

# How We Catch Sea Ducks

## Notes by various sea duck researchers on methods for capturing sea ducks

December 2010: These notes were compiled by Tim Bowman (USFWS-Alaska) and are periodically revised with contributions by other researchers. They are posted here because: 1) they may be of general interest to visitors to this web site, and 2) by sharing these techniques and tips with other biologists, we hope to improve capture efficiency, thereby facilitating the gathering of data on sea ducks that will help improve their management and conservation. If you would like to share your experiences with mist-netting or have other tips for fellow biologists, feel free to send these, as well as photos if appropriate, to [tim\\_bowman@fws.gov](mailto:tim_bowman@fws.gov). I will be glad to incorporate these into the notes.

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## MIST-NETTING SEA DUCKS

### THE TECHNIQUE

One of the more common methods of live-capturing sea ducks for scientific purposes is by the use of overwater mist nets. The principle of this technique is that birds do not see the extremely fine net until it's too late to avoid it, and become entangled in the net when they fly into it. Typically, decoys are placed near the net to attract ducks. The technique has been used quite successfully to capture nearly all species of sea ducks. The technique works better for some species (scoters, eiders, harlequin ducks) than for others (goldeneyes, bufflehead, mergansers, and long-tailed duck). It is likely that any species *COULD* be caught, but some species are more adept at seeing and avoiding the net than other species. We rarely catch dabbling ducks.

The standard setup involves two 18 m mist nets strung between upright poles, each pole supported by a set of 4 floats (modified decoys), usually painted to mimic the target species.

The technique was pioneered for use in capturing murrelets (Paton et al. 1991, Kaiser et al. 1995). Since that time, many modifications have been made in the method of deployment, engineering, and components specific to certain species or environmental circumstances. The technique has proven effective both on breeding and wintering areas.

## COMPONENTS

The basic setup consists of three hubs, each with a vertical mast that supports two mist nets. The entire setup is securely anchored at each end and cinched tight so the nets are in a straight line and don't sag. A list of equipment needed for mist-netting is available at [http://seaduckjv.org/atlantic\\_migration\\_study.html](http://seaduckjv.org/atlantic_migration_study.html).



### Nets

We purchase mist nets 18 m long. They are 210 denier 2-ply with a mesh size of 100mm. These come as either 4-tiered or 2-tiered nets (Avinet.com). We have experimented with 2-, 3-, and 4-tiered nets and firmly believe that the shorter 2- or 3-tiered nets are more effective at catching birds. There is a general consensus among those who have used this system that the weakest link seems to be the visibility of the vertical supports (masts), not the net, which under most circumstances is almost invisible. Presumably, the shorter nets work better because there is less hardware sticking up into the air for birds to see.

### Hubs and Float Arms

Hubs provide an attachment point for the float arms and the vertical mast. The most recent design uses a welded aluminum base, with hollow aluminum float arms that are locked into the hub using retaining pins. Heavy PVC float arms have also been used, but they tend to flex a bit and could break. All float arms and hubs should be drilled uniformly so parts are universally changeable (i.e., any float arm can be used with any hub).



It is best to use real decoys on the float arms, modified to slip into or over the ends of the float arms and pinned in place. Buoys with duck heads have also been used (see photo below), but don't look as realistic as real decoys. Use the same species of decoy that you intend to trap. Larger decoys (magnum or better yet super magnum) are best, and if custom painting is necessary, use only FLAT paint. The decoys also provide the flotation for the hubs and float arms. If they sit too low in the water when the net is fully deployed, then spray some foam onto the bottom of the decoy to add flotation, and then spray paint the foam a flat black. Also, you can also spray a small amount of foam into each end of the float arm to create an air space and increase buoyancy.

The hubs are connected to each other by non-stretchy tension lines, about 3/8-inch diameter. These should be measured and adjusted for appropriate length in the water, on an anchored set, before the setup is used for real trapping. One option that will make fine adjustments easy, even when deployed in the water, is to attach a Tie-Boss on each side of the middle hub that allows you to lengthen or shorten the tension line if needed.



### Masts

Nets are strung on vertical supports about 42-48 inches tall. The masts are made of solid  $\frac{1}{2}$ -inch diameter stainless steel bar (aka "round bar") and cost about \$10 per mast (check pipe supply or engineering supply stores). These are very rugged and will flex slightly, but won't break. We use a 3-4 inch piece of tubing as a mast cap that slides over the end of the mast and allows you to attach the net end loops for storage and, by use of a D-ring (see photo below), attach guy lines to adjust tension on the nets. Masts can be somewhat camouflaged using flat black paint with some flat gray patches tossed in as well. Paint the mast caps flat black as well. Poles should be wrapped in black electrical tape before painting.

### Decoys

Decoys must be painted with FLAT paint. A simple and practical decoy deployment system is to use one long line (1/4 to 3/8 in diameter), anchored at each end with a weight of about 5-8 pounds. Decoys can be rigged with snap (aka long-line snaps) and clipped onto the line. Decoys should be placed 4-5 feet apart, no closer. Anchor both ends of the decoy lines so one end is close to the net (10-15 feet), and so it will not drift

into the net due to wind and tide. Remember – both wind and tide can change direction. Set decoy strings both upwind and downwind of the net. Setting 2 strings on the downwind side and one string on the upwind side, each with 5-10 decoys, seems to be a good starting point, which can then be adjusted based on how birds are reacting to the set. A good arrangement is to put the downwind strings on each side of the middle hub so that they make a V-formation pointing toward the center hub, and the upwind dekes near the center of the net.

### **Boats**

For tending nets, the best boats are small, maneuverable boats with low gunwales. Inflatable boats in the 14-16 ft range are ideal. The bow of the boat should be free of anything that might snag on the mist net. If there are rings, cleats, or handles, they should be taped up with duct tape and made as smooth as possible.



### **SET UP AND DEPLOYMENT**

Perhaps the most important factor in net placement is to **SET YOUR NET UP WHERE THE BIRDS WANT TO BE**. A little scouting before trapping begins will pay big dividends. Also, when you're scouting, note where birds fly to when flushed. That might make a good alternate site or location for a second net setup. Setting up in flight pathways is usually less productive.

Nets set up pre-dawn can be very effective due to the low light in early morning minutes/hours as birds return to feeding areas from roosts. If you are setting up mist nets pre-dawn in areas visible to the public, it is probably useful to alert local law enforcement authorities about your activities beforehand to head off any suspicious activity investigations.



It also helps to set the net up in a location where there is a dark background, like trees, bluffs, or mountains, which break up the outline of the masts and make it less visible. Don't set your net up in areas with really strong current or tides; you may end up losing or breaking equipment if you do.

The nets can be set with one end anchored to land, or can be set up entirely offshore. Because ducks usually land into the wind, nets should be set up perpendicular to the wind if possible.

Land-anchored sets, such as those used for more shorephilic species like harlequins or goldeneyes, are easily set up on shore on a beach or other open area clear of brush, and swung or towed offshore into position. First, pin together the 3 hub/floats assemblies. Make sure the stabilizer lines are pointing towards another mast and not towards the direction of the anchor lines. Run the tension lines between the inside shackles on the hubs making sure to go through the ring on the stabilizer line. The center mast should have the two bagged mist nets already attached. Secure all three masts to the hubs with the retaining clips.



Unhook the stuff bags from the center mast and run each net out to an end mast making sure you keep the net off the ground. At the end of the net should be a ziplock bag containing the detachable mast cap and guy lines. Before putting the mast cap on the end pole make sure there are no twists in the mist net. Place the mast cap over the top of the end pole. Secure the guy lines to I-bolts on the 2 outer float poles. Don't run the net down the poles yet - it will help keep them from snagging on the ground. Attach the anchor lines.



Now you're ready to tow the net offshore. With a person at each of the three masts, lift the assembly and walk the setup into shallow water. **When walking the net into shallow water or towing the net, it is important to always keep tension on both ends to keep the net taut and prevent fouling on crap on shore or in the water.** One person holds the shore anchor line, which can later be tied off to a rock, tree, or heavy anchor, while the boat person(s) holds the seaward anchor. Slowly tow the seaward end offshore until it's about perpendicular to shore. The boat person drops the anchor and the shore person slowly drags the net shoreward until the anchor catches. This may take several attempts to get the nets the desired distance from shore. We have had birds (particularly harlequins) fly between shore and net when there was a gap of >6 meters, so try to get it close to shore if you're attempting to capture ducks flying close to shore.

Once the setup is anchored securely, slide the mist nets down the masts. Make sure the lower tier of the net is set at the water's surface to prevent birds from swimming or flying underneath the net.



Offshore sets are a bit more difficult to deploy, but it becomes easier with practice. You should first assemble all the hubs and have them on the boat ready to deploy. All lines (anchor lines and tension lines) should be stored so they feed out smoothly; 5-gallon buckets are perfect for storing lines. Essentially, you will start at one end of the assembly (1<sup>st</sup> anchor), and lay out all the other gear in line as the boat backs up slowly.

The boat driver should back up so the net will be set up perpendicular to wind. Drop the first anchor and make sure it is set securely. Feed out all the anchor line, and clip to the first hub (with mast already clipped on). Clip a tension line to the other side of the hub, through a stabilizer ring, and feed out the tension line. Clip in the center hub similarly (with mast and nets attached). After the last hub is attached, clip the other anchor line and drop the anchor only when the entire setup is taut and oriented perpendicular to wind. Then go back to the end hub and use the Tie-Boss to cinch up any slack in the anchor line and ensure that anchor is also set securely.



You can then run each net outwards to the outer masts. This is best done with one person in the bow of the boat slowly hand-walking the tension line toward the next hub.



Another person feeds the mist net out of the bag. If a third person is available, they can help by keeping the top edge of the mist net in hand all the way down the net - this will help ensure there are no twists in the net when the net and mast cap is placed on the mast. Secure the guy lines to the I-bolts on the outer float arms, then stretch the net out along the mast, with the bottom tier nearly touching the water.



### TRAPPING TIPS, ETC.

#### Flushing birds into the net

We usually place one person on shore to observe the net, or tend it with a boat, and have another skiff that motors around and stirs up birds, maintaining contact with the shore person via radio. If a bird gets caught in the net, the boat that's flushing birds stops until the bird is picked from the net. You can often flush birds that land on the downwind side of the net (don't even bother trying to move birds that are on the upwind side). Ducks will always flush into the wind (thus it's important to set the net up perpendicular to the wind). The ducks need to be very close to the net to catch them. Depending on wind and the species you're trapping, this nearly always means within 30 feet of the net, closer for smaller ducks and in breezy conditions. From the perspective of the boat, 30 feet from the net will look like the birds are right in front of the net. Be patient when herding ducks toward the net - if you push too hard, they'll flush too early. Watch the heads of the birds as you move closer to them - if they start stretching their necks and looking back and forth, they're probably nervous and about to fly. Try to move the birds toward the center of the net as much as possible. Don't charge them until they are less than 30 feet from the net. Also, if the wind is anything but perpendicular to the net, you should try to cut the birds off on the more upwind side of the net so they turn toward the net.

Note: We have some evidence that ducks become "net wary". Once they've experienced the net, it's difficult to get them near it again. On subsequent trapping sessions (same year, or even later years), few ducks are recaptured, even though we trap in the same

locations. Your best chances of catching birds are on your initial drives of an area, so make sure your set looks great when you start.

### **Picking birds from the net**

Call the support boat and tell them you have birds in the net so they cease moving birds. Always approach the net from the downwind or down-current side so that the boat does not drift into the net. Do this regardless of which side of the net the birds entered. If they entered on the opposite side, just reach over the net and pull them out that way. Remove birds from the net butt first - i.e., look for the duck butt and back the bird out the same way it entered. Then free the legs, and then the wings or head in whatever order makes most sense.



### **Communication**

Good communication among all boats is essential. Each boat should have at least 2 functional radios, tested beforehand. Radios should have a lanyard attached so they can either be worn around the neck, or secured onto the boat, but not loose where they can be dropped in the water. When talking on radios, use the person's name 3 times before continuing with the message (e.g., Jim, Jim, Jim, do you copy?). Speak slowly, and keep your mouth a few inches away from the microphone. Keep the radio out of the wind when talking.

### **Coordination**

Each net should have one boat that tends the net at all times. Thus, for each operation you will need one boat per net, plus one other support boat that can assist with setting up decoys, running birds back to shore, stirring up birds, helping to pick birds from the net in case of a good catch, and delivering coffee and donuts.

When a boat is picking birds from the net, or is making adjustments to the net, the support boat should stop until everyone is out of the net. There's no sense stirring up

birds if you're messing with the net. Thus, the net tender should call the support boat on the radio before and after they've tended the net.

### **TRANSPORTATION and HOUSING OF DUCKS**

Small "cat" crates are suitable for transport and short-term housing of ducks. The bottoms of the kennels should have a mesh platform raised slightly above the bottom of the kennel so that the birds are not resting in water or feces. For short term use, you can put more than one duck in these kennels, although some species, like surf and white-winged scoters, are more aggressive than others and should not be placed together unless absolutely necessary.

Once ducks have been transported to the facility where they will undergo surgery, it is advisable to transfer them to larger cages (e.g., collapsible rabbit cages or larger "dog" crates) that allow the birds to stand, preen, and dry off. These larger cages also are well suited as a post-surgery recovery area for ducks. As in the smaller cages, the bottoms of these cages should have a mesh platform or absorbent material (e.g., wood shavings) to keep the ducks dry. Keeping ducks dry will ensure that they can be released as soon as possible, without undue stress.



### **MODIFIED OVER-WATER NETS**

An interesting modification to this design has been used by Grant Gilchrist and Lynne Dickson (CWS); they modified this net system and used a single, 2-tiered 80m mist net strung between 2 tall poles and used a winch to provide horizontal tension (see Gilchrist and Weise 1997). This was a non-floating system and was strung in flight corridors or channels where birds pass regularly.



Paul Flint (USGS - Alaska) shares the following: We used an approach similar to that employed by Dickson and Gilchrist except on a smaller scale. In several locations birds were observed to fly through natural gaps between islands or between islands and the mainland. We stretched a Dacron line or 1/8 inch rope across these gaps. A standard 18 m mist net was then attached to this 'high tension' line using small clips twisted into the main line. Thus, the 'high tension' line may have been 100 m long with the 18 m net attached in the center. Care must be used such that the clips cannot slide down the main line. Decoys or other weights were then attached to the bottom of the net to hold it down to the water. One person on shore would slack this main line to assist those in the boat during net attachment. This setup appeared to have a higher strike rate than the floating setup, likely because of the lack of vertical poles. However, the actual capture rate was not much higher. Frequently, birds would hit the net and escape before a boat could reach the net. The additional height of this setup frequently caused entangled birds to be suspended in the air, as opposed to the floating system where birds usually drag the net down and end up in the water. Frequently, these suspended birds would escape. We suggest having one observer positioned on the high tension line such that they can slack this line and lower an entangled bird into the water very quickly.

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## **MIST-NETTING NESTING SEA DUCKS**

[Paul Flint, USGS-Alaska]: We have used mist nets for many years to capture eiders on breeding areas. An 18 m net on lightweight standard mist net poles is placed in or across a shallow wetland and decoys are used to attract birds. A simple set of guy lines are used to maintain net tension. The entire set can be placed in a just a few minutes. This approach is particularly effective in capturing territorial drakes during early incubation. We would identify ponds with roosting drakes and flush the bird, observing where it landed. Then we would set up on the original lake. One or more observers would hide on the downwind side of the net. Then we would flush the bird and it usually would return to the original wetland. Frequently, they land short of the decoys and net, at

which point observers would flush the bird into the net. We usually only caught a few birds at any one spot and this approach requires that the net be moved frequently to new territories. We used only a single hen decoy combined with 3-4 drakes.

We have also used mist nets to capture incubating sea ducks with good success. Observers deploy the net well away from the nest site. Two people pull the net tight and then walk towards the nest from the upwind side. The net is carried parallel to the ground to minimize visibility. Observers should walk quickly and not look at the incubating bird. In most cases we were able to place the net directly on the incubating bird. However, if the female flushes the net can quickly be rotated to the upright position. This approach has several advantages over standard bow-trap approaches. First, it is more efficient since it only requires a single visit to the nest (as opposed to one to set the trap and one to catch the bird). Second, we believe that it may reduce nest abandonment rates since there is less disturbance to the area around the nest and the female is not actually captured 'on the nest'. That is, when they flush, they drag the net and are not entangled and stopped until they are several meters from the nest.

# HOW TO CAPTURE FLIGHTLESS SEA DUCKS USING GILL NETS

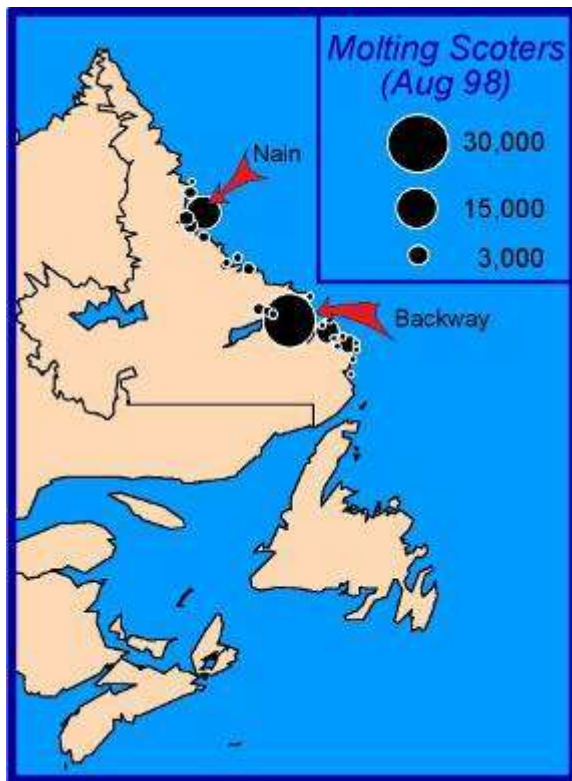
Scott Gilliland, Andre Breault, Gus Dicker, Keith McAloney, Eric Reed and Pierre Ryan

## Introduction

An understanding of population dynamics and migration routes are critical to manage waterfowl populations sustainably. Data sets resulting from large scale banding programs are rich with information (King 1963, 2002), but wanting for most sea ducks. Fewer than 1,000 Surf Scoters have been banded in North America in the last 60 years. The number of banded sea ducks has been limited because opportunities to capture large numbers of birds are rare. Sea ducks are often found in remote areas or on large water bodies where conditions make capturing of large number of birds difficult. Here, we describe a method that uses gill nets that we have used successfully to capture large numbers of sea duck during molt in the Labrador sea.

## Background

From 1998 to 2000, the Canadian Wildlife Service conducted exploratory surveys for molting scoters along the coast of Labrador in eastern Canada. We found a total of 50-60,000 scoters. The majority of birds were located at the Backway and in the Nain areas (see map below).



## Technique

We modified drive-trapping techniques described by Breault and Cheng (1989) for capturing molting waterbirds with gill nets for use in large deep waters. This technique works well on birds that are concentrated while they are flightless, for example molting birds or cr ching young. The basic technique uses 2-3 boats to herd a flock of birds into a gillnet that has been set in front of the flock. Sets are made very quickly, and the net is free floating, i.e. it is not anchored. Because the area is tidal, the drive must be quick so the net does not drift and collapse on itself. Single decoys are used to mark the net ends, and 8-12 decoys are attached to the middle of the net. Once the birds reach the net they are forced to dive by making loud noises (i.e. using air horns or firing cracker shells) and by driving the boats close to the flock.

## Hardware

Gillnets - We used gillnets ranging in length from 150 to 450 m. Nets were 4 m deep, had 90 mm mesh size and were constructed with 0.03 mm nylon monofilament yarn.



New net ready to be opened.



Nets must be cleaned of debris after use,



and are carefully packed in plastic tubs.

To ensure a smooth shot, keep the float and sink ropes from over-lapping, and keep the head and foot of the net aligned as it is packed into the box.

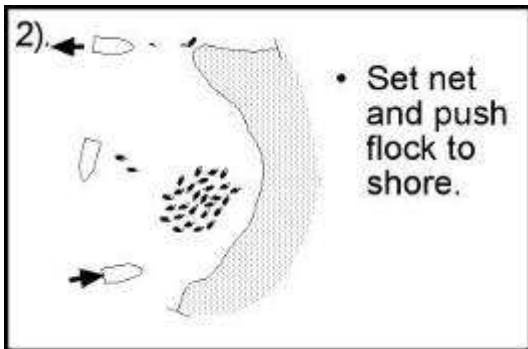
Boats - We operate two 5-7m open boats with 70- 100 hp engines, and a small fast maneuverable boat for driving the birds (we use a 4 m inflatable with 20-30 hp engine). It is important to have at least one boat with a large clear deck area for handling nets and birds, and to remove any thing from the boats that may become entangled in the net.

Other Gear - We use 12-14 scoter decoys in each set. Two individual decoys are attached to swordfish snaps for marking the net ends, and two strings of 4-6 decoys each are attached to swordfish snaps and used for attracting birds to the middle of the net. We use cracker shells and air horns to make birds dive into the net.

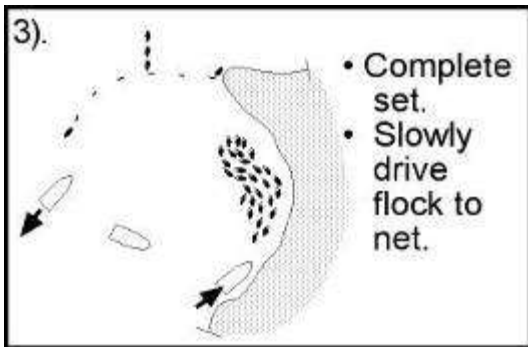
## Setting Nets and Driving Birds



Once a flock is located, select the best site for the net. Good sites are located at points where the near shore water depth is deeper than the net and there is little current. If there is a wind, choose locations where the net can be shot from shore in the direction of the wind. This will ensure that the net does not drift into shore.

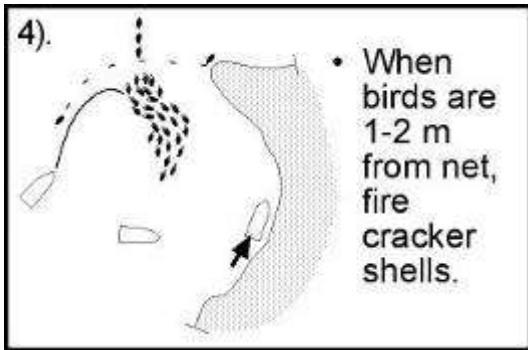


The chase boats move in quickly and push the flock towards shore, while the net boat sets the net. A decoy is fixed to the end of the net with a swordfish snap, and the net is shot perpendicular from the shore. The net is not fixed and it is important that the net does not touch bottom to reduce the risk of drowning birds.



The net boat sets the rest of the net and attaches one to two strings of decoys to the mid-point of the net with, and a second single decoy to the end of the net. Once a third to half the net is set the chase boats begin to drive the birds towards the net. The net boat backs off from the end of the net and joins the other boats in the drive.





When the flock is 1-2 m from the net, a cracker shell is fired over the flock to make them dive into the net. Sometimes it is more effective to wait until the leading edge of the flock passes over the net before discharging shells.

#### Follows is a Series of Photos Showing a Typical Set



The net is shot over the bow of the boat with a decoy marking the beginning of the net. When shooting the net, throw the head and foot ropes apart so the net opens cleanly.



A couple of lines of decoys are attached to the middle of the net.



A flock is herded towards the net.



A flock at the net. The decoys attract the birds, and shows the exact location of the net.



Birds' diving at the net after the cracker shot is fired.

### **Retrieving the Net and Removing Birds**

Once the birds are in the net, it is important to retrieve the net quickly to reduce the risk of drowning birds.



To avoid entangling the boat in the net, pickup from the down wind end and keep the boat perpendicular to the net. When picking up a group of birds, try to support the group until they are in the boat.



It helps to have a large work area in the boat so that the birds and the net do not have to be piled on top of each other.

### **Removing Birds From the Net**

Removing the birds from the net is daunting at first, but can be done quickly and efficiently with experience. It is easiest to begin at an end of the net, but it is possible to start anywhere.



The bird maybe wrapped in several layers of the net and it is often easiest to suspend the bird belly up, head down. Unravel a layer at a time; the bird can be freed from the pocket when you can follow a single layer of net from the bird to the foot or head rope of the net.



Once the belly is exposed, remove the net from the feet and hold the feet together. The bird is pretty near free. Pull the net around the birds back freeing a wing at a time.



Done. Put a band on it.

### **Future Improvements**

We are working on several refinements to the technique:

**Net-** The monofilament net we are currently using has been effective for catching eiders and scoters. The 0.03 mm yarn used in this net is a little light for eiders, occasionally breaks under their weight, and if you are considering a trapping program directed towards eiders, we suggest trying a heavier weight yarn for the net construction.

We are experiencing a low rate of toe and joint injuries. The primary injury is a dislocation of the middle toe. We think this injury results from the length of their foot (from the toe nail to the base of the tarsus) being the same length as the mesh size of the net. We are hoping that using nets of a different mesh size will eliminate this injury.

We are also considering use of multi-strand yarn for net construction. The monofilament nets are bulky and moving to a multi-strand yarn should improve the net handling characteristics of the net.

Bird Handling - We catch an average of 20 birds per set (range 1-88), and getting the birds out of the net takes a bit of time. We feel one of the larger risks for the birds is wetting of their plumage. To reduce wetting of the birds we ensure no water is in the boat before hauling the net and we cut the net if it appears to be taking too long. We are considering using a boat with a self-bailing deck covered with anti-fatigue mats to minimize the chance that a bird may sit in a pool of water.

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