

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



Willow Flycatcher from the New River, North Carolina

**Mark K. Sogge, Ecologist**

**U.S.G.S. Forest and Rangeland Ecosystem Science Center,  
Colorado Plateau Field Station, Flagstaff, AZ**

**December 2000**

## 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 North Carolina – in the early 1940's, Traill's Flycatcher (a lumping of Willow and Alder flycatchers) was known only as a spring and fall migrant within the state (Pearson et al. 1942). Indeed, Pearson et al. (1942) go so far as to suggest "It is unlikely that it will ever be found breeding in North Carolina, unless perchance in some of the higher mountains." However, by 1980 willow flycatcher nests were discovered near North Wilkesboro and Raleigh, and breeding was suspected in the North Carolina mountains south to Franklin and Brevard (Potter et al. 1980). Thus, it appears that willow flycatchers expanded their breeding range from more northern states into the central and northern sections of North Carolina. This makes North Carolina 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.

The objective of the field work outlined in this report was to capture and take blood samples from willow flycatchers breeding in North Carolina, focusing on portions of the New River where flycatchers are relatively abundant (J. Gerwin, *pers. comm.*). 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). Using these techniques, we have captured and taken blood samples 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

### **New River, near Jefferson, North Carolina (Figure 1).**

I surveyed for willow flycatchers along roadside portions of the New River (in Ashe County), from approximately 5 km east of Jefferson downstream to near New River State Park. I found flycatchers singing and calling at several locations along the river, and captured a total of five flycatchers from two sites (Table 1). Details on each site (termed New River 1 and New River 2) follow.

Table 1. Willow flycatchers captured and banded at the New River, North Carolina, on 18 June 2000.

Band Number	Site	Age	Sex	Comments
1740-51607	New River 1	Adult	Female	Active brood patch, therefore incubating eggs.
1740-51608	New River 1	Adult	Unknown	
1740-51609	New River 1	Adult	Unknown	
1740-51610	New River 2	Adult	Unknown	
1740-51611	New River 2	Adult	Unknown	

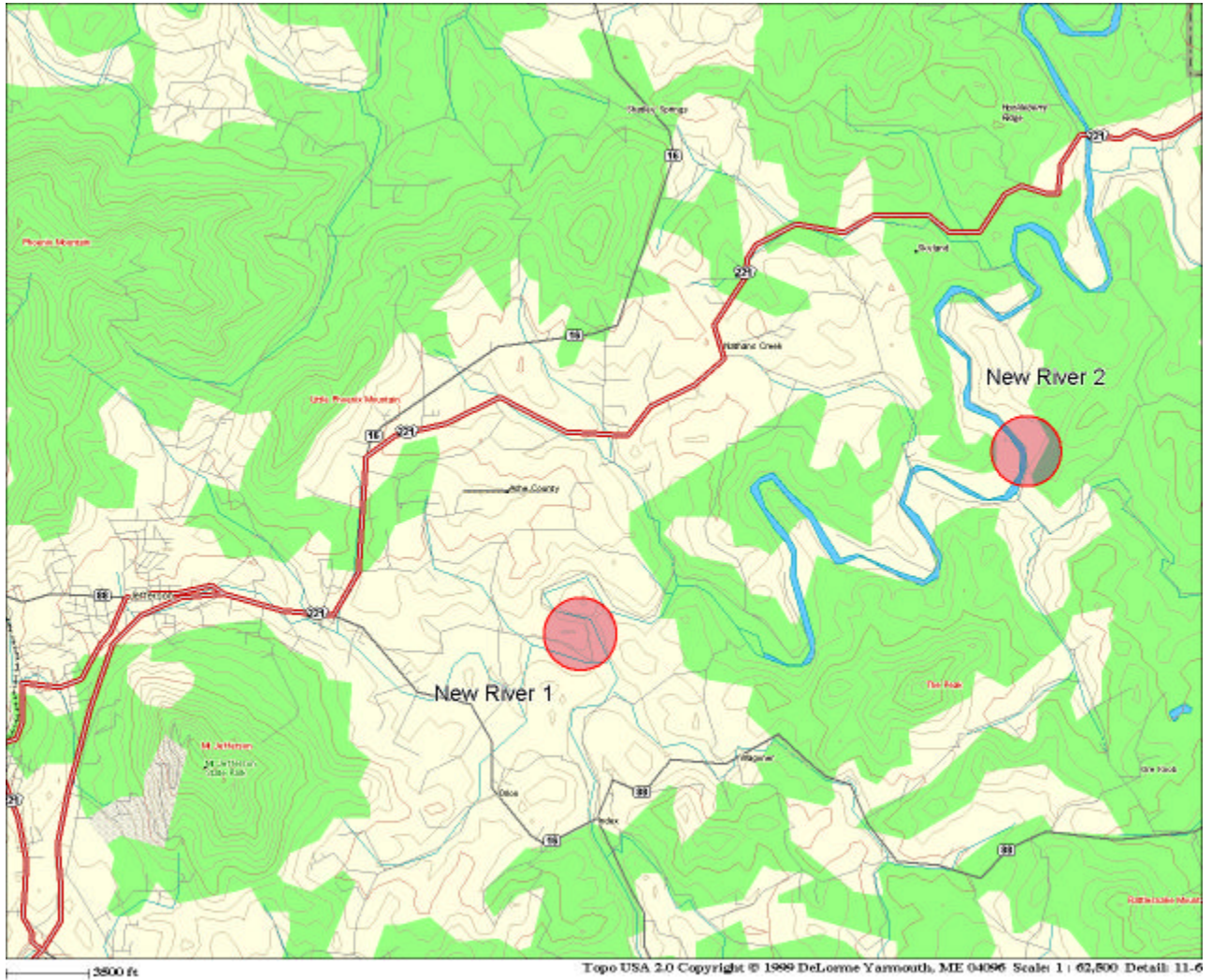


Figure 1. Location of willow flycatcher capture and sampling sites along the New River, in Ashe County North Carolina, during June 2000.



**New River 1** N 36° 25.061' W 81° 24.490' (WGS 84 datum, using Garmin GPS 12 global positioning unit without differential correction)

This site was located on the west shore of the New River, along Joe Little Road (approximately 5 km east of Jefferson). The two flycatcher territories here encompassed a diverse range of vegetation types. Nearest the river was a 5 to 15 m wide band of dense herbaceous vegetation and blackberry plants (Figure 2a). This was bordered on the west by a dirt road (Joe Little Road), then a 40 – 50 m wide patch of what appeared to be an ornamental conifer trees (roughly 4-5 m tall) interspersed among dense, tall (1 – 1.5 m high) herbaceous vegetation (Figure 2b). This area was bordered on the west by hillside with a 30 m wide band of tall conifers, planted in dense rows. During my survey and capture work, I noted flycatchers foraging in and singing among all of these habitat areas. Indeed, a pair of flycatchers became very agitated and gave strong alarm calls when I entered into the rows of tall conifers, suggesting that a nest might be located therein. The inside of this tall conifer strip (Figure 2c) looked remarkably similar to dense saltcedar (*Tamarix ramosissima*) habitat in which willow flycatchers often nest in Arizona and New Mexico (Sogge and Marshall 2000). I caught three flycatchers at this site (Table 1), and verified local breeding based on an active brood patch on a captured female (evidence that it was incubating eggs).



Figure 2a. East portion of New River 1 site.



Figure 2b. West portion of New River 1 site.



Figure 2c. Interior of tall conifer habitat.

*New River 2* N 36° 26.2226 W 81° 20.740' (WGS 84 datum, using Garmin GPS 12 global positioning unit without differential correction)

Willow flycatchers occur here in streamside vegetation on both sides of the New River along Fulton Reeves Road (approximately 10 km east-northeast of Jefferson). I detected two flycatcher territories here, with the flycatchers singing from the narrow (roughly 2 to 3 m wide) bands of 2 to 3 m tall cattail and blackberry bushes on both sides of the river. The habitat strips were bordered by dirt roads (e.g., Fulton Reeves Road) and/or pastures and agricultural lands (Figure 3). This section of river is popular for water-based recreation, and I noticed at three rafting and canoeing groups during the roughly one hour that I was there. I captured two flycatchers at this site (Table 1).



Figure 3. Willow flycatcher capture site (New River 2) along the New River.

## Acknowledgements

I would not have been able to collect these samples without the assistance of several people. My thanks to Paul Super (Great Smoky Mountains Institute), who helped track down contacts and information on potential breeding locations. I also thank John Gerwin (North Carolina State Museum of Natural History) for sharing his knowledge of local flycatcher distribution and ecology. I greatly appreciate the help of the staff of the North Carolina Wildlife Resources Commission, who made it possible to receive a scientific collection permit on very short notice. This project was currently funded by a variety of cooperating agencies including the U.S. Geological Survey, the U.S. Bureau of Reclamation, Arizona Game and Fish Department, and Northern Arizona University.

## Literature Cited

- Avise, J.C. 1994. Molecular markers, natural history, and evolution. Chapman and Hall, New York.
- Browning, M.R. 1993. Comments on the taxonomy of *Empidonax traillii* (willow flycatcher). *Western Birds* 24:241-257.
- Busch, J.D., M.P. Miller, E.H. Paxton, M.K. Sogge and P. Keim. 2000. Genetic variation in the endangered southwestern willow flycatcher. *Auk* 117:586-595.
- Flett, M.A. and S.D. Sanders. 1987. Ecology of a Sierra Nevada population of willow flycatchers. *Western Birds* 18:37-42.
- Hoelzel, A.R. and A. Green. 1992. Analysis of population-level variation by sequencing PCR-amplified DNA. Pp 159-188 in *Molecular Genetic Analysis of Populations*, A.R. Hoelzel, *ed.*, Oxford University Press. 315 pp.
- Pearson, S.B., C.S. Brimley and H.H. Brimley. 1940. *Birds of North Carolina*. Bynum Printing Company, Raleigh, North Carolina. 416 pp.
- Potter, E.F., J.F. Parnell and R.P. Teulings. 1980. *Birds of the Carolinas*. University of North Carolina Press, Chapel Hill.
- Sogge, M.K. and R.M. Marshall. 2000. A Survey of Current Breeding habitats. Pages 43-56 in *Status, Ecology, and Conservation of the Southwestern Willow Flycatcher*. Finch, D.M. and S.H. Stoleson (eds). USDA Forest Service Rocky Mountain Research Station General Technical Report RMRS-GTR-60. 131 pp
- Sogge, M.K., R.M. Marshall, T.J. Tibbitts and S.J. Sferra. 1997. A Southwestern Willow Flycatcher Natural History Summary and Survey Protocol. National Park Service Technical Report NPS/NAUCPRS/NRTR-97/12. 37 pp.
- Unitt, P. 1987. *Empidonax traillii extimus*: An endangered subspecies. *Western Birds* 18:137-162.
- U.S. Fish and Wildlife Service. 1993. Proposal to list the southwestern willow flycatcher as an endangered species and to designate critical habitat. *Federal Register* 58:39495-39522 (July 23, 1993).
- U.S. Fish and Wildlife Service. 1995. Final Rule Determining Endangered Status for the Southwestern
- Zink, R.M., S. Rohwer, A.V. Andreev, and D.L. Dittmann. 1995. Trans-Beringia comparisons of mitochondrial DNA differentiation in birds.