A NEW METHOD FOR CATCHING WILSON'S STORM PETRELS *OCEANITES OCEANICUS* AT SEA

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ABSTRACT

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Catching oceanic birds is challenging for researchers interested in studying migration and feeding dynamics. To address that challenge, we evaluated a new method for catching Wilson's Storm Petrels *Oceanites oceanicus* at sea. Using an extended butterfly net and a sweeping technique, we successfully captured 50 sub-adult and adult storm petrels offshore in the Northwest Atlantic with a 94% success rate. All were processed without sign of physical trauma or injury; 100% flew off in apparently good condition. This method provides a cost-effective and safe approach for the capture and study of small oceanic birds attracted to fish slicks.

Key words: capture, net, oceanic bird, petrel, seabird

INTRODUCTION

Several species of oceanic birds in the order Procellariiformes migrate annually from their polar and subpolar Southern Hemisphere breeding grounds to Northern Hemisphere waters for the non-breeding period. Studying these species at sea is inherently challenging due to the complex logistics of working in pelagic marine environments. Moreover, catching seabirds undergoing challenging life-history phases (i.e., migration, molting) and subjecting them to potentially harmful capture stress and handling (Smith *et al.* 1994, Deguchi *et al.* 2014) presents ethical concerns, especially since global seabird populations declined up to ~70% between 1950 and 2010 (Paleczny *et al.* 2015).

Previous methods for catching live birds at sea (e.g., Gill *et al.* 1970, Bugoni *et al.* 2008, Ronconi *et al.* 2010) include the use of modified hoop-nets with 2–3 m of line attached thrown from a vessel to catch shearwaters and petrels nearby. Other researchers have captured shearwaters and alcids at sea after dark using a combination of spotlights and dipnets (Whitworth *et al.* 1997, Adams *et al.* 2012) or collected storm petrels using a net-gun (Stephenson *et al.* 2008). These methods put birds at risk of becoming at least partially submerged in water, physical injury from entanglement (particularly the wings; Løkkeborg 2011), or capture-induced physiological stress (Smith *et al.* 1994); such methods also pose a lethal risk of drowning. Therefore, less invasive and more efficient methods would be advantageous.

Wilson's Storm Petrels *Oceanites oceanicus* breed on Antarctic/sub-Antarctic coasts and islands, and they migrate to the western North Atlantic Ocean, arriving off the coast of Massachusetts (USA) in May and June (Nisbet *et al.* 2013). Here we discuss a

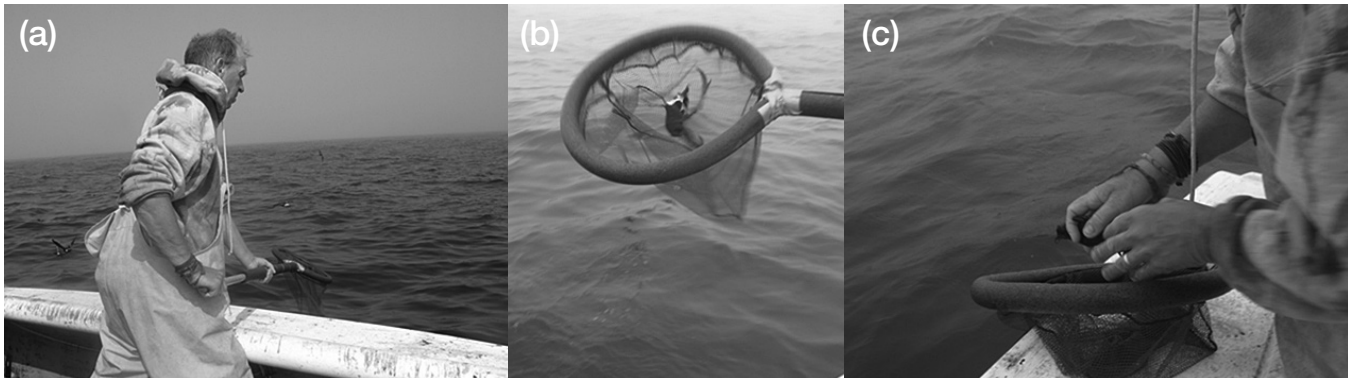

Fig. 1. (a) Modified butterfly net and sweeping posture used offshore when catching Wilson's Storm Petrels. (b) A live petrel is caught mid-air. Note the small area, size of mesh, and protective modifications around the perimeter of the net. (c) A petrel is processed after being removed from the net.

previously undescribed, safe, and effective technique for catching this species at sea, which will allow further investigation of their wintering ecology.

METHODS

On 07 and 10 July 2011, we drifted in a 12 m commercial fishing vessel on the continental shelf 10 km east of Chatham, Massachusetts in a known corridor for storm petrel austral migration. Sea conditions on both occasions were 1 m swells and winds of 10–15 knots (19–28 km/h) with warm, clear skies. Once at the site, we used mashed livers from spiny dogfish *Squalus acanthias* to create an oily slick on the water's surface. Within five minutes, this attracted a variety of seabirds, including gulls (*Larus* spp.), shearwaters (*Ardenna* spp., *Puffinus* spp., and *Calonectris* spp.), and Wilson's Storm Petrels. At any given time, 5–10 storm petrels were observed around the boat. We targeted them with a long-handled (200 cm), circular-rimmed (40 cm circumference) Cumings dipnet (Fig. 1a), which had a net made of 0.6 mm Micromesh insect netting. The metal rim and wooden handle of the net were wrapped with Thermo King foam pipe insulation to protect birds in case of contact during capture (Fig. 1b). As petrels were attracted by the chum, we used a sweeping technique to capture the birds while they hovered and fed close to the boat (Fig. 1b). Birds were gently removed from the net (Fig. 1c) and placed in small cotton bags (attached to a line with a clothespin) to await processing.

For processing, each bird was banded with a US Fish and Wildlife size 1A stainless steel band; pictures were taken of the wing, tail, and claws; ages were determined based on the shape of their primary and tail feathers (Pyle 2008, Table 1); and feather samples were collected for a separate study using stable isotopes to infer feeding and molting. All birds were then released and were given a release condition score ranging from one to three: (1) poor, bird unable to fly; (2) fair, bird can fly but shows signs of distress or impairment; or (3) good, bird flew off unabated.

RESULTS

A total of 53 sweeps at petrels was attempted over two days, resulting in 50 individually captured birds—a 94% success rate. Only one bird was captured at a time, and no birds escaped the net. Our bycatch rate was 0%, meaning no other species were incidentally captured. Average handling time, defined as the time measured from when a bird was captured to when it was removed for pre-processing, was 10 seconds. We captured 5–10 birds at a time and would start chumming again while working on the last bird. Age analysis revealed that 50% of individuals were adults (25 birds), 42% were immature (21 birds), and 6% were of unknown age (3 birds). We observed no injuries or signs of physiological stress, such as rapid vibration or shaking; all birds showed movement and signs of vitality during and after capture. Upon release, all birds consistently demonstrated characteristic flight behaviors (i.e., shallow wingbeats and immediate robust fluttering flight), with 100% of birds scoring a class 3 release condition.

DISCUSSION

When banding birds, researchers must assess the capture method to ensure it is done safely and effectively. Previous methods for capturing waterbirds or birds at sea required close supervision to prevent injury or drowning. These methods had variable effectiveness and affected both target and non-target species.

One difficulty with daytime sampling is easy evasion by birds, which is less of an issue when spot-lighting at night. In one of the earliest described methods of capturing Procellariiformes at sea during daylight hours, Gill *et al.* (1970) used a "hoop" net thrown from a vessel. The circular plastic tubing, about 1.3 m in diameter and covered with mist netting, would land over swimming or flying birds. Upon retrieval, birds often rolled out of the net and escaped, thereby limiting the reliability of the method. Bugoni *et al.* (2008) described a method for catching pelagic seabirds away from nesting areas using a weighted hand-thrown net like those used in shallow tropical waters for catching small fish. This type of net, secured to the thrower by a line, is cast from a vessel and falls over the target birds, which are entangled and brought to the boat. This method was effective in catching a high number and a diverse selection of birds, but it was not completely selective and produced high bycatch. Birds caught with this method became wet and risked both hypothermia and drowning. The authors concluded that this was not an effective way to catch Wilson's Storm Petrels because the species rarely sits on the water.

Our "butterfly net" method solves the abovementioned issues of effectiveness, safety to target species, and bycatch. We were able to limit the number of captures so that we could process the birds

TABLE 1
Summary of age classes and release condition scores for Wilson's Storm Petrels captured using the "butterfly net" method

Bird ID	Age Class[a]	Release Condition	Bird ID	Age Class	Release Condition
001	SY	3	026	AHY	3
002	AHY	3	027	HY	3
003	HY	3	028	HY	3
004	SY	3	029	HY	3
005	AHY	3	030	AHY	3
006	AHY	3	031	AHY	3
007	AHY	3	032	AHY	3
008	AHY	3	033	AHY	3
009	HY	3	034	HY	3
010	HY	3	035	AHY	3
011	HY	3	036	HY	3
012	AHY	3	037	HY	3
013	AHY	3	038	AHY	3
014	AHY	3	039	AHY	3
015	HY	3	040	AHY	3
016	HY	3	041	AHY	3
017	AHY	3	042	AHY	3
018	HY	3	043	U	3
019	AHY	3	044	U	3
020	AHY	3	045	HY	3
021	HY	3	046	AHY	3
022	HY	3	047	HY	3
023	HY	3	048	HY	3
024	HY	3	049	HY	3
025	AHY	3	050	U	3

[a] SY/AHY (Second Year/After Hatch Year) = adult, HY (Hatch Year) = immature, U = unknown age

in a timely manner, and no birds ever escaped the net. Since the birds were captured in flight and never submerged, they faced no drowning risk and were not waterlogged, allowing immediate release and alleviating the need to hold birds for an extended period until their feathers dried. In addition, no bycatch occurred. We recognize that we tested this method for only one species of oceanic bird across a limited morphological size range. However, given the general lack of information on Wilson's Storm Petrels, our approach may prove useful for future studies seeking to capture storm petrels attracted to fish slicks.

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