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An Inexpensive Technique for Capturing Gregarious Wading Birds on their Foraging Grounds

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Abstract.—A method for trapping adult herons and egrets in foraging habitats is described. This method will give researchers access to adult members of Ardeidae. Over five trapping seasons, Great Egrets (*Ardea alba*) and Snowy Egrets (*Egretta thula*) ($n = 78$) were captured in non-tidal areas. The technique used decoys, live bait in basins and modified foot-hold traps. It is not appropriate for catching many birds at one time. The method could be modified for similarly-sized species. *Received 19 February 2014, accepted 2 April 2014.*

Key words.—*Ardea alba*, Ardeidae, *Egretta thula*, foot-hold traps, Great Egrets, Snowy Egrets, trapping methods.

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Most ecologists have studied long-legged wading birds without capturing them. However, to answer fundamental ecological questions about the Ardeidae (McCrimmon *et al.* 2001) and address conservation challenges (Kushlan and Hancock 2005), it is necessary to capture individuals to take measurements, collect samples (e.g., blood, feathers), and band and sometimes tag birds with transmitters so they can be followed in space and time. Significant changes have occurred in molecular techniques (Liu *et al.* 2004; Izmailov 2013), allowing a more thorough understanding of the genetics of individuals and populations. Since adults are rarely captured, having the bird in hand presents opportunities for the study of individual morphometrics and physiology and the ecological and behavioral correlates of individual differences.

Many improvements have occurred in our ability to track individuals (Halsey *et al.* 2009; Bridge *et al.* 2011; Nathan *et al.* 2012) as a result of advances in electrical engineering, communications and web-based applications (Sundell *et al.* 2006; Kranstauber *et al.* 2011). Technology has advanced to the point where researchers have the ability to merge molecular biology and genetics, anatomy, and ecological energetics with highly detailed large and small-scale movement studies.

To enable these research opportunities, birds must be safely and humanely captured. Several options exist for capturing long-legged wading birds, and each one (including the one presented here) has benefits and drawbacks. Rocket nets are costly, require training, are difficult to deploy, cause disturbance, may be less effective when birds are wary (King *et al.* 1998) and may cause injury or death to birds (Heath and Frederick 2003; Herring *et al.* 2008). Flip traps and mist nets may not be effective in dense vegetation (Jewell and Bancroft 1991). Birds may be captured on the nest, but this risks nest abandonment by adults and may decrease reproductive success (Frederick 1986; Jewell and Bancroft 1991; Mock *et al.* 1999).

We describe a capture technique that has several benefits. The materials needed to construct the device are inexpensive and easily obtainable. The components are simple to construct, lightweight, and easily transportable. The device can be deployed quickly and can be moved to different foraging sites easily. The technique has been effective and has enabled us to capture enough Snowy Egrets (*Egretta thula*) and Great Egrets (*Ardea alba*) to conduct telemetry studies. It can be adapted for other species of wading birds, but it is not recommended when many birds are needed quickly. It does not work well in areas where the water level fluctuates over the course of a few hours, such as in tidal areas. The method combines work done with decoys (Crozier and Gawlik 2003) and foot-hold traps (King *et al.* 1998) and adds baited basins to keep birds near set traps.

METHODS AND DISCUSSION

Prey Basins

Plastic concrete-mixing tubs, approximately 70 cm long x 63 cm wide x 16 cm deep, were used for holding bait. The sides and bottom were perforated with numerous 3-mm holes for water movement. A box cutter was used to cut off the wide curved lip around the top of the basin because Snowy Egrets often perch on the wide lip. However, cutting off the lip did not eliminate this behavior completely. White stripes, 10 cm wide, were painted on the inside bottom of the basins so prey were more visible as they passed from the dark to the white areas. When placed in the water, bricks or stones are set in the bottom of the basins to keep them from floating away. Any similarly sized basin or basket that is capable of holding prey and keeping them alive could be used.

Bait

The basins were stocked with fish caught in local waters or live bait purchased in a bait shop. The latter greatly increases the cost of trapping, and yet this is often necessary when local prey cannot be captured consistently. The number of prey placed in basins is best adjusted to the match the amount of fresh circulating water in the basins. There is no recommended density of prey. Since it is important to keep birds near the traps as long as possible, numerous (100-200) prey (3-6 cm fish) are more effective than less numerous prey since birds will spend more time near the bin striking.

Egret Decoys

Realistic decoys are available for several species of wading birds, but they are expensive. Instead, we modified inexpensive pink flamingoes by painting the plastic body white. The bills of these decoys were painted yellow or black (depending on whether we were focused on trapping Snowy or Great egrets), but it is unclear if this altered the attractiveness of the decoys. Our experience has shown that the decoys need not be an exact replica of the target species to attract Snowy and Great egrets. Crozier and Gawlik (2003) showed a positive relationship between the number of decoys and the number of birds attracted, so it is recommended that at least four decoys be used to attract birds to the basins. Moreover, Green and Leberg (2005) found that the plumage color of decoys appears to be a species-specific attractor.

Foot-hold Traps

We used Oneida Victor #3 2-coiled, Softcatch traps with Slight Offset (Cumberland's Northwest Trapper Supply, Inc.). These traps have rubber-padded jaws that leave a gap when snapped. Traps were modified further in an attempt to avoid leg and foot injury to birds. We accomplished this by cutting one of the spring connections to its lever. This ensured that the power of only one spring pushed on the lever once the trap was triggered. The straight section of the cut spring was cut to remove excess material that could interfere with setting the trap. Steel wire (1.25-mm gage) was tightly wound around one arm of the jaws just outside of the rubber padded area (where the steel of the jaws makes contact; Fig. 1). This was done on the side of the jaws where the lever was disconnected from the spring. If wire is wrapped on the spring-loaded side, it often jams with the lever under the force of the spring. This makes it difficult to open, which can be a hazard when a bird is trapped. Enough wire was coiled around the jaw so that the gap between the jaws was increased to between 0.75-1.00 cm. This gap worked without injury to Great Egrets, Snowy Egrets, Little Blue Herons (*E. caerulea*), and Yellow-Crowned Night Herons (*Nyctanassa violacea*). Great Blue Herons (*A. herodias*) were also caught this way and none were injured, but we recommend traps be gapped further if Great Blue Herons are the target species. The anchor chains were removed by snipping their connections to the bottom of the trap (Fig. 1a). Our experience showed that neither Snowy Egrets nor Great Egrets could move the traps more than a few inches once they

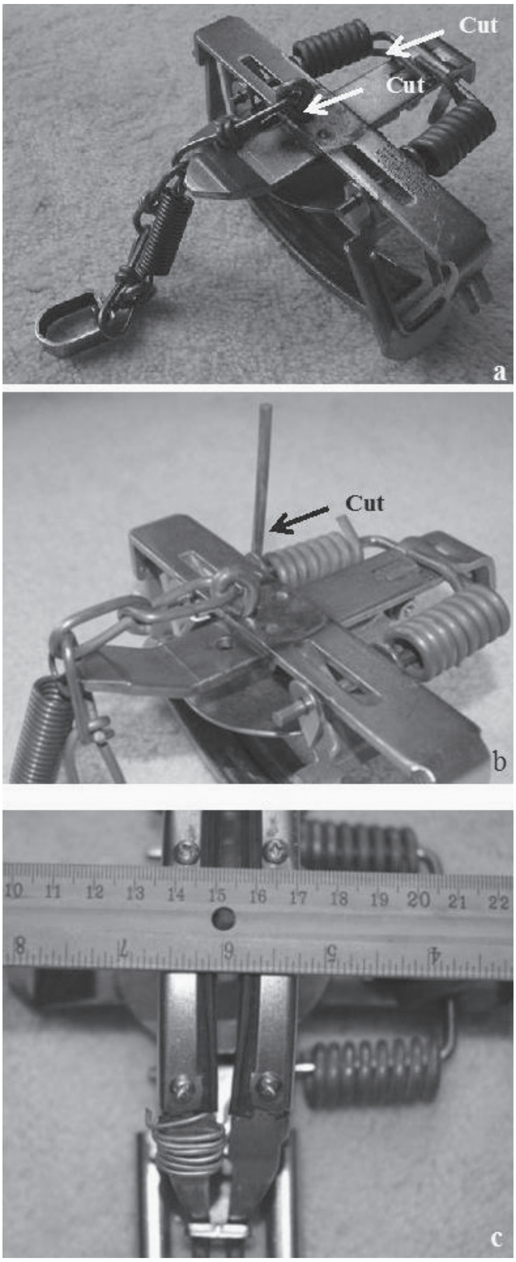

Figure 1. Methods used to modify foot-hold traps. (a) cuts made to the anchor chain connection and spring, (b) removal of excess spring lever, (c) expanded gap between jaws.

were trapped. Great Blue Herons, on the other hand, were capable of hobbling along dragging a trap with them. Anchors should be kept and modified with elastic sections when trapping Great Blue Herons (King *et al.* 1998). Twelve or more traps per basin are recommended to maximize capture rates, but additional traps will improve the chances of catching birds.

Procedures for Trap Setting

Traps are set by opening the jaws (by pushing the lever down) and flipping the "dog" over one of the jaws. The free end of the dog fits under a notch in the "pan" unit (round pressure plate that is stepped on by the bird). The pan unit pivots vertically by a connection to a horizontal bolt, tightened in place by a nut. When arriving from the manufacturer, this nut is often tight enough to resist the free movement of the pan. The nut was loosened enough so that the pan would drop freely when released. This maximizes the sensitivity of the traps. Traps can be "rough" set so the pan is elevated as high as it can go and the dog is fully inserted into the notch. In this position, considerable pressure is required to trigger the trap. Prior to positioning around the basin(s), the traps can be further "fine" set by slowly moving the pan down so that it is barely inserted into the notch. The slightest touch from an ambulating wading bird will trigger a trap set this way.

Set-up and Deployment

Knowledge of foraging locations used by egrets prior to trapping will greatly improve the chances of success. Even with decoys, it can be difficult to attract a bird to an area it rarely uses. Around local sunrise, Great, Snowy and Cattle egrets typically fly to a preliminary staging or foraging area from a roost or breeding colony (often in groups) (Caldwell 1981). These sites are excellent for the placement of decoys, basins and traps, and arriving birds often begin foraging soon after landing.

The site chosen for deployment should allow water to flow through the holes to help keep the fish alive for as long as possible. The distance the traps are set from the basin depends on the target species. Snowy Egrets often stand right next to the bins while striking at fish, so placing traps

5-15 cm from the basin edge worked well for this species. Snowy Egrets often get into the bins to feed, and traps have been placed in basins to trap these birds. Great Egrets will often strike at prey from a greater distance than Snowy Egrets so traps should be set 30 cm or more from the edge of the basins for this species. As much of the trap should be covered with native sediment or vegetation as possible, leaving only the pan exposed. If possible, traps should be spray painted with rust resistant paint that matches the substrate. Great and Snowy egrets do appear to exhibit neophobia to objects unfamiliar to them (Greenberg and Mettke-Hofmann 2001).

Next, decoys are arranged near the basin(s). No studies have examined how the spatial distribution of decoys influences where recruited foragers land. Crozier and Gawlik (2003) did not vary decoy distribution. We suggest recruited birds tend to land on the edge of decoy "flocks" rather than in the middle of them, and, therefore, we placed the decoys next to the bins (Fig. 2). An examination of how decoy spacing and decoy-flock size influence landing location is needed since this would increase the chances of birds landing next to bins and detecting fish.

Finally, 100 or more live fish were caught in a seine in local waters and placed in the basins. Next, the researchers retreated to a distance of 50-100 m. Both the number of fish and the distance from which the traps are monitored should be determined by trial and error. The distance researchers stay away will vary according to the tendency of birds to flush in response to human presence. We did not use a blind, but a blind could be used if warranted by the conditions and behavior of the birds.

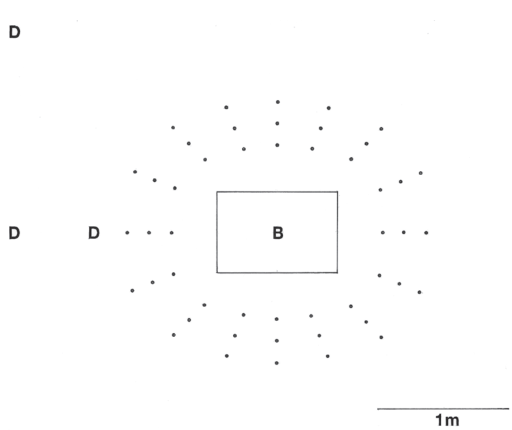

Figure 2. Layout of basin (B), decoys (D), and traps (.) in the field.

Typically, prey were caught or purchased on the day prior to trapping and placed in a perforated bucket in local waters overnight. It is best to arrive at the trapping site before first light and an experienced team can have the traps and decoys set with the prey in place in 45 min. If egrets typically use the area where the traps are set, birds could arrive just after first light. However, sometimes a bird would not land near the decoys all day.

Once a trap is sprung, the bird reflexively attempts to take flight. Snowy Egrets and Little Blue Herons often remain "frozen" with their wings extended. Great Egrets often stand motionless, and it might not be immediately clear that the bird has been trapped. Great Blue Herons can take off, but cannot sustain flight. Once approached by foot, the bird will first attempt to take flight. Some birds continue to do this even when the researcher is within 5 m. Most birds will turn and attempt to strike at the researcher when close. A minimum of two people are required to get the bird out of the trap; one to bring the bird under control (preferably with a bag over its head) and the other to release the trap from the bird's foot. Extreme caution is needed when approaching and handling the birds. Never step near the trap that holds the bird's foot. Egrets and herons can deliver painful or deadly strikes on a human. A helmet with a face shield is recommended.

Both Great and Snowy egrets frequently landed among the decoys, but getting them to find the fish in the basins was a greater challenge. Often birds departed without feeding or triggering traps. We found that laying some freshly killed fish on or near the basins, out of range of waves, attracted birds to the basins. Once Great and Snowy egrets saw the live fish, they would typically remain in the area, which increased their chances of being trapped. Maximizing the number of traps will increase the probability of capturing birds. Set traps need to be monitored continuously to ensure that: 1) the fish remain alive; 2) the supply of fish is not exhausted, so that egrets remain at the site to maximize trapping success; and 3) researchers can respond quickly if an egret is captured.

This procedure was used successfully in the shallow areas of freshwater rivers, salt marsh pannes, non-tidal coastal marshes, wooded gum-cypress (*Nyssa* sp. and *Taxodium* sp.) swamps and freshwater impoundments. The procedure could be modified to catch Cattle Egrets (*A. ibis*) or other terrestrial Ardeids by using crickets or earthworms instead of fish and placing the basins in the areas used by these species. Cattle Egrets are also attracted to white decoys and will feed on crickets provided in basins (Brzorad 1994).

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