

## **Common Eider population decline and habitat change on Nova Scotia's Eastern Shore Islands**

Final Report NSHCF: Year 1  
Prepared by Molly Simon and Mark Mallory

Department of Biology  
Acadia University

Field data collected principally in 2013 by Molly Simon

### **Project Goal:**

To determine the possible cause(s) of the decline in breeding common eiders in the Eastern Shore Islands Wildlife Management Area, and to suggest possible means to improve populations and female survival.

### **Project Objectives:**

1. Evaluate habitat changes over the last 20 years on nesting islands by comparing current habitat conditions to measures acquired in 1993. This will be accomplished in a single field season.
2. Quantify predator activities on islands to determine: a) which predators are present; b) which islands support different types of predators; c) numbers and timing of predatory activity on islands; and d) relationships of predators to habitat cover on islands.
3. Conduct detailed nesting surveys following the protocols of the past 36 years, and also evaluate early season prospecting by eiders, and post-hatching movements of females and young off of islands, to collectively examine when and how predators or habitat changes may be influencing nesting by eiders.
4. Measure body condition and stress levels in breeding females on different islands, to examine whether female quality may be influenced by, or perhaps be influencing where eiders nest in relation to habitat quality and predator activity.
5. Complete analyses and, in collaboration with Nova Scotia Department of Natural Resources (NS DNR) personnel, recommend options for improving eider nesting success and female survival on the Eastern Shore Islands.

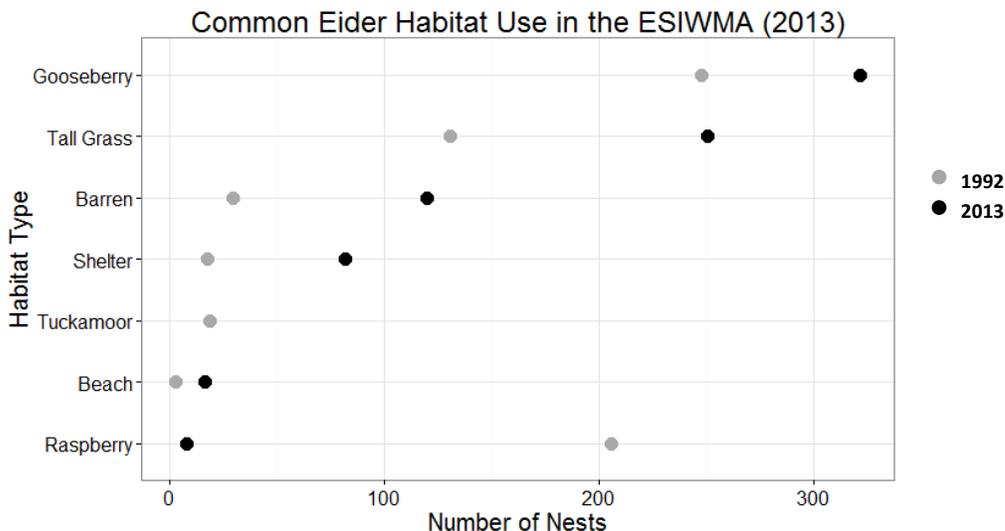
### **Outline of Work Completed:**

1. Habitat was mapped on 17 islands with eider breeding colonies in 2013. These maps are currently being digitized for comparison to habitat maps from 1993.
2. 38 motion activated cameras were placed on 5 islands to determine predator activity. All islands with breeding eiders were also surveyed for mammalian and avian predators at least twice during the breeding season.

3. The study area was surveyed in late April and again in early May to locate prospecting females. Detailed nesting surveys were conducted on 21 islands to determine the number of nests, as well as clutch size, incubation stage and habitat type for each nest. All islands with eider nests were re-visited later in the season to determine the fate of each nest. Crèche surveys were conducted at the same time as the post-hatch surveys.
4. 51 eggs were collected from both exposed nests and nests in breeding shelters to determine stress in the females at the time of egg formation. Blood samples were also taken from 12 incubating females to determine stress levels.
5. Analyses are currently underway, and preliminary results were presented to the NS DNR's Wildlife Division, the Atlantic Migratory Game Birds Technical Committee Meeting, and the Atlantic Society of Fish and Wildlife Biologists Annual General Meeting in October of 2013. A poster was also presented at the Nova Scotia Federation of Anglers and Hunters Annual General Meeting in March of 2014.

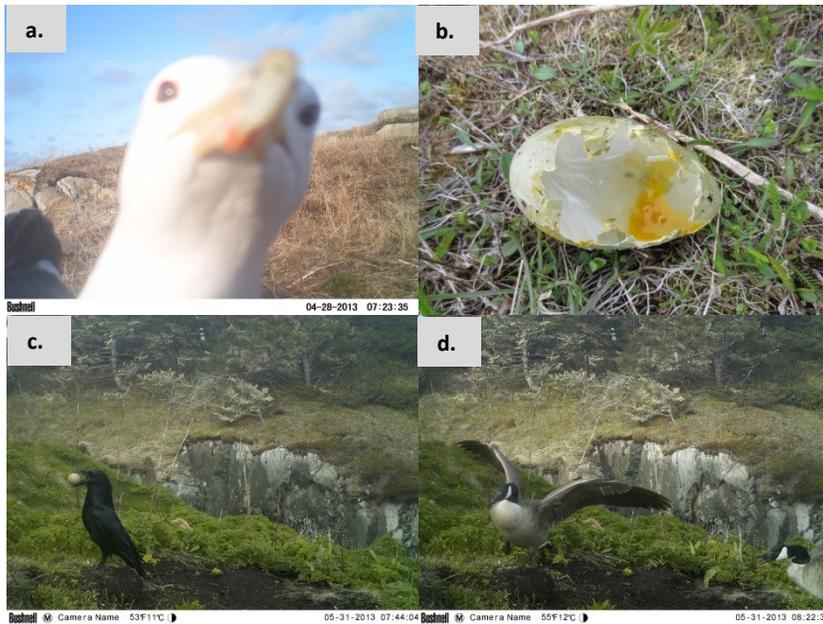
#### Outline of Work Completed:

1. Gooseberry continues to be the most preferred breeding habitat of eiders in the Eastern Shore Islands Wildlife Management Area (ESIWMA), with nearly 40% (322/827) of all nests in 2013 found in this habitat (see Figure 1). Tall Grass also continues to be a preferred habitat, with Beach and Tuckamoor almost never being used. However, Raspberry was the second most used habitat type in 1992-1993, but was almost never used in 2013. Both Barren and Shelters were used more often in 2013 than in 1992-1993.

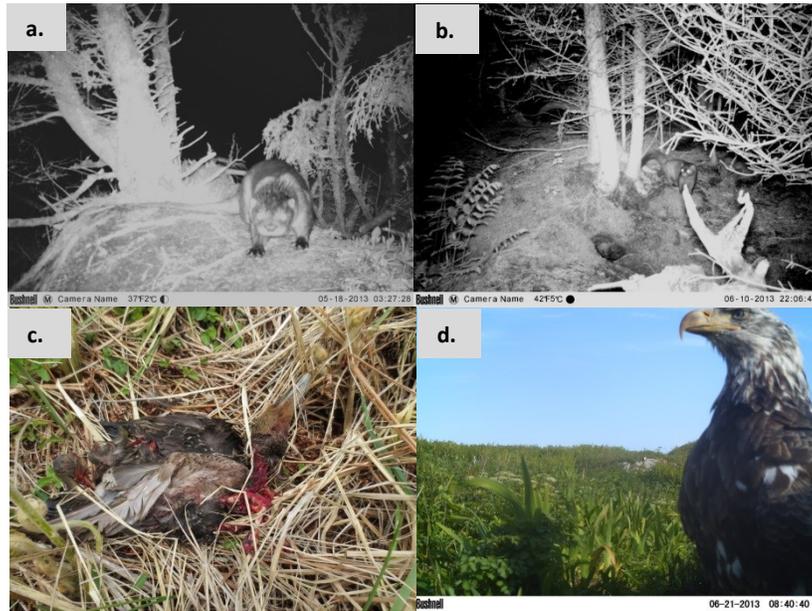


**Figure 1.** The number of nests found in each habitat type in 2013 and 1992.

2. Mammalian predator activity was confirmed on a number of different islands, and both mammalian and avian predation of eggs and adult eiders was noted on many islands (see Figures 2 and 3).



**Figure 2.** Possible predators of common eider eggs and a depredated egg **a.** Great Black-backed Gull, **b.** freshly depredated egg, **c.** Common Raven with eider egg, and **d.** Canada Goose.

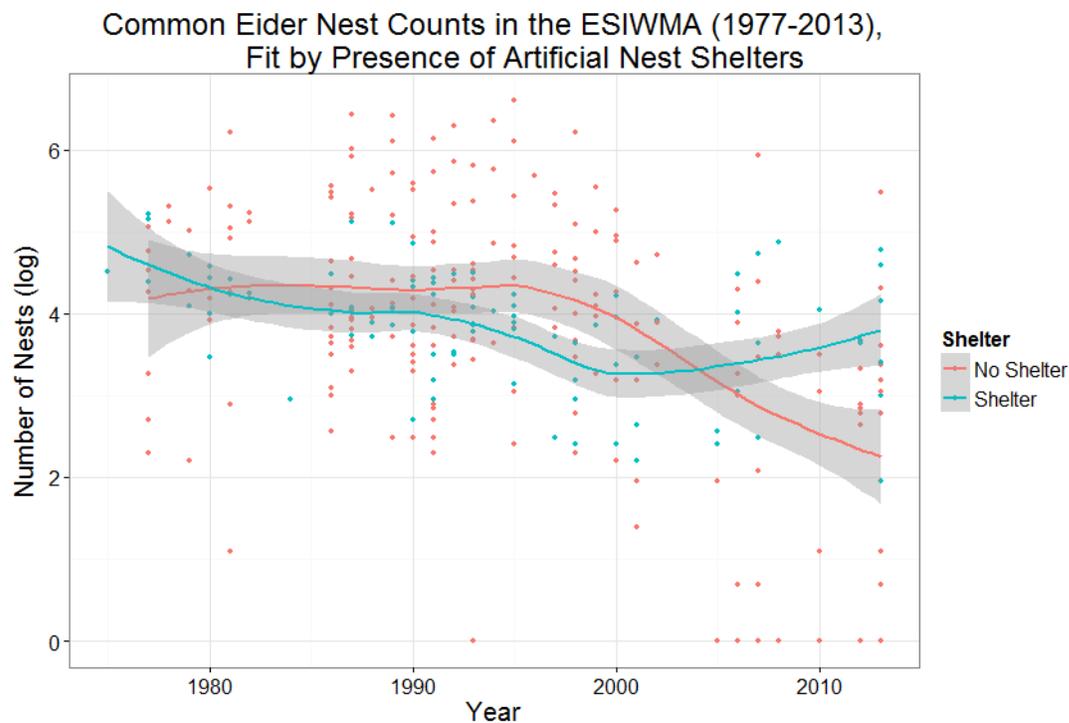


**Figure 3.** Possible predators of common eider adults and ducklings **a.** River otter, **b.** American mink, **c.** Depredated female eider, and **d.** Immature Bald Eagle.

3. Very few eiders were seen in the study area in late April, and these were mainly seen feeding off of shoals, and not on or near breeding islands. Eiders first started appearing on some islands in early May, but not on others until late May. This asynchrony was also confirmed with incubation stage checks on nests. The females on some islands are breeding a full month later than those on other islands. The earliest measured nests showed incubation beginning in

the first week of May, with ducklings appearing as early as June 5<sup>th</sup>. The latest measured eggs were freshly laid in the first week of June, and chicks were hatching as late as July 3<sup>rd</sup>, with some nests yet to hatch. This may be related to the presence of mammalian predators on some islands, though further analysis is required to determine if this is the case.

A total of 841 nests were located on 16 islands. This number reflects an extremely thorough search of all previously known colonies. Though most medium-sized colonies still persist, many large colonies of greater than 100 nesting females have decreased or disappeared altogether since the 1990s. There is some evidence to suggest that islands with plastic nesting shelters (placed in the mid-1980s or early 1990s) have fared better than others (see Figure 4). Clutch sizes are comparable to those recorded in the 1990s and in other studies, with a mean clutch size of 3.5, and a median clutch size of 4.



**Figure 4.** The number of nests in each common eider breeding colony over time. Each individual point represents the total number of nests on one island in a given year. Islands with plastic nest shelters are shown in blue, while islands with no plastic nest shelters are shown in red.

Of 699 nests that could be relocated, 14-38% were depredated and 61% successfully hatched at least one duckling. Surveys were halted when ducklings were hatching to try and minimize predation events. Therefore, very few ducklings were seen. The few that were observed on the water during post-hatch surveys (a total of 8 ducklings) were immediately depredated by Great Black-backed Gulls and Bald Eagles. Anecdotal reports from local fishermen indicate that duckling survival may be very low in recent years, with no crèches being observed in the last few years.

4. As a BSc thesis project, one student examined heterophil:lymphocyte ratios (white blood cell counts) in nesting females from the ESIWMA, as well as those on the South Shore (John's and Bon Portage islands) of Nova Scotia, and compared those to existing data from the Canadian Arctic and Iceland. Results indicate that eiders in the Arctic have a higher baseline stress level than the eiders in Nova Scotia, but Iceland is lower than Nova Scotia eiders. This may be related to both migration and predation differences among the three regions.
5. Additional plastic nest shelters will be placed on islands after the 2014 breeding season. Islands that previously had large colonies and that currently have no nesting shelters will be targeted for shelter placement. It is also recommended that breeding surveys be conducted on all islands later in the incubation period or after the majority of nests have hatched in order to minimize disturbance to incubating females. Additional analyses are required before further recommendations regarding predators can be made.

### **Achievements and Lessons Learned:**

The most surprising finding was the asynchrony in nesting timing between islands. This was a completely unexpected result and affected the blood sampling and egg collection that was planned. The initial goal was to collect eggs and blood from islands with mammalian predators and islands without mammalian predators. However, when the sampling was conducted (during what was thought to be the mid-incubation period on all islands), there were no eiders breeding on islands with mammalian predators. It was initially thought that these colonies had disappeared altogether. On some islands, this was the case, and no nests were found later in the season, but on others, many nests were found nearly a month later. This asynchrony may point to an indirect effect of the presence of mammalian predators on breeding islands.

Secondly, the number of adult females that were killed by what appeared to be avian predators was worrisome. There were a number of mature and immature Bald Eagles in the study area, and they could be taking incubating females from the colonies. The fact that islands with plastic nest shelters have maintained colonies seems to point to avian predators as a potential source of direct mortality for adult females.

### **Next Steps:**

In addition to placing nest shelters in 2014, it is recommended that surveys targeting avian predators be undertaken. This could be done with spotting scopes from blinds and adjacent islands, or remotely using VHF or satellite transmitters, or geolocators.

It is also recommended that thorough post-hatch or late incubation surveys be conducted at least once every 3 years, with all known breeding islands being surveyed in a given year. This will provide a total breeding population estimate, and capture both early and late breeders in the count. It will also serve to monitor the spread of mammalian predators throughout the study area, and to record the immediate effects on breeding colonies.