

# **Banding and Genetic Sampling of Willow Flycatchers in Tennessee: 2000**



Willow Flycatcher. Photo courtesy of Rick and Nora Bowers. ©

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## Background

The willow flycatcher (*Empidonax traillii*) is a small neotropical migratory bird, with four (Unitt 1988) or five (Browning 1993) described subspecies. The western and southwestern populations are riparian obligate breeders, and have suffered serious declines as riparian habitats have been lost or modified (USFWS 1993). The southwestern race (*E.t. extimus*) has been listed as endangered (USFWS 1995), and there is much concern over the status of Sierra Nevada populations (*E.t. brewsteri*) in California (Flett and Sanders 1987).

The current subspecific taxonomy of the willow flycatcher is derived from a series of beak, wing, and tail measurements, as well as plumage coloration (Unitt 1987, Browning 1993). These differences, although widely accepted, are still considered inconclusive by some and can not be used to separate all individuals of all subspecies reliably (Unitt 1987). Because subspecies designations for the willow flycatcher carry significant practical management and conservation implications, the U.S. Geological Survey undertook a genetic analysis to re-evaluate subspecific taxonomy. Such genetic analyses have been successfully used to provide information on taxonomy, genetic variation, historical patterns of population fragmentation, hybridization, and population structure of other species (Avice, 1994, Zink et al. 1995), but no such analyses have been conducted for the willow flycatcher. Accurately evaluating subspecies designations will give resource managers a more solid foundation upon which to base and justify management and conservation actions. These same genetic analyses will also provide information on the level of genetic variation present in the species, subspecies, and specific populations.

In order to perform a comprehensive genetic analysis, it is important to obtain flycatcher genetic samples from throughout the specie's breeding range. The willow flycatcher occurs across most of the conterminous United States, and in the northeast region breeds as far south as Tennessee and North Carolina. The flycatcher is a comparatively new breeding species in Tennessee, first documented as nesting in the state in 1958 (Knight 1944, Nicholson 1997). Spreading into Tennessee from the northeast (initially breeding only in Carter and nearby Johnson counties), it spread across a broad front by about 1970 and extended its range to the extreme southwest corner of the state by the mid-1990s (Nicholson 1997). This makes Tennessee one of southeastern-most portions of the willow's flycatcher's breeding range, and of great interest as a region from which to obtain genetic samples.

Currently, the willow flycatcher is an uncommon summer resident in the state, though it may be locally more common in a few areas such as Johnson County and Cross Creeks National Wildlife Refuge (in Stewart County). Nicholson (1997) summarized typical breeding habitat as moist, shrubby areas or shrub swamps, with willows as the dominant woody plant. Territories may be extensive habitat patches, or in narrow bands of willows along streams or lakeshores. Less commonly, flycatchers occur in drier shrubby thickets of osage orange, plum, and blackberry, among pastures or hayfields (sometimes termed "oldfield" habitat). Nests are open cups usually built in the upright crotch of a small tree or bush, with Tennessee nests averaging 1.8 m high and typically containing 3 to 4 eggs (Nicholson 1997).

The objective of the field work outlined in this report was to capture and take blood samples from willow flycatchers breeding in Tennessee, with the goal of obtaining samples from populations in different parts of the state. The blood samples will be used in high-resolution DNA analysis techniques to evaluate the current taxonomic classification of the willow flycatcher.

## **Methods**

I located Willow flycatcher breeding sites by surveying potentially suitable habitat via tape-playback (Sogge et al. 1997), which involves broadcasting flycatcher songs and calls from a handheld tape player. Once a flycatcher was located, I lured the bird into a mist-net by broadcasting another series of willow vocalizations from speakers placed on both sides of the mist-net. Capture usually occurred within a few minutes, and flycatchers were removed from the mist-net immediately after they were caught. I took a series of standard morphological measurements (e.g., bill length and width, weight, etc.) of all flycatchers, and fitted each with a numbered aluminum band from the USGS (formerly US Fish and Wildlife Service) Bird Banding Lab. Blood samples were gathered by clipping the toenail (not the toe), and washing the resulting drop of blood into a micro-vial of buffer solution (per Busch et al. 2000). We have captured and taken blood samples using these techniques from over 1,000 willow flycatchers across the United States, with no resulting mortality or injuries. Blood samples will be analyzed by the summer of 2001.

## **Results**

I located and captured willow flycatchers in two general areas – Cross Creeks National Wildlife Refuge (Stewart County) and Mountain City (Johnson County). These areas were selected because available literature (Knight 1994, Nicholson 1997) and personal communications indicated these as locations where flycatchers could most reliably be located and caught.

### **Cross Creeks National Wildlife Refuge (Figure 1).**

The refuge includes extensive areas of river or pond habitat, typically bordered by agricultural crop land or narrow stringers of tall deciduous trees. There were relatively few habitat patches with the dense, shrub/young tree structure where breeding willow flycatchers might be expected. On 15 June, I surveyed for flycatchers at six potentially suitable patches and detected willow flycatchers at two sites (termed Cross Creeks 1 and Cross Creeks 2). Details for each site are presented below.

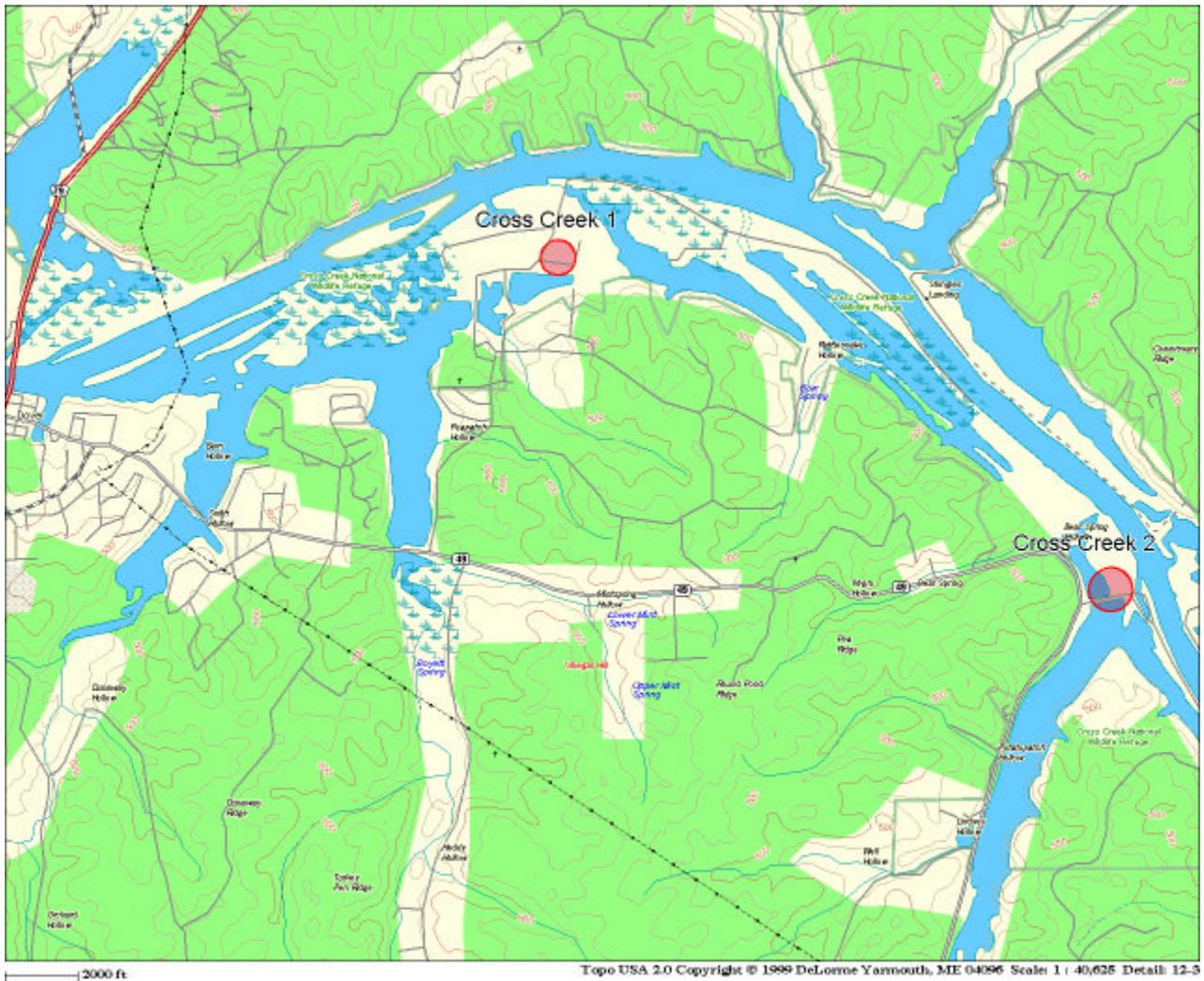


Figure 1. Location of willow flycatcher capture and sampling sites in Cross Creeks National Wildlife Area, Tennessee during June 2000.

*Cross Creeks 1*: N 36° 30.000' W 87° 47.244' (WGS 84 datum, using Garmin GPS 12 global positioning unit without differential correction)

This site was a small basin (surrounded by a dike) that appeared to be a drained pond, with a patch of dense willow (*Salix spp*) and alder (*Alnus spp*) trees varying from 3 to over 10 m in height (Figure 2). A dirt road parallels the south edge, approximately 15 m away from the site. The patch of shrubs/trees was approximately 80-100 m long and varied from 10-25 m wide. The substrate was still muddy at the western end, and included shallow, swampy ponded water at the eastern end (with associated emergent marsh vegetation). The canopy cover was very high and understory very dense throughout most of this patch.

On 15 June, flycatchers responded to the survey with songs (*fitz-bews*) and/or call notes (*whitts*) from what appeared to be two territories (a total of three flycatchers responded). The following morning, flycatchers could be heard in 4 – 5 territories, singing almost continuously from 0430 until 0900 hrs and intermittently after that. I caught a total of four flycatchers (Table 1), located one flycatcher nest (under construction approximately 2 m high in a 4 m shrubby willow), and found another (approximately 4 m high in a 10 m tall willow) that may have been a Willow Flycatcher nest.



Figure 2a. Cross Creeks 1 site, from West.



Figure 2b. Cross Creeks 2 site, from south.



Figure 2c. Interior, Cross Creeks 1 site.



Figure 2d. Interior, Cross Creeks 1 site.

*Cross Creeks 2*: N 36° 28.494' W 87° 44.162' (WGS 84 datum, using Garmin model GPS 12 global positioning unit without differential correction)

This was a small patch of willows surrounding a shallow, water-filled depression (with associated emergent vegetation) created by a “bay” off the main river (Figure 3). Two dirt roads converge at the southeast corner of the patch, with one running on top of the dike that borders the south side of the patch. The depression was roughly circular, and approximately 25 – 35 m in diameter. The stringer of willows bordering the depression varied from 5 to 10 m wide, and the willows ranged from 3 to 8 m tall. Although the middle of the depression was relatively open, the willow stringer had high canopy cover, with dense understory along the edges. On 16 June, I caught the male at one territory (Table 1), and shortly thereafter located the pair’s nest (2 m high in a 2.5 m tall willow). The nest was fully constructed, but no eggs were yet present. Moving to the opposite side of the site, I located another territory and flycatcher nest (1.5 m high in a 2.5 m tall tree; Figure 4) containing 4 eggs, but did not attempt to capture the adults.



Figure 3a. Cross Creeks 2 site, from west.



Figure 3b. Cross Creeks 2 site from north.



Figure 3c. Interior edge, Cross Creeks 2 site.



Figure 3d. Interior center, Cross Creeks 2 site.



Figure 4. Willow flycatcher nest and eggs at Cross Creeks 2 site, 16 June 2000.

Table 1. Willow flycatchers captured and banded at Cross Creeks National Wildlife Refuge, TN, on 16 June 2000.

Band Number	Site	Age	Sex	Comments
1740-51601	Cross Creek 1	Adult	Unknown	
1740-51602	Cross Creek 1	Adult	Unknown	
1740-51604	Cross Creek 1	Adult	Unknown	
1740-51605	Cross Creek 1	Adult	Unknown	
1740-51606	Cross Creek 2	Adult	Unknown	

At 1245 hrs, I returned to the refuge headquarters and met briefly with Walter Neasbit (acting refuge manager). We discussed the results of my survey and banding work. Neasbit noted that the types of habitat patches in which I found the flycatchers are very uncommon on the refuge, and occur primarily “by accident.” That is, they are not habitats that are useful to waterfowl or other game species of interest to the refuge. These habitats usually develop where refuge maintenance activities lapse, and persist for only a short while.

## Mountain City (Figure 5):

I surveyed for flycatchers at a number of road-side patches both north and southeast of the town of Mountain City. I located flycatchers at only two sites (termed Mountain City North and Mountain City South). Details for each site are presented below.

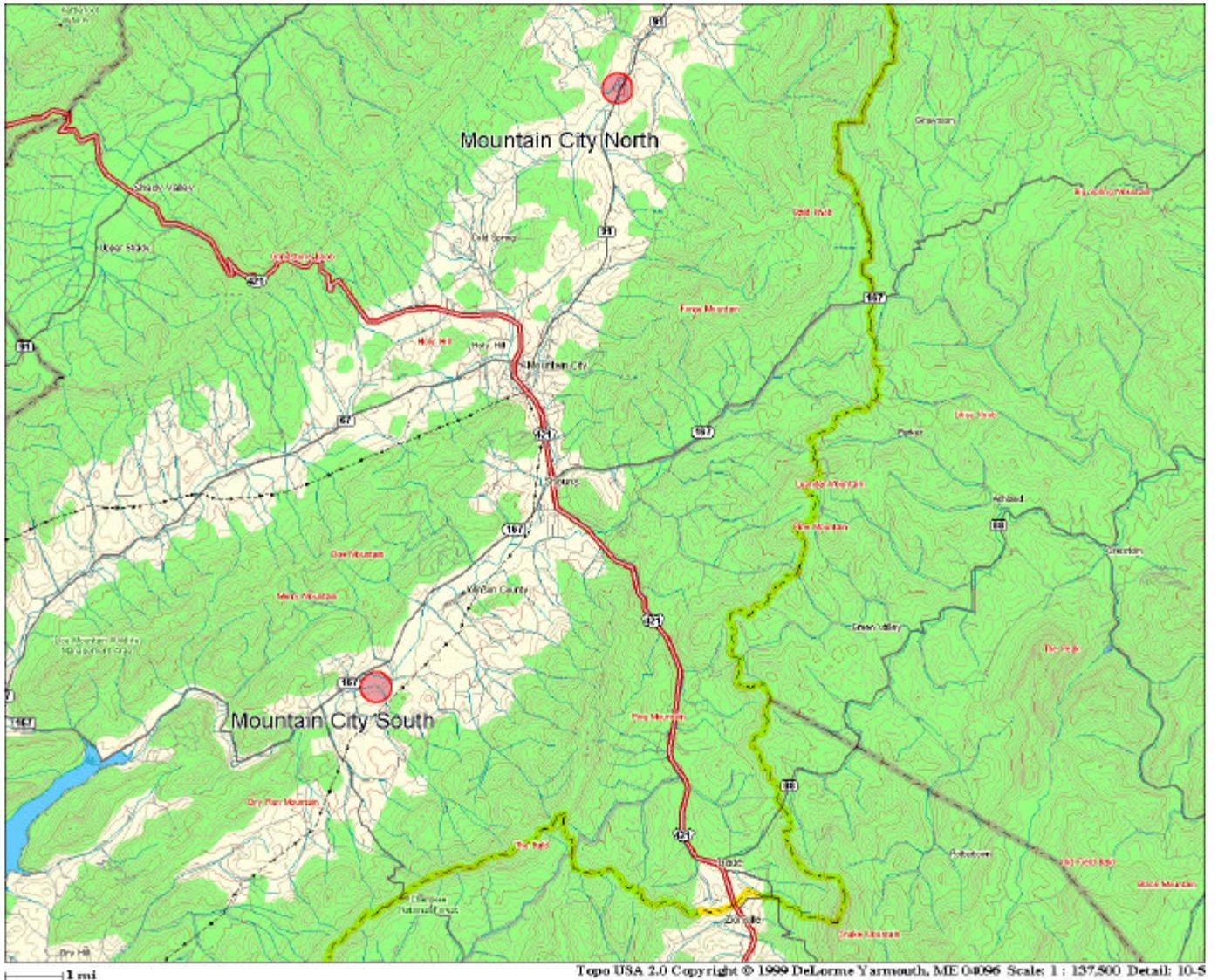


Figure 5. Location of willow flycatcher capture and sampling sites near Mountain City, Tennessee during June 2000.

*Mountain City North*: N 36° 32.621' W 81° 46.526' (WGS 84 datum, using Garmin model GPS 12 global positioning unit without differential correction)

This site borders (literally) the west side of Hwy 91, just north of Cole Springs Road. The patch is a 150 – 200 m long narrow stringer of dense deciduous shrubs/trees straddling a 1 m wide irrigation ditch (Figure 6). Canopy height varies from 4 to 8 m. Although difficult to estimate from the roadside, patch width appears to range from only 5 to 10 m in width.

On 18 June, I detected a Willow Flycatcher singing and *whitting* strongly from the exposed branches of a large willow less than 5 m from the roadside. Due to heavy traffic along the highway, I decided it would probably be ineffective, and potentially unsafe, to attempt capture along the highway border, and so did not try to catch this flycatcher.



Figure 6. Mountain City North willow flycatcher site.

*Mountain City South*: N 36° 23.649' W 81° 51.114' (WGS 84 datum, using Garmin model GPS 12 global positioning unit without differential correction)

On 19 June, I detected Willow Flycatchers in a narrow stringer of young willows (roughly 4 m tall), bordering a patch old-field habitat in a rural housing/farming area southeast of Mountain City near the town of Neva (Figure 7). The willow stringer was only 2-3 plants wide (for a maximum width of 5 – 10 m, sometimes only 1 – 3 m) and approximately 80 m long. The old-field habitat patch was roughly oval (approximately 80 m by 50 m), and was comprised of 1 to 1.5 m tall herbaceous and shrubby vegetation interspersed among large brambles of blackberry bushes (up to 2 m tall). A small (approximately 15 m diameter) pond was present near the center of the patch. Based on simultaneously singing birds, there appeared to be approximately 6 flycatcher territories. I captured and banded five Willow Flycatchers (Table 2), including a female with an active brood patch (verifying breeding at the site).



Figure 7a. Mountain City South site, from west



Figure 7b. Pond at Mountain City South site.



Figure 7a. Mountain City South site, interior



Figure 7b. Mountain City South site, interior.

Table 2. Willow Flycatchers captured at Mountain City South site (near Neva, TN), 19 June 2000.

Band Number	Age	Sex	Comments
1740-51612	Adult	Female	Brood patch present; verifies nesting. Missing middle front toenail on right foot.
1740-51613	Adult	Unknown	Missing inner toenail on right foot and front center toenail on left foot.
1740-51614	Adult	Unknown	
1740-51615	Adult	Unknown	
1740-51616	Adult	Unknown	

## Acknowledgements

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