

## MIST NETTING FROM A BOAT IN FORESTED WETLANDS

R. RANDY WILSON AND ROGER S. ALLAN

*Department of Biology  
Division of Ecology and Organismal Biology  
University of Memphis  
Memphis, Tennessee 38152 USA*

Abstract.—During a demographic study of Acadian Flycatchers (*Empidonax vireescens*) and Prothonotary Warblers (*Protonotaria citrea*) difficulties were encountered using standard mist-netting techniques in a flooded bottomland hardwood forest. Here a technique is presented for capturing individual birds by setting up a mist net within a boat. This technique was used to capture 14 birds when other techniques could not be used. Capture times were similar to those over dry land, and no birds were killed or injured using this net set-up. This modification of traditional mist-netting techniques allows single-species demographic work to be conducted in areas of high water.

### CAPTURA CON REDES DESDE UN BOTE EN UN ANEGADO

Sinopsis.—Durante un estudio demográfico de individuos de *Empidonax vireescens* y *Protonotaria citrea* se encontraron dificultades en colocar las redes de captura en un anegado forestado. Se utilizó la técnica de colocar redes entre botes. La técnica permitió la captura de 14 individuos. El tiempo de captura fue similar a los capturados en tierra firme, y ninguna de las aves resultó herida o perdió la vida con la utilización de esta nueva técnica. La modificación presentada permite estudios demográficos en aéreas donde la profundidad de las aguas dificulta el colocar redes.

Mist nets have long been used to capture birds for monitoring productivity, recruitment, and survivorship (Baillie et al. 1986, DeSante 1992). In addition to community level monitoring programs, which require multiple nets with established net locations, mist nets are also used for single-species demographic investigations. When used to capture specific birds, fewer nets are used (generally  $\leq 2$ ) and placement of the net(s) depends on the location of the bird. Conspecific study mounts and recorded songs or vocalizations are often used to attract territorial birds into the net (Holmes et al. 1989). Although this technique is a proven method for capturing individual birds in mesic and xeric habitats (e.g., Karr 1981), it has not been used in deeply flooded areas. Consequently, detailed demographic studies of individual species (e.g., Nolan 1978, Roth and Johnson 1993, Sherry and Holmes 1992) have not been performed in forested wetlands. Here we present a technique for mist-netting in areas subject to inundation, which we used in our demographic study of Acadian Flycatchers (*Empidonax vireescens*) and Prothonotary Warblers (*Protonotaria citrea*) in a seasonally flooded bottomland hardwood forest.

### STUDY AREA AND METHODS

The White River National Wildlife Refuge is a 60,000-ha area, located in Arkansas, Phillips, Monroe and Desha Counties, Arkansas, and comprised almost entirely of bottomland hardwood forest. Flooding occurs from early December to late May, inundating much of the refuge to a

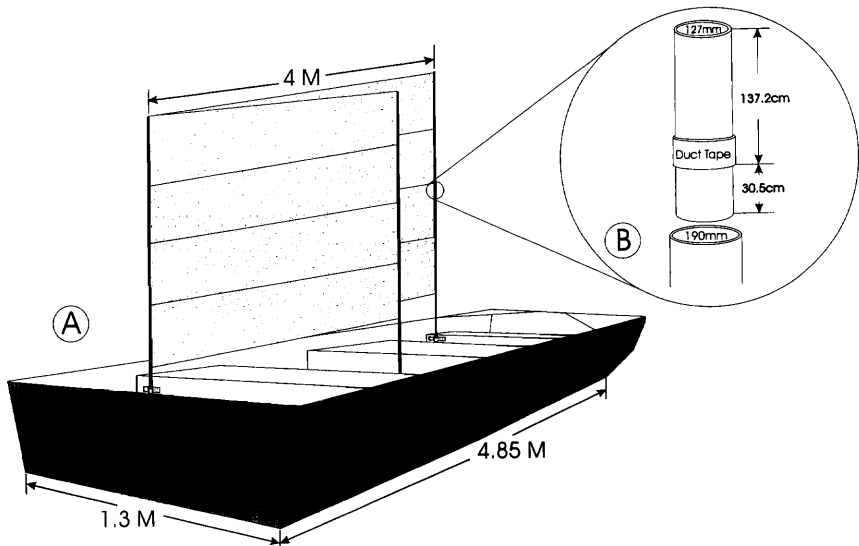


FIGURE 1. Configuration of mist net in jon boat (A), with inset showing the construction of mist net poles (B).

depth of 2–3 m (pers. obs.). Before floodwaters recede, many of the early nests of Prothonotary Warblers have produced fledglings and Acadian Flycatchers have begun to establish territories. Although traditional mist netting can be conducted after the water recedes, birds must be banded earlier to monitor individuals throughout the breeding season.

Other than the boat and mist net, all supplies necessary for this technique were inexpensive and easily obtained from any hardware store. We constructed poles from 1.5-m sections of 127-mm and 190-mm diameter electrical conduit pipe (Fig. 1B). One section of each diameter was used for each pole. Each 127-mm diameter section was wrapped with duct tape approximately 30.5 cm from one end until the diameter was greater than the inside diameter of the 190-mm conduit. This acted as a stopper when the 30.5-cm ends were inserted into the sections of 190-mm diameter pipe, yielding a total pole length of approximately 2.7 m.

Our objective was to erect a V-shaped net. To accomplish this, we placed poles in bases attached at the apices of the largest possible triangle within the boat (Fig. 1A). We used two boats during this study: a 5.7-m Tide Craft bass boat and a 4.8-m jon boat. In the bass boat, we were able to relocate the existing seat pedestals for use as bases for the poles. In the jon boat, we constructed bases from 30.5-cm sections of 2.54-cm diameter PVC pipe, which we attached to the seats using conduit C-brackets.

We inserted the 190-mm diameter end of a pole into each base, and affixed a 6-m mist net (stock #20-N, 32 mm mesh, obtained from Avinet Inc.) to the pole in the bow, wrapped it around the pole in the stern,

and affixed the other end to the pole on the side. This procedure resulted in the desired V-shaped net pattern. The last pole could then be adjusted to achieve the desired tension in the net, and the two end poles could be secured to the boat with guy lines when needed. The end poles were located so that movement around them was possible and the entire net was accessible for removing birds.

#### RESULTS AND DISCUSSION

Between 6 May and 23 May 1994, we used this technique on 8 d to capture four Acadian Flycatchers (ACFL) and 10 Prothonotary Warblers (PROW) when traditional mist netting could not be performed. The average time required to capture birds was  $8.66 \pm 4.17$  SE ( $n = 3$ ) and  $6.52 \pm 3.90$  ( $n = 5$ ) min for ACFL and PROW, respectively; this excludes one ACFL capture for which no study mount was used and five PROW captures for which exact times were not recorded. These times were similar to captures on dry land, which averaged  $9.47 \pm 1.86$  ( $n = 32$ ) min for ACFL and  $6.81 \pm 1.15$  ( $n = 43$ ) min for PROW. We believe any differences in the amounts of time required to capture birds from boats or on dry land may be related to the birds' breeding cycle and not the capture method. As the breeding season progressed, the amount of time required to capture individual birds tended to increase (pers. obs.), suggesting that territory defense may be of lesser importance. None of the birds were killed or injured in the net, and there were 2–5 people present in the boat when birds were captured.

There are some additional considerations for using this technique. The decoy study mount should be placed just forward of the side pole to preclude birds from getting entangled in both sides of the net (i.e. to prevent capturing a bird deep in the "V"). Because any loose pieces of tape or rough edges may snag the net, special care should be taken when extending the net around the pole in the stern. We found this method preferable to another method we attempted, in which only two poles were used and one end of the net was rolled around the pole to achieve the desired net length. Rolling the net was more time consuming, requiring 11–15 min as compared to 5–7 min for the three pole set-up. More importantly, the rolled net was more difficult to set up, and tended to have insufficient bag and unequal trammel heights whereas tension and bag can be adjusted easily with the three-pole arrangement. Although single 3-m sections of conduit can be used, the 1.5-m sections allow easier net attachment and are easier to transport. Finally, when choosing a boat, overall length as well as width should be taken into account; a wider boat allows for greater movement within the boat and added stability, but may limit access to some habitats.

With the loss of bottomland hardwood forests in the southeast, many avian species associated with these forested wetlands are showing population declines, thus increasing the need for detailed population studies. We believe this is a very important addition to existing mist-netting techniques that allows detailed demographic work to be carried out in areas

of inundation. However, the applicability of this technique is not limited to bottomland hardwood forests, but to any geographical region or habitat that requires boats to navigate.

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