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FUNDY PULL TRAP: A NEW METHOD OF CAPTURING SHOREBIRDS

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Abstract.—We developed a simple, durable, and inexpensive pull trap to capture roosting shorebirds in daytime. Prior to devising this new trap, we captured Semipalmated Sandpipers (*Calidris pusilla*) using mist nets during daylight. On average, we captured nearly three times more birds per banding day using the new trap ($\bar{x}$ = 209 vs. 74 birds per high tide period). Moreover, handling times and mortality due to capture were reduced using the pull trap.

NUEVO MÉTODO PARA LA CAPTURA DE PLAYEROS (CHARADRIIFORMES)

Resumen.—Se desarrolla una trampa de bajo costo, sencilla y duradera para la captura de playeros durante horario diurno. Previo al desarrollo de esta trampa se capturaron a individuos de *Calidris pusilla* utilizando redes. Con la nueva trampa se capturaron tres veces más aves ($\bar{x}$ = 209 vs. 74), en el período de descanso de estos durante la marea alta, que con el uso de redes. Además el período de manejo y mortalidad asociada a la captura de estos playeros se redujo con el uso de la nueva trampa.

Shorebird researchers have long been frustrated in their attempts to catch large numbers of sandpipers and plovers (especially migrant and wintering flocks) because of the lack of mobility of large nets which required the use of gunpowder (e.g., for 'cannons' and 'rockets') or because work had to be conducted at night over long and tedious hours and most often under difficult conditions (wet and muddy habitats). Indeed, many trapping methods have been devised for catching shorebirds (see Ennion 1959, McClure 1984). The main techniques used have been rocket-netting (Harrington 1982, Harrington and Leddy 1982, Pienkowski et al. 1979) and cannon-netting (Boere 1976, Dick and Pienkowski 1979, Wilson et al. 1980) in daytime and mist-netting at night (Boere 1976, Harrington 1982, Harrington and Morrison 1979, McNeil and Burton 1973, Morrison 1984, Wilson et al. 1980).

Walk-in and drop traps have also been effective (Ennion 1959, McClure 1984) for capturing small sandpipers during migration (e.g., Senner et al. 1981, but see McNeil and Burton 1973) and on the breeding grounds (Gratto et al. 1983, Miller 1983) although small numbers are usually captured by these means.

In the Bay of Fundy, roosts of post-breeding migrant shorebirds in late summer can attain or exceed 100,000 birds, 95% of which are Semipalmated Sandpipers (*Calidris pusilla,* Hicklin 1987). Because of differences in usage of roost sites by these birds in daytime and at night, it was advantageous for us to contrive some means of capturing and banding

the birds in daytime as part of our continuing studies on the migration of Semipalmated Sandpipers in the Bay of Fundy.

During late summer 1987, we devised a new kind of trap that allowed us to catch large numbers of sandpipers in daytime. The sandpipers did not get entangled, but were trapped beneath a net from which they were easily and quickly removed. Trap losses and injuries were minimal. The net is hand-pulled and functions much like a small rocket net without the rockets, is highly mobile, and is simple and inexpensive in construction. In this paper, we explain the construction of this new trap and compare its trapping effectiveness with traditional mist net trechniques.

MATERIALS AND METHODS

We captured shorebirds along the beach at Dorchester Cape, Shepody Bay, in the upper reaches of the Bay of Fundy using mist nets in 1986 and the pull trap in 1987. A core of four people plus volunteer help was used in each year. In 1986 we used one to three 37 m, 4-shelf mist nets. In 1987 we used two traps of the new design, one 5 m and one 8 m long. Dates for the two years were 24 Jul.–10 Sep. 1986 and 29 Jul.–29 Aug. 1987. All trapping took place on the same beach. Specifications of the new trap follow.

A. *Equipment*
   1. Net: 5.1 cm (2 inch) mesh, #12 gauge, white monofilament herring net, 3.7 m (12 feet) wide and 5 or 8 m long, depending on the numbers of birds to be caught and the amount of beach available for the net to fully stretch out. (Note: This type of net is apparently difficult to find in the United States. In Canada, it is imported and can be purchased from FORSEA LTD., Box 99, 264 Botsford Street, Moncton, New Brunswick, E1C 8R9; Tel.: 506-858-0800 and FAX No. 506-858-0608. If ordered from the U.S., obtain VISA number from customs office and specify "shorebird" or "game bird" netting.)
   2. One 3.1 m (10 feet) long, 1.3 cm (½ inch) diameter light-duty steel conduit to serve as the leading pole to pull the net.
   3. Two 1 m lengths of conduit to be used as launching stakes.
   4. 1 cm diameter sash cord to weigh down the sides of the net when stretched.
   5. 2 mm diameter pull cord (or any strong line of a color which will blend with the background substrate).

B. *Design and Construction* (see Fig. 1)
   1. Cut the net to the desired length. In our case, 5 and 8 m long proved effective. Attach the 3-m wide pole to the leading edge, or the width, of the net.
   2. Weave the sash cord lengthwise along the net to provide some weight along the sides.
   3. Tie both ends of a 6 m length of pull cord to the two ends of the 3 m pole. Construct a loop at the midpoint. From the loop, tie the

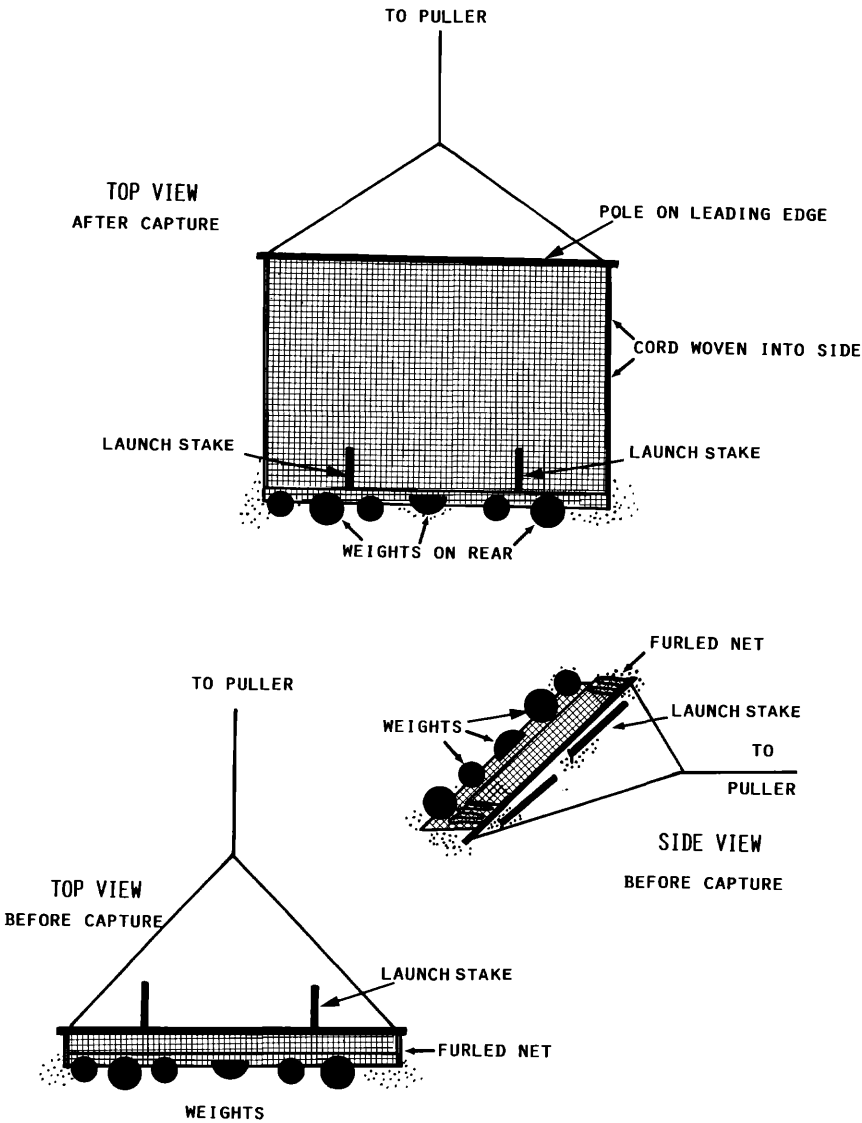

FIGURE 1. Top and side views of shorebird pull trap before and after capture.

remaining length of pull cord to extend to the site where the person pulling the cord can hide from view of the birds.

4. At the site where birds are expected to roost or fly by, set the two launch poles in the ground, about 2 m apart, such that one-half of each pole is above ground at a 30°–45° angle.
5. Fold the net behind the two launching stakes such that the 3 m

pole and pull cord lie on the very top and the pole rests against the launching poles. Weigh down the back of the net with stones (Fig. 2).

6. When the puller gives a sharp jerk on the cord, the 3 m pole rides upwards along the launch stakes and then through the air pulling the net behind it until it is fully stretched.

C. *Capturing Shorebirds at Dorchester Cape: 1986 and 1987*

We placed both mist nets and pull traps at the previous day's high water mark (at the "wrack" line) parallel to the waterline.

Shorebirds were only captured at high tide soon after they had settled in a roost site. Once the birds became inactive (i.e., resting), we set up one to three mist nets (1986) or a trap (1987) about 25–50 m from where the birds were roosting. With the trap, the puller extended the pull cord to a hiding site above the beach, whereas with mist nets, a "scarer" hid in a convenient spot and scared birds into the nets once the birds flew close to one.

At high tide, one or two "herders" moved the birds slowly towards the net (1986) or pull trap (1987). With the mist net, the birds were scared into the net once they flew close to it. Using the pull trap, we usually waited for the birds to settle into the capture area in front of the net and the launch poles. On occasion, sandpipers were trapped when flying low over the catch area. Once a large number settled in front of the net, the cord was pulled, covering the birds, which were then removed from under the net and placed in holding boxes. We continued to herd birds until tidal waters began to recede and birds left for feeding areas, or until we had captured as many birds as we could band and process in the available time.

RESULTS AND DISCUSSION

Using mist nets between 24 Jul. and 10 Sep. 1986, we captured 2591 birds of four species (mainly Semipalmated Sandpipers) during 35 banding days for an average catch of 74 ± 56.3 (±1 SD) birds per day (range: 2–246; Table 1). Using the new trap between 29 Jul. and 29 Aug. 1987, we captured 5129 shorebirds of seven species (again, mainly Semipalmated Sandpipers) during 24 banding days for an average daily catch of 209 ± 154 (±1 SD) birds (range: 7–607; Table 1). The average daily catch was significantly higher using the trap ($t = -4.80$, $P = 0.00001$, df = 57). The 1987 sample consisted primarily of adults because we stopped banding prior to peak arrival times of juvenile Semipalmated Sandpipers. Had banding with the pull trap continued into the first 10 d of September as in 1986, the total number of birds captured would have been considerably higher, because in previous years we found juveniles easier to catch than adults.

By using this new trap, we increased our average daily catch nearly 3-fold. Mortality was greater using mist nets than the pull trap. In 1986,

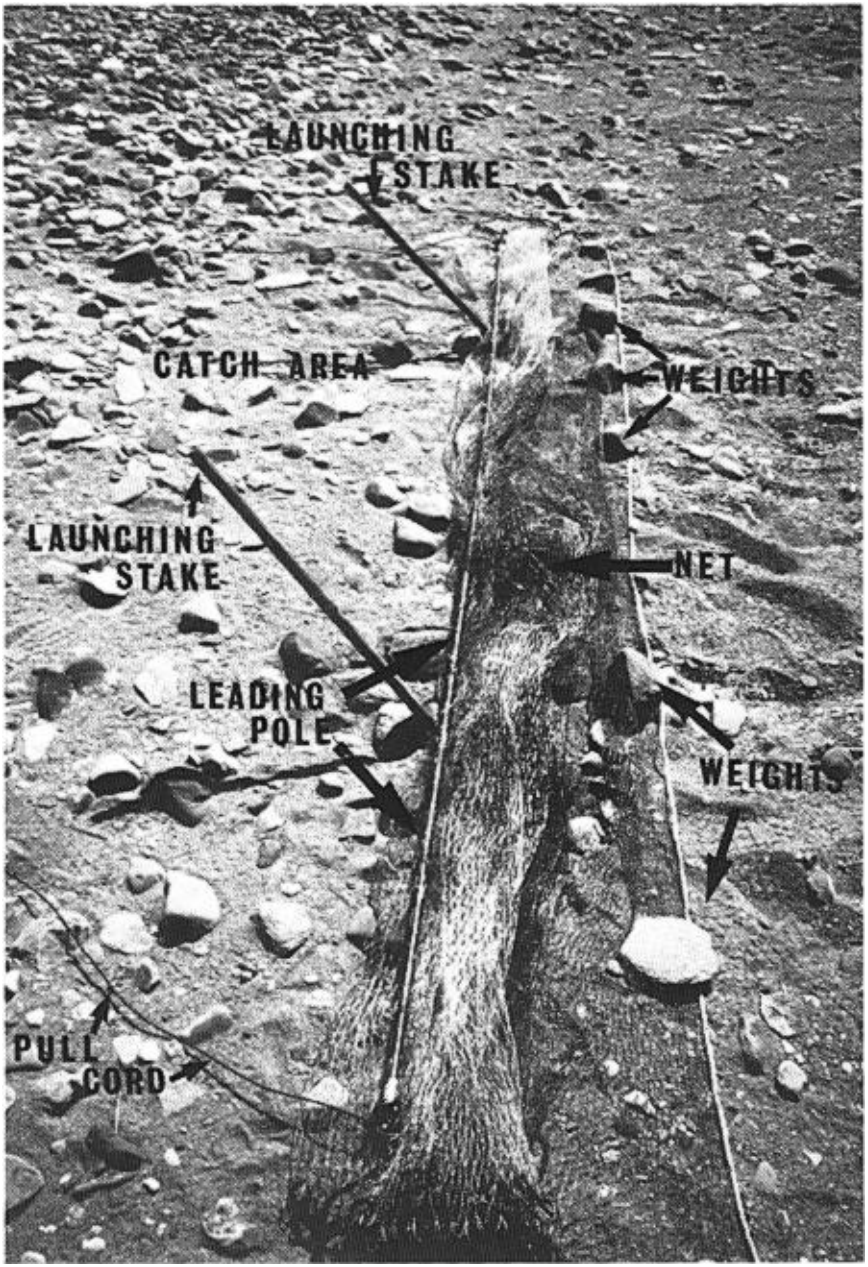

FIGURE 2. The Fundy Pull Trap in place at the Dorchester Cape banding site.

TABLE 1. Numbers of shorebirds captured by mist net (24 Jul.–10 Sep. 1986) and with the Fundy Pull Trap 29 Jul.–29 Aug. 1987) at Dorchester Cape, New Brunswick, Canada.

Method	Semipalmated Sandpipers		Semipalmated Plover (*Charadrius semipalmatus*)	Least Sandpiper (*Calidris minutilla*)	White-rumped Sandpiper (*Calidris fuscicollis*)	Sanderling (*Calidris alba*)	Ruddy Turnstone (*Arenaria interpres*)	Bairds Sandpiper (*Calidris bairdii*)	Western Sandpiper (*Calidris mauri*)	Recaptures	Total
	Adults	Juveniles									
Mist net	1811	684	65	2	1	—	—	—	—	28	2591
Pull trap	5008	12	27	5	12	1	1	2	1	60	5129

52 birds died, primarily by drowning, when the net either collapsed into the water or when birds were caught in the lower shelf which stretched into the water. This hazard is especially prevalent in the Bay of Fundy where tidal amplitudes can unexpectedly rise by 0.25 m above the predicted tide levels because of strong winds. This type of loss amounts to a direct mortality of 2.0%. In 1987 we had nine casualties (0.18%) using the new trap caused in all cases by birds being struck by the leading pole when the cord was pulled.

The heavy gauge of the netting holds birds down rather than entangling them in the mesh which we believe reduces the stress of handling as compared to mist nets. Although not quantified, less time is needed to extract birds from the pull trap than from mist nets. Minimizing handling time is important in any banding and release operation.

There are other advantages to this trap that make it a better alternative to mist nets in many situations:

1. *Mobility*: the trap is easily dismantled and re-constructed wherever the birds happen to be.
2. *Simplicity*: this is a "low-tech" piece of equipment. There are few things that can go wrong or break down. Nets and poles can be made to the size that best fits the situation where birds are to be captured.
3. *Durability*: because the monofilament netting is tough, the net will last many years. The materials are simple, durable, and inexpensive.

This trap was devised specifically for the Bay of Fundy situation, a macrotidal estuarine system that attracts large numbers of calidrine sandpipers for short periods of time during autumn migration. If properly adapted, we believe the Fundy Pull Trap can be used in a variety of different situations.

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LITERATURE CITED

BOERE, G. C. 1976. The significance of the Dutch Waddenzee in the annual life cycle of arctic, subarctic and boreal waders. Part 1. The function as a moulting area. Ardea 64: 210–291.

DICK, W. J. A., AND M. W. PIENKOWSKI. 1979. Autumn and early winter weights of waders in north-west Africa. Ornis Scand. 10:117–123.

ENNION, E. 1959. The house on the shore: the story of Monks House Bird Observatory. Routledge and Kegan Paul, London.

GRATTO, C. L., F. COOKE, AND R. I. G. MORRISON. 1983. Nesting success of yearling and older breeders in the Semipalmated Sandpiper (*Calidris pusilla*). Can. J. Zool. 61: 1133–1137.

HARRINGTON, B. A. 1982. Morphometric variation and habitat use of Semipalmated Sandpipers during a migratory stopover. J. Field Ornithol. 53:258–262.

———, AND L. LEDDY. 1982. Sightings of knots banded and colour-marked in Massachusetts in August, 1980. J. Field Ornithol. 53:55–57.

———, AND R. I. G. MORRISON. 1979. Semipalmated Sandpiper migration in North America. Pp. 83–100, *in* F. A. Pitelka, ed. Shorebirds in marine environments. Studies in Avian Biology No. 2. Cooper Ornithological Society, Allen Press, Lawrence, Kansas.

HICKLIN, P. W. 1987. The migration of shorebirds in the Bay of Fundy. Wilson Bull. 99:540–570.

MCCLURE, E. 1984. Bird banding. The Boxwood Press.

MCNEIL, R., AND J. BURTON. 1973. Dispersal of some southbound migratory North American shorebirds away from the Magdalen Islands, Gulf of St. Lawrence, and Sable Island, Nova Scotia. Carib. J. Sci. 13:257–278.

MILLER, E. H. 1983. Habitat and breeding cycle of the Least Sandpiper (*Calidris minutilla*) on Sable Island, Nova Scotia. Can. J. Zool. 61:2880–2898.

MORRISON, R. I. G. 1984. Migration systems of some New World shorebirds. Behav. Marine Anim. 6:125–202.

PIENKOWSKI, M. W., C. S. LLOYD, AND C. D. T. MINTON. 1979. Seasonal and migrational weight changes in Dunlins. Bird Study 26:134–148.

SENNER, S. F., G. C. WEST, AND D. W. NORTON. 1981. The spring migration of Western Sandpipers and Dunlins in south central Alaska: numbers, timing, and sex ratios. J. Field Ornithol. 52:271–284.

WILSON, J. R., M. A. CZAJKOWSKI, AND M. W. PIENKOWSKI. 1980. The migration through Europe and wintering in Western Africa of Curlew Sandpipers. Wildfowl 31:107–122.

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