

A TARGETED MIST NET CAPTURE TECHNIQUE FOR THE WILLOW FLYCATCHER

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ABSTRACT: We developed a targeted mist-netting technique designed to capture Willow Flycatchers (*Empidonax traillii*) at their breeding sites. The technique uses a variety of conspecific vocalizations to lure territorial flycatchers into mist nets. Songs and calls are broadcast from a portable CD player with speakers placed on both sides of the net. By playing vocalizations commonly heard during territorial interactions, and switching the sound output from one speaker to the other, flycatchers are readily drawn into the nets. This capture technique is highly effective, captures birds of both sexes, and worked at sites throughout the Willow Flycatcher's breeding range and on its Central American wintering grounds.

Mist netting is an important tool in many avian research projects. Passive netting by deploying and periodically checking nets works well for many studies, especially those set where vegetation is relatively short (approximately net height), the target species are active at the heights sampled by the net, and/or when multiple bird species are sought. Because these conditions do not apply to all areas or studies, targeted trapping methods have been developed for many species (e.g., see McClure 1984). By exploiting behavioral characteristics of a particular species, targeted techniques can be especially effective, even under difficult netting conditions.

Breeding Willow Flycatchers (*Empidonax traillii*) can be captured readily via passive mist netting, especially in relatively short, linear habitats or where nets can be placed near active nests (Sedgwick and Klus 1997). In 1996, we initiated a large-scale Willow Flycatcher research program that required the capture of hundreds of adult flycatchers over much of the species' range. Furthermore, we needed to capture both male and female flycatchers to study sex-based survivorship and movements. This was especially challenging in habitats where thick vegetation in the lower strata and tightly interwoven upper-canopy vegetation often limit the number and location of net lanes. The Southwestern Willow Flycatcher (*E. t. extimus*), our primary target bird, is a federally listed endangered species, so the technique also had to minimize damage to habitat and pose little risk of capture-related injury.

The Willow Flycatcher is an aggressively territorial species (Sedgwick 2000, Sogge 2000), singing and approaching in response to playback of conspecific songs (*fitz-bews*) and calls. This behavior underlies current survey protocols (Sogge et al. 1997) and suggests it can be taken advantage of during banding efforts (McClure 1984: 222). However, our preliminary efforts (1994 and 1995) to capture flycatchers by broadcasting *fitz-bews* from a tape player placed under a mist net met with only limited success. Here, we describe a more effective capture technique that includes a variety

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of flycatcher songs and calls broadcast from a CD player through speakers set on both sides of a mist net.

METHODS

Study Area

We concentrated our banding effort in central Arizona at two main study areas, the Salt River and Tonto Creek inflows to Roosevelt Lake (Gila County) and the lower San Pedro River and its confluence with the Gila River (Pinal County). At both areas, vegetation ranges from 8 to 15 m tall and is composed of dense stands of saltcedar (*Tamarix ramosissima*) and broad-leaf riparian woodland, primarily of Goodding willow (*Salix gooddingii*) and Fremont cottonwood (*Populus fremontii*).

Mist Nets

Because of dense vegetation, we typically used short (length 2.6 and 6 m, height 2.6 m, mesh 38 mm) mist nets suspended between aluminum poles (diameter 1.6 cm, height 122 cm). The height at which we placed the nets (3–4 m at top of net) depended on the height and density of the understory and mid-canopy vegetation. In general, we stayed at least 10 m from active nests. To provide flight lanes for the flycatchers, we tried to place nets so vegetation did not encroach within 2 to 3 m above and on the sides of the net; nets closely surrounded by vegetation worked less well.

Vocalizations

Flycatchers use a variety of vocalizations during their natural interactions and in response to broadcast recorded vocalizations (vocalizations below follow terminology in Sedgwick 2000). Highly agitated and aggressive flycatchers sing at increased rates and use emphatic *fitz-bews*, *creets*, *whits*, *writ-tus* (*wee-oos* of Stein 1963), and *trills* (*churr* of Stein 1963). In some intense confrontations (e.g., physical chase and aggression), flycatchers combine these into patterns sounding roughly like a high-pitched squeaker toy. To obtain vocalizations for our broadcasts, we tape-recorded an array of Willow Flycatcher vocalizations and from these selected a series that included *fitz-bews*, *creets*, and *whits* of varying rate and pitch, *writ-tus*, and *trills*. One recording included an array of calls made during an aggressive encounter between a flycatcher and a Brown-headed Cowbird (*Molothrus ater*). We transferred the recorded vocalizations from cassette tape to audio CD by using a PC-based CD-ROM writer. The final CD contained 12 tracks, each track with a 10- to 60-second series of one or more vocalizations.

Broadcast Equipment

To broadcast vocalizations, we used a portable CD player and two speakers. One speaker was placed on each side of the mist net, 2 to 5 m from the net perpendicularly. Where possible, speakers were set in dense vegetation or on branches 1 to 2 m above ground. We used commercially available monaural amplified speakers and adjusted playback volume with

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the CD player's controls. The speakers and CD player were connected via monaural audio cables 8–15 m (25–50 ft) long with 1/8-inch male mono or stereo jacks on both ends. We switched sound output between the two speakers during a capture attempt by using a handmade toggle switch or simply plugging and unplugging the appropriate speaker wire into the CD's headphone jack.

The Capture Process

The net/speaker combination was placed in a suitable open area near a song perch or nest. Banders sat quietly 5 to 15 m away from the net (in dense vegetation whenever possible), where they could clearly see the entire net and surrounding area. Once the vocalizations were broadcast, flycatchers generally paid little attention to the bander, even when he or she was clearly visible. The capture process typically began with the bander broadcasting *fitz-bews* and/or *whits* to bring a flycatcher closer to the net, then trying different tracks to find which vocalizations elicited the strongest response from that particular flycatcher. This usually stimulated the flycatcher to become more aggressive and move toward the speakers, flying close to whichever speaker was broadcasting. By then switching immediately to the speaker on the opposite side of the net, the flycatcher could be drawn into the net as it flew across to pursue the "moving" vocalization. The bander, able to watch the entire area around the net, could readily manipulate the speaker output as the flycatcher moved near the net and could approach and remove the bird immediately after it hit the net.

RESULTS

The targeted mist-netting technique was very effective in capturing territorial adult Willow Flycatchers. From 1996 through 2000, we captured 492 adult flycatchers at our primary study sites in Arizona (Luff et al. 2000), 99 elsewhere in Arizona, and 364 in other states ranging from the Pacific Northwest to the northeastern and southeastern United States. There were no capture-related injuries or mortalities among these 955 flycatchers. At our primary study sites, we captured and banded an average of 60 to 75% of the adult population at each site. Males generally responded more strongly than females and were therefore captured more often. Outside of Arizona, where the sex of the captured flycatcher was not important to our objectives, we captured many more males (262; 72%) than females (102; 28%). At our primary study sites in Arizona, where we focused on catching both sexes, the proportion of captured males (280; 57%) to captured females (212; 43%) was much closer.

Targeted netting also worked during the nonbreeding season. Lynn and Whitfield (2000) reported target-netting 59 wintering flycatchers in El Salvador and Panama. In Costa Rica, we captured and banded 82 wintering flycatchers—over 90% of the local wintering population at two study sites (Koronkiewicz and Sogge 2000); the ratio of males to females was approximately equal (USGS unpubl. data). As on the breeding grounds, there were no capture-related injuries or mortality.

DISCUSSION

This targeted capture technique works well because it takes advantage of the Willow Flycatcher's strongly territorial nature and aggressive response to conspecific vocalizations. Three factors were important in developing our particular capture protocol: incorporating a variety of flycatcher vocalizations, using a CD player, and using multiple speakers to manipulate the flycatcher into the net. A variety of recorded vocalizations was useful because individual flycatchers responded best to different vocalizations. One series of vocalizations, recorded when a flycatcher chased a cowbird from its territory, was particularly effective in eliciting aggressive response and chasing behavior, especially once a flycatcher was near the net. Other types of calls recorded during territorial squabbles between flycatchers also produced this effect, though not as strongly. A few flycatchers did not respond strongly to any vocalizations and simply sang or called from above the nets or elsewhere within their territory. Although we initially used portable tape players when netting, we soon switched to CD players because a CD could hold multiple tracks and allowed rapid, silent, and relatively motion-free switching from one vocalization to another. Furthermore, CD broadcast had better clarity and durability than did that of tape players. Use of two speakers dramatically improved capture success over use of one. By alternately switching the sound output from one side of the net to the other, we more naturally mimicked a conspecific territorial intrusion and were better able to manipulate the responding flycatcher into the net. Flycatchers focusing intently on and pursuing the source of the vocalizations flew close to and/or perched near the broadcasting speaker. Placing the speaker high (over 2 m) often led to flycatchers flying back and forth over the top of the net, so the positioning of speakers relative to the net was very important. Furthermore, long speaker wires (>10 m) are important because they allow the bander to move away from the net, limiting disturbance.

Frequently, both birds of a pair reacted to the broadcast vocalizations, and we sometimes caught the second bird after its mate was captured. When females were targeted, nets placed 10–20 m from the nest were more effective than those placed farther away within the territory. Females often responded aggressively and sometimes sang during the capture process, so aggression and song do not always indicate the sex of the responding bird. The combination of CD vocalizations and aggressive response by territory holders sometimes stimulated neighboring males to intrude into the territory and be caught.

A particularly important aspect of this technique is its low impact on the flycatchers. Based on voluntary reporting, the overall injury and mortality rates of passerines during mist-netting/banding projects are 0.2% and 0.4%, respectively (Canadian Bird Banding Office, unpubl. data). Even such relatively low rates could be problematic in work with an endangered species. Our targeted mist-netting technique, coupled with highly experienced staff, has allowed us to avoid any capture-related injuries or mortality among the >1000 flycatchers captured on the breeding and wintering grounds. Because a bird's degree of entanglement in a net (and thus difficulty of removal) is directly proportional to its time in the net (McClure 1984), the

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bander's being present when the bird is captured and removing it immediately helps minimize stress and avoid injuries. The technique also minimizes our time within a flycatcher's territory; birds not previously targeted for capture were usually caught within 10 minutes (broadcast time).

We believe this technique can be readily adapted to other species as well. Using only songs and calls from commercially available tapes and CDs, we have used this technique to capture Alder (*E. alnorum*), Cordilleran (*E. occidentalis*), and Dusky (*E. oberholseri*) Flycatchers. Johnson et al. (1981) identified at least 51 bird species that are responsive to playback recordings and might therefore respond well to targeted capture. Persons attempting to use this technique on other species can start with basic songs and calls from their target species, then augment with additional vocalizations where possible.

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Willow Flycatcher

Sketch by John Schmitt