>Orconectes (G.) virilis</i>	3
20040628	Catawba River Bypassed Reach	Burke	NC	5.2	<i>Procambarus (O.) acutus</i>	3
20040713	Linville R.	Burke	NC	5.2	<i>Cambarus (C.) bartonii</i>	1
20050321	Linville R.	Burke	NC	5-6	<i>Orconectes (G.) virilis</i>	5+
20040818	Muddy Cr.	Burke	NC	1.6	<i>Cambarus (P.) acuminatus</i> complex	3
20040713	Paddy Creek Bypassed Reach	Burke	NC	1.3	<i>Cambarus (C.) bartonii</i>	1
20040628	Paddy Creek Bypassed Reach	Burke	NC	0.2	<i>Procambarus (O.) acutus</i>	6
20040721	Bridgewater 01	Burke	NC	279.2	<i>Cambarus (C.) bartonii</i>	2
20040406	Bridgewater Tailrace	Burke	NC	278.3	<i>Cambarus (C.) bartonii</i>	3
20040721	Bridgewater 04	Burke	NC	278.3	<i>Cambarus (C.) bartonii</i>	1
20040721	Bridgewater 04	Burke	NC	278.3	<i>Cambarus (P.) acuminatus</i> complex	1
20040819	Warriors Fk.	Burke	NC	4.8	<i>Cambarus</i> sp. (poor quality specimen)	1
20040715 & 20040819	Johns R.	Burke	NC	3.4	<i>Cambarus (P.) acuminatus</i> complex	14
20040715 & 20040819	Johns R.	Burke	NC	3.4	<i>Cambarus (C.) bartonii</i>	1
20040716	Rhodhiss Tailwater	Caldwell/Burke	NC	247.9	<i>Orconectes (G.) virilis</i>	19
20040407	Oxford Tailwater	Catawba/Alexander	NC	229.8	<i>Orconectes (G.) virilis</i>	1
20040407	Oxford Tailwater	Catawba/Alexander	NC	229.8	<i>Cambarus (C.) bartonii</i>	2
20040700	Oxford Loc. 1	Catawba/Alexander	NC	229.8	<i>Cambarus (C.) bartonii</i>	1
20040700	Oxford Loc. 1	Catawba/Alexander	NC	229.8	<i>Orconectes (G.) virilis</i>	1
20040719	Oxford Loc. 3	Catawba/Alexander	NC	227.9	<i>Cambarus (C.) bartonii</i>	2
20040719	Lower Little R.	Alexander	NC	0.25	<i>Cambarus (C.) bartonii</i>	1
20040715	Lookout Shoals Tailwater	Catawba/Iredell	NC	220.1	<i>Orconectes (G.) virilis</i>	1
20040607	Balls Creek	Catawba	NC	1.5	<i>Cambarus (P.) acuminatus</i> complex	18
20040708	Mtn. Island L. @ mouth of McDowell Cr.	Mecklenburg	NC	1.3	<i>Procambarus (S.) clarkii</i>	1
20040607	Long Creek	Mecklenburg	NC	0.7	<i>Procambarus (O.) acutus</i>	2

Table 1 (continued). Crayfish survey results

Date	Stream Name	County	State	River Mile	Species	No.
20040607	Long Creek	Mecklenburg	NC	0.7	<i>Orconectes (G.) virilis</i>	15
20040607	Long Creek	Mecklenburg	NC	0.7	<i>Cambarus (P.) acuminatus</i> complex	11
20040729	Wylie Tailwater 02	York	SC	142.7	<i>Cambarus (C.) howardi</i>	1
20040729	Wylie Tailwater 03	York	SC	142.6	<i>Cambarus (C.) howardi</i>	1
20040412	Wylie Tailwater	York	SC	143.5	<i>Cambarus (C.) howardi</i>	4
20040615	Six Mile Creek	Lancaster	SC	2.2	<i>Procambarus (O.) acutus</i>	2
20040615	Six Mile Creek	Lancaster	SC	2.2	<i>Cambarus (P.) acuminatus</i> complex	1
20040615	Waxhaw Creek	Lancaster	SC	1.1	<i>Procambarus (O.) acutus</i>	6
20040615	Waxhaw Creek	Lancaster	SC	1.1	<i>Cambarus (P.) acuminatus</i> complex	4
20040614	Cane Cr.	Lancaster	SC	3.3	<i>Procambarus (O.) acutus</i>	6
20040614	Fishing Cr.	Chester	SC	2.9	<i>Cambarus (P.)</i> sp.? (poor quality specimens)	2
20040802	Fishing Cr. Tailwater	Chester	SC	104.7	<i>Cambarus (C.) howardi</i>	1
20040728	Great Falls Long Bypassed Reach	Chester/Lancaster	SC	2.6	<i>Procambarus (O.) acutus</i>	2
20040413	Great Falls Long Bypassed Reach	Chester/Lancaster	SC	3.2	<i>Procambarus (O.) acutus</i>	13
20040800	Rocky Cr. Tailwater	Lancaster/Fairfield/Chester co. line	SC	99.2	<i>Cambarus (C.) howardi</i>	1
20040614	Big Wateree Cr.	Fairfield	SC	3.8	<i>Cambarus</i> sp. (poor quality specimen)	1
20040614	Big Wateree Cr.	Fairfield	SC	3.8	<i>Cambarus (D.) latimanus</i>	2
20040615	Grannies Quarter Creek	Kershaw	SC	2.3	<i>Procambarus (O.) acutus</i>	2
20040615	Grannies Quarter Creek	Kershaw	SC	2.3	<i>Cambarus (C.) howardi</i>	2
20040615	Grannies Quarter Creek	Kershaw	SC	2.3	<i>Cambarus (D.) latimanus</i>	2
20040615	Grannies Quarter Creek	Kershaw	SC	2.3	<i>Cambarus (Puncticambarus)</i> sp.	2

**Table 2.** Freshwater crayfish confirmed or expected in the Catawba-Wateree River Basin (Cooper 2003, Price 2005, Eversole 2004)

Species	2005 Status (SCDNR, NCWRC, FWS, Taylor et al. 1996)*
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<i>Cambarus (Cambarus) bartonii</i>	CS
<i>Cambarus (Cambarus) howardi</i>	NC W, SC CC
<i>Cambarus (Depressicambarus) reduncus</i>	CS
<i>Cambarus (Depressicambarus) reflexus</i>	CS
<i>Cambarus (cf. Hiaticambarus) sp.</i>	undetermined
<i>Cambarus (Jugicambarus) asperimanus</i>	CS
<i>Cambarus (Jugicambarus) dubius</i>	CS
<i>Cambarus (Lacunicambarus) diogenes</i>	CS
<i>Cambarus (Puncticambarus) acuminatus</i> complex	CS
<i>Cambarus (Puncticambarus) sp. nov.</i>	undetermined
<i>Cambarus (Puncticambarus) hobbsorum</i>	SC CC
<i>Procambarus (Ortmannicus) acutus</i>	CS
<i>Procambarus (Ortmannicus) blandingii</i>	SC CC
<i>Procambarus (Ortmannicus) chacei</i>	CS
<i>Procambarus (Ortmannicus) enoplosternum</i>	CS
<i>Procambarus (Ortmannicus) lepidodactylus</i>	CS
<i>Procambarus (Scapulicambarus) troglodytes</i>	CS
<i>Procambarus (Scapulicambarus) clarkii</i> INTRODUCED	CS
<i>Orconectes (Gremicambarus) virilis</i> INTRODUCED	CS
<i>Faxonella clypeata</i>	CS

**\* Species statuses according to South Carolina Department of Natural Resources (SCDNR) - proposed; North Carolina Wildlife Resources Commission (NCWRC); or U.S. Fish and Wildlife Service (FWS):**

CC – Crayfish of Conservation Concern (SC designation)

W – Watch List

SC – Special Concern Species

T – Threatened Species

E – Endangered Species

CS – Currently Secure according to Taylor et al. 1996