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Tools and Technology

A Lift-Net Method for Capturing Diving and Sea Ducks

LINDSAY L. WARE,[1] *Long Point Waterfowl, 115 Front Street, Port Rowan, ON N0E 1M0, Canada*
BENJAMIN T. NAUMANN, *Long Point Waterfowl, 115 Front Street, Port Rowan, ON N0E 1M0, Canada*
PHILIP L. WILSON, *Long Point Waterfowl, 115 Front Street, Port Rowan, ON N0E 1M0, Canada*
SCOTT A. PETRIE, *Long Point Waterfowl, 115 Front Street, Port Rowan, ON N0E 1M0, Canada*
MICHAEL L. SCHUMMER, *Long Point Waterfowl, 115 Front Street, Port Rowan, ON N0E 1M0, Canada*

ABSTRACT Alternatives to bait-trapping waterfowl are often necessary when studying health or body condition, when targeting species that are not easily attracted to bait or those that occur in deep-water habitats where bait-trapping can be difficult. We designed an active netting method for capturing diving and sea ducks, which we deployed at 8 sites in Lake Ontario, Canada from 2006 to 2007 and 2011 to 2012. A mist net suspended horizontally 0.5 m below the water surface was lifted out of the water when ducks swam over the capture area. The technique requires a stationary structure to anchor one end and is lifted out of the water by hand or using a vehicle on the non-anchored end using attached ropes. We used structures including docks and walls of a shipping channel to secure ropes, but other structures could be used. Catch rates were 0.63 birds/hr for greater scaup (*Aythya marila*), and 0.65 birds/hr for long-tailed ducks (*Clangula hyemalis*). In comparison, catch rates for floating mist nets were 0.08 birds/hr and 0.86 birds/hr for greater scaup and long-tailed ducks, respectively. Equipment costs to build a lift-net were 85% less than to build a floating mist net. © 2013 The Wildlife Society.

KEY WORDS capture, diving duck, sea duck, trapping, waterfowl.

Waterfowl field studies often require the live-capture of birds. Although several capture techniques have been developed, various logistical, financial, and scientific constraints are associated with capture of live waterfowl. Agricultural grains are often used to lure waterfowl into traps, but this technique may bias results toward individuals in poor body condition and, thus, the captured sample may not be representative of the population (Dufour et al. 1993). Also, agricultural grains are not attractive to all species of waterfowl, especially those that primarily consume macroinvertebrates or are non-terrestrial feeders (e.g., sea ducks; Baldassarre and Bolen 2006, 2008*a*). However, few published papers describe methods for capturing diving birds without bait (see Breault and Cheng 1990, Kaiser et al. 1995). Floating mist nets can be used to catch sea ducks and diving birds (Kaiser et al. 1995), but there appears to be substantial among-species variability in success (L. L. Ware and P. L. Wilson, personal observations). Floating mist nets also require substantial time and effort to deploy, are difficult to use in high winds, and offer minimal age, species, or sex selection. Additional methods for live-capture of diving and sea ducks are needed, especially those that improve capture efficiency and reduce potential bias associated with bait traps.

Because of initially low catch per unit effort of greater scaup (*Aythya marila*) using floating mist nets, we sought to develop a method for capture of diving and sea ducks that 1) was cost-effective; 2) required equipment that was compact and easily transported; 3) could be operated by a relatively small field crew; 4) had a low risk of injury to ducks; 5) enabled researchers to be selective of the species, sex, and age of ducks captured; 6) did not require the use of bait; and 7) increased catch per unit effort compared with traditional floating mist-net methods. We compare the catch per unit effort from our new method (termed the lift-net) to that of the traditional floating mist-net technique (Kaiser et al. 1995).

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[1]*E-mail: lware@alumni.unity.edu*

STUDY AREA

We deployed the lift-net at 8 sites at Hamilton Harbour, Toronto and Wellington, Ontario, Canada at Lake Ontario 19 February to 9 March 2006, 30 December 2006 to 31 January 2007, 25–26 January 2011, 20–26 February 2011, 5–16 December 2011, and 19–29 March 2012. Capture sites were urbanized shorelines used primarily for industrial, residential, or transportation purposes. Several species of diving ducks and sea ducks, including greater scaup and long-tailed ducks (*Clangula hyemalis*), were abundant at Lake Ontario during winter (Petrie and Schummer 2002, Schummer and Petrie 2011), and used near shore areas with boat dock channels and marinas (Schummer et al. 2008*b*).

METHODS

Equipment, Deployment, and Operation

We designed the lift-net using an 18-m × 3-m mist net (100-mm mesh) supported by 18-m ropes (1.27-cm diam;

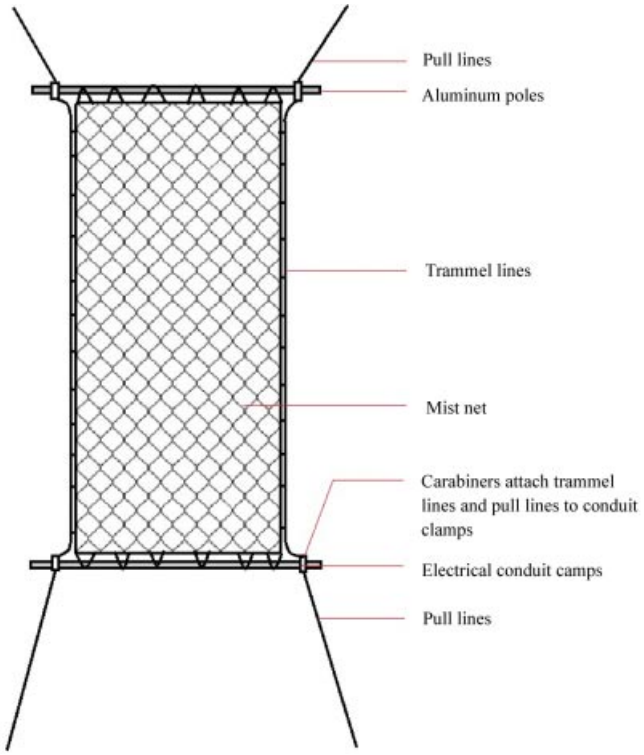

Figure 1. Diagram of lift-net structure and components of an active netting method for capturing diving and sea ducks, which we deployed at 8 sites in Lake Ontario, Canada from 2006 to 2007 and 2011 to 2012.

hereafter, trammel lines) woven through the outside edges of the top and bottom panels (Fig. 1). We kept the trammel lines apart using a 3.3-m-long × 3.75-cm-diameter aluminum pole attached to the 3-m-long ends of the net. We attached trammel lines and 30-m ropes (hereafter, pull lines) together using carabineers (security links used for mountain climbing) that were fastened with a piece of rope to a conduit clamp installed on each end of the above-mentioned aluminum poles. At each capture location, we used a pull line long enough to enable the net to be submerged under water. While in a boat, we secured the pulls lines on one end of the net to a permanent structure. As we moved the boat across to the other shore, we deployed the net out of a storage container. When we reached the opposite shore, we attached the pull lines to a vehicle or they were held by concealed technicians. The net was submerged horizontally approximately 0.5 m under water and was lifted up out of the water by moving the vehicle away from the net 2–3 m, or manually pulling backward on the pull lines, thus entangling ducks that were swimming over the net. Pull lines were secured so that birds remained suspended out of the water (Fig. 2). We moved a boat near the suspended lift-net, extracted ducks from the net, and placed them in pet carriers for transport to shore. When ducks were removed, the lift-net was immediately ready for re-deployment.

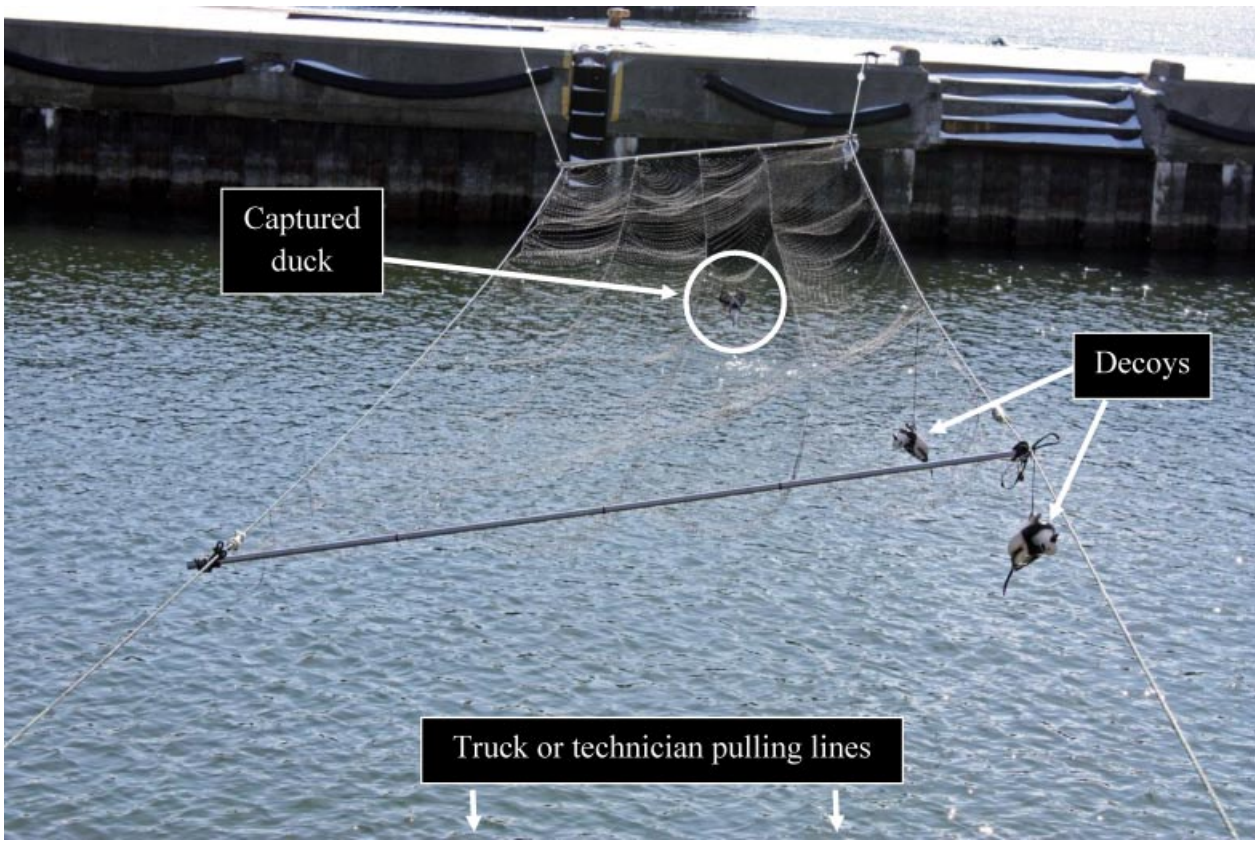

Figure 2. Lift-net elevated out of the water showing net components, decoys, and a captured long-tailed duck at Hamilton Harbour, Lake Ontario, Ontario, Canada, 22 February 2011.

Site Selection

We chose our trap sites within the study area based on waterfowl use and the availability of structures to secure one end of the lift-net. We used docks, cleats on concrete channel walls of boat docking channels, and a bridge along a rock breaker to secure one end of the net. The structures used as anchors were approximately 40 m from the shore where the net was being pulled. We used areas where we could leverage the net from elevated points (e.g., 3 m) above the water so the net would lift out of the water quickly and high enough to capture ducks. We placed the lift-net within boat channels and docks where ducks habitually fed but also used duck decoys to attract ducks near the net. When decoys were used, they were placed near but outside the capture area so ducks would swim over the lift-net toward the decoys. The extraction crew was stationed in a boat nearby the lift-net to keep other boats away from the net and enable quick extraction of captured ducks.

RESULTS

We captured 57 greater scaup using the lift-net in 15 trapping-days (0.63 ducks/hr) during 18 February 2006 to 9 March 2006 and 30 December 2006 to 28 January 2007. Our capture rate while using floating mist nets was 0.08 greater scaup/hr (Table 1).

We captured 104 long-tailed ducks in the lift-net over 17 trapping-days (0.65 ducks/hr) during 20–26 February 2011, 5–16 December 2011, and 19–29 March 2012. Our capture rate using floating mist nets was 0.86 long-tailed ducks/hr (Table 1). Greatest daily rate of lift-net capture occurred on 20 February 2006, when 18 greater scaup were captured in 8 hr (2.25 ducks captured/hr) and on 28 March 2012, when 15 long-tailed ducks were captured in 8.5 hr (1.77 ducks captured/hr).

No birds were injured while being captured in or extracted from the lift-net. Set-up and deployment time for a lift-net was approximately 20–45 min, while it took approximately 60–90 min to set up and deploy the floating mist nets. Estimated cost of equipment needed to construct a lift-net as described above was approximately US$230.00, compared with approximately US$1,500.00 we spent to construct a floating mist net with 3 platforms.

DISCUSSION

Numerous techniques exist to capture waterfowl, but capturing diving and sea ducks during the non-breeding season is challenging because of the relatively deep-water habitats used by these ducks and weather conditions that can make captures difficult and unsafe. The lift-net we developed takes advantage of the behavior of diving and sea ducks because, unlike dabbling ducks, they cannot fly vertically from the water surface and either dive when startled or must run along the surface of water before flying. When the net is lifted from the water, the ducks are not usually able to gain flight before being captured or they dive directly into the net. Other advantages of using lift-nets to capture diving and sea ducks include low risk of injury to the bird, relatively low cost of construction and operation, equipment that is lightweight, compact, and easily transportable between capture locations, and not requiring bait as an attractant. Further, a lift-net provides the ability to select a particular species, gender, or age class, provided that the capture personnel are able to visually determine species and age or sex cohorts.

Our capture of greater scaup using the floating mist net had low capture per unit effort relative to the lift-net technique. In contrast, long-tailed duck catch rate for the floating mist net was greater than with the lift-net, due to a period in which 49 long-tailed ducks were captured on a single day (8 hr). In this case, conditions were ideal for using floating mist nets because of the presence of >10,000 long-tailed ducks near an offshore shoal that allowed for easy deployment of the mist net. In addition, ice conditions were reduced because of abnormally warm December temperatures. Ice conditions generally made it difficult to deploy the floating mist net at Lake Ontario; whereas, the lift net could be deployed and operated in areas used by long-tailed ducks throughout winter, such as boat channels and docks. When studies require capture of specific sex or age cohorts, or when there are low personnel and/or financial resources available, researchers should consider use of the lift-net technique. However, opportunistic use of floating mist nets may also increase catch efficiency when conditions are favorable for using this capture method.

Several factors limit the usefulness lift-nets. Physical requirements of sites (e.g., presence of permanent structures) eliminate some trap sites. In addition, anchoring structures should be no >40 m from the shore to reduce drag and achieve optimal lift speed (L. L. Ware and P. L. Wilson, personal observations). Sites also should have ≥3 m of elevation between where ropes are pulled and the water surface so the net lifts quickly enough to entangle ducks and properly suspend them for extraction. Capture locations must be accessible by vehicles or have areas that conceal people pulling lines manually. Because of the limited amount of surface area provided by a mist net, lift-nets are not ideal

Table 1. Lift-net and floating mist-net capture information and catch per unit effort (CPU) for greater scaup (*Aythya marila*) and long-tailed ducks (*Clangula hyemalis*) at Lake Ontario, Canada, December–March (2006–2007), February (2011), and December–March (2011–2012).

Species and method	*n*	Trap-hr	CPU	Ad (F, M)	Juv (F, M)
Greater scaup					
Lift-net	57	92	0.63	47 (21, 26)	10 (7,3)
Floating mist net	17	210	0.08	15 (4, 11)	2 (2,0)
Long-tailed duck					
Lift-net	104	161	0.65	55 (22, 33)	49 (37,12)
Floating mist net	126	147	0.86	59 (22, 37)	67 (49, 18)

for one-time captures of a large number of ducks from flocks, and are better suited for multiple captures of relatively small groups of ducks.

Our lift-net design has potential for versatility and improvement of duck capture. The use of a temporary anchoring system, such as use of anchored floating mist-net hubs or other over-water stationary objects may enable use of the net at areas that do not have suitable or existing anchor objects. However, this application needs further investigation. Another possible improvement may be the use of a lighter net such as monofilament gill net that minimizes drag through the water and may increase speed of net lift during captures. Although we used the lift-net technique to capture greater scaup and long-tailed ducks, this method also may be effective at capturing other species of diving ducks, sea ducks, and other diving waterbirds, provided the species use areas with appropriate nearby structures for anchoring of the net. A lift-net also may be effective in capturing flightless adult dabbling ducks and ducklings, goslings, and cygnets.

MANAGEMENT IMPLICATIONS

The lift-net technique can increase sample size and capture efficiency for projects focused on elusive waterbirds that are not attracted to bait. Furthermore, the technique allows researchers to target species and specific age or sex cohorts for capture to increase our knowledge of species for which we lack baseline ecological data. Information obtained from such studies may help to influence management and conservation practices in ways otherwise not possible.

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