

MAHONE BAY ROSEATE TERN RECOVERY PROJECT  
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## **ABSTRACT**

The Bluenose Coastal Action Foundation began the Roseate Tern Recovery Project in 2003 after Roseate Terns had disappeared from the Mahone Bay area. Efforts to re-establish a secure nesting site for Roseate Terns began on Quaker Island in 2004, but ended in 2007 after several years of no success. After conducting Bay-wide surveys, efforts became refocused towards Grassy Island, a historical Roseate Tern nesting island, and a stewardship program was initiated in 2010. Nesting boxes, tern decoys, and a mixed tern colony sound system were placed on Grassy Island for the purposes of attracting terns which are colonial seabirds. Since gulls are a common predator to terns, a permit was received to deter gulls from nesting on Grassy Island. The stewardship program was continued in 2011. Other islands in the Mahone Bay area hosting tern colonies were also monitored throughout the field season, with Grassy Island having the largest colony in the area. However, only Westhaver Island was successful in producing fledglings. Severe storm events, predation, and human disturbance affected the success of the other tern colonies in the Bay. Along with monitoring the seabirds, education and outreach activities occurred through presentations, attending local festivals, and surveying boaters in the area so as to inform more people about the importance of conserving this species at risk.

## ACKNOWLEDGMENTS

The Roseate Tern Recovery Project (RTRP) team would like to extend their gratitude and appreciation to those who have contributed to the successful completion of the 2011 field season. The following have played a critical role in supporting the RTRP:

- 2011 Field Season Boat Driver: David Welsford
- BCAF Staff
- Environment Canada's Canadian Wildlife Service
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- Lunenburg Academy
- Bayview Community School
- Hebbville Academy
- Gold River – Western Shore Elementary School
- Aspotogan Consolidated Elementary School
- Shelburne High School
- Bridgewater Growing Green Sustainability Festival
- Mahone Bay Regatta (Pirate Festival)
- 7<sup>th</sup> Annual Pubnico Tern Festival
- Lunenburg Farmer's Market
- Chester Race Week
- Local establishments and community members of Lunenburg County

## INTRODUCTION

### BLUENOSE COASTAL ACTION FOUNDATION

Established in 1993, the Bluenose Coastal Action Foundation (BCAF) is a non-profit charitable organization that addresses the environmental concerns within Lunenburg County, NS. The goal of BCAF is to promote the restoration, enhancement, and conservation of our ecosystem through research, education, and action. As part of the Atlantic Coastal Action Program (ACAP), BCAF was originally conceived to respond to the urgent need to restore human-impacted coastal environments so that they could continue to sustain coastal communities. The watershed boundaries in which BCAF conducts its work include the coastline from Sandy Point to Cherry Hill and inland to include the following watersheds: Petite Riviere, LaHave, Mushamush, Gold, and East Rivers. The towns or communities of Lunenburg, Mahone Bay, Chester, Bridgewater, and New Germany fall within BCAF's watershed boundaries.

Over the past 18 years, BCAF has successfully completed a number of projects within Lunenburg County. Currently BCAF is involved in several projects which include, but are not limited to, the Atlantic Whitefish Recovery Project (AWRP), American Eel Habitat Assessment, Elver Abundance Study, Bridgewater Active Transportation, Environmental Home Assessment Program, Gold River Restoration and Salmon Research Project, LaHave River Watershed Project, and Mahone Bay Roseate Tern Recovery Project (RTRP).

### ROSEATE TERN

In Canada, the Roseate Tern (*Sterna dougallii*) is classified as an endangered species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). In Nova Scotia, it is protected under the *Migratory Birds Convention Act*, *Species at Risk Act (SARA)*, and the *Nova Scotia Endangered Species Act*. Populations in the north east region of the United States are also considered endangered by the United States Fish and Wildlife Service (USFWS). The USFWS has also listed the Caribbean breeding population of the Roseate Tern as threatened due to a decline in its numbers (COSEWIC 2009).

There is only one population of Roseate Terns that breed on the Atlantic coast of Canada. Their range runs from the Magdalen Islands in the Gulf of St. Lawrence east to New Brunswick and Nova Scotia. There are three main colonies in Nova Scotia where Roseate Terns are currently nesting; Country Island, The Brothers, and Sable Island (COSEWIC 2009; Nova Scotia Species at Risk 2010). Roseate Terns nest almost entirely on small islands that are sparsely vegetated with beach grass and other herbaceous plants. Roseate Terns nest under cover, usually in the form of dense vegetation, or under and among boards, driftwood, and artificial structures like boxes and tires (COSEWIC 2009). In the North Atlantic, Roseate Terns forage for small fish which include small herring, pollock, butterfish, and sand lance (Environment Canada 2010).

In Canada, Roseate Terns nest in large mixed colonies of Common terns (*Sterna hirundo*) and Arctic terns (*Sterna paradisaea*). By doing so, greater protection from predators is provided as they benefit from the aggressive behaviours of these other terns. Terns that breed in Mahone Bay, NS arrive in early May and typically depart in mid-August to travel to staging areas prior to their migration. Roseate Terns are known to utilize staging areas located in Saco Bay, ME and on Cape Cod. While there is little data available on habitat used during the winter months, Roseate Terns are known to over winter in South America from Colombia to eastern Brazil (COSEWIC 2009).

Roseate Terns typically breed first at three years, with the average age of breeding adults in the northeastern population being 7.8 years. They are ground nesters who typically lay a clutch of 1-2 speckled eggs which are easily camouflaged against beach-like substrates (COSEWIC 2009). The parents take turns incubating the eggs for 23 to 24 days. Chicks hatch in June and typically leave the nest several days later to find other hiding places. They fledge after 25 to 28 days and depart for staging areas with their parents in mid August (Hinterland Who's Who 2011). Roseate Terns can be confused with Common and Arctic terns as they are similar in appearance – they are a medium-sized, pale seabird, that are closely related to gulls; however, the Roseate Tern has a long and deeply forked tail. In addition, during breeding, adults are mostly white with a black cap, have black at the tip of their wings, and also a white breast suffused with pale pink. The bill of the Roseate Tern is black with red appearing at the base later in the breeding season (COSEWIC 2009).

### **BIOLOGICALLY LIMITING FACTORS**

The Roseate Tern (ROST) has an annual adult survival rate of 83%, which is low for a seabird. In addition, they lay one small clutch per year (mean clutch size = 1.7 eggs/pair), and usually do not breed until their third year. In addition, colony sites can be limited by their need for specific foraging sites (Environment Canada 2010; COSEWIC 2009).

### **THREATS TO ROSEATE TERNS**

Threats to the reproductive success of terns (Common, Arctic, and Roseate) in Canada include predation at breeding colonies by Herring and Great Black-backed Gulls (*Larus marinus*), American Crows (*Corvus brachyrhynchos*), raptors, and American mink (*Neovison vison*). Predation and displacement by gulls are thought to be the primary factor limiting distribution of the Roseate Tern in Canada (Environment Canada 2010).

Human disturbance, extreme weather events, habitat loss from development, rising sea levels, pollution, and disease has threatened the recovery of the Roseate Tern within Mahone Bay and other breeding sites in Atlantic Canada.

### **HISTORY OF ROSEATE TERNS IN MAHONE BAY**

The islands within Mahone Bay lay midway between Atlantic Canada's two "managed" Roseate Tern colonies; Country Island (Guysborough County) and North Brother Island (Yarmouth County).

Grassy Island, located in Mahone Bay, historically supported one third of the breeding Roseate Tern population in Canada. Beginning in the mid-1990's, the terns abandoned Grassy Island after being displaced by a colony of Herring Gulls (*Larus argentatus*) and Great Black-backed Gulls, which establish their nests three to four weeks before terns.

## **SITE DESCRIPTION**

Mahone Bay (44°30'N, 64°15'W) is located in Lunenburg County, Nova Scotia, Canada. Islands in Mahone Bay range from 200 to 2400 m<sup>2</sup> and the area is a popular destination for recreational and commercial (lobster fishery) boaters.

The Mahone Bay islands provide a variety of habitats including rocky shores, cobble and sand beaches, dune complexes, tidal flats, wetlands, and mature forests. These coastal habitats have led to support a diverse population of wildlife, both marine and terrestrial. Distinct seabird and shorebird populations occupy these islands such as osprey, eagles, puffins, leach's storm petrels, razorbills, shearwaters, northern gannets, black guillemots, cormorants, and terns (Mahone Islands Conservation Association 2011).

## **BACKGROUND**

The Roseate Tern Recovery Project (RTRP) was initiated in April 2003 by BCAF. The primary goal of the project is to re-establish a secure nesting site for endangered Roseate Terns on an island in Mahone Bay, Nova Scotia. This goal would fulfill the third objective of the "Recovery Strategy for the Roseate Tern in Canada", which hopes to restore a broader distribution of Roseate Terns by establishing at least one more managed colony.

During the first year of the project, the Bluenose Coastal Action Foundation determined that the most appropriate stewardship site for Roseate Terns in Mahone Bay was Quaker Island. From 2004 to 2007, BCAF facilitated research on the island to establish a Roseate Tern colony by using tern decoys, sound systems, nesting boxes, predator deterrence, and predator control measures. Unfortunately, successful stewardship on Quaker Island was not accomplished due to mink predation, severe storm events, and potentially anthropogenic disturbances. The lack of tern breeding success on Quaker Island led BCAF to refocus their efforts in 2008 and 2009. During these field seasons, Bay-wide surveys at a maximum of three times per week were conducted to document tern distribution, abundance, productivity, and reproductive success.

Beginning in April 2010, the RTRP initiated a tern stewardship program on Grassy Island due to its historical suitability as habitat for breeding terns, and also as it once held one third of the Roseate Tern population in Canada. The island is located offshore, which limits anthropogenic disturbances, but is close enough to be regularly monitored. Grassy Island is a Wildlife Management Area owned by Nova Scotia Department of Natural Resources (NSDNR). Therefore, gull deterrence and management efforts were first approved by the NSDNR and the Canadian Wildlife Service.

A Public Education and Outreach Program and a Tern Colony Signage Program are also implemented by the Bluenose Coastal Action Foundation. The outreach program aims to inform recreational users of Mahone Bay's islands, students, and local groups in Lunenburg County of the presence, conservation status, and recovery actions required for endangered Roseate Terns, as well as provide information tern colonies in general. The Tern Colony Signage Program was created to enhance public recognition of and respect for tern colonies. Ultimately, it is hoped that this will decrease human disturbance to tern colonies, leading to healthier Common and Arctic tern colonies in Mahone Bay. The decrease in human disturbance events in the Bay may attract and shelter Roseate Terns; allowing reproduction and recovery of this endangered species.

## **MATERIALS AND METHODS**

In order to monitor the seabirds, a 20' Boston Whaler (generously donated by Rick and Barb Welsford) was used to travel to islands where tern colonies were located. The boat was equipped with proper safety gear including a radio, GPS, flares, etc. BCAF staff carried a cellular telephone at all times when in the field. BCAF field staff were required to take a safe boating course, as well as a first aid course. A rowboat loaned by Frank MacAuley was used to monitor Gully Island in Bayport.

### **BAY-WIDE SURVEYS**

Bay-wide surveys and monitoring were conducted by RTRP staff up to three times a week beginning May 3<sup>rd</sup>, 2011 until August 23<sup>rd</sup>, 2011 using the Boston Whaler. Bay-wide surveys were used to identify the location of tern colonies on various islands, by travelling around to islands in Mahone Bay which could potentially hold tern colonies. All information including date, weather, temperature, time, persons present, all bird species, and their observed actions was recorded in the field book.

### **DISTRIBUTION AND ABUNDANCE OF TERNS**

Once tern colonies were established on specific islands, those islands were visited regularly (maximum three times per week) to monitor tern abundance, productivity, and reproduction. Visits to the islands indicate that the islands were observed from the boat, and the RTRP team did not actually land on the island.

To monitor abundance at tern distribution sites, terns were flushed from the island and numbers were estimated by eye or photographs while birds were in flight. The RTRP crew learned how to estimate large numbers of terns by first learning to recognize small groups (i.e., 5, 10, and 20) to obtain a more accurate and quick estimate. Distribution and abundance of terns were monitored continuously throughout the field season.

### **NEST, EGG, AND FLEDGLING COUNTS**

Reproductive success of terns was monitored during the later field season (June-August) by conducting nest, egg, and fledgling counts. To conduct counts accurately, field staff would walk in a straight line, one meter apart, and mark the area walked with flags. Nests and eggs were counted on the inside of the flags, as flags were placed down and picked up in continuous lines across the nesting areas. To ensure that no nest was counted twice, pieces of popsicle sticks were laid in the nests as they were counted and recorded. Counts were completed as quickly and efficiently as possible in order to minimize stress to adult terns and unprotected eggs and chicks. Fledgling counts were conducted with binoculars from the boat. Juvenile terns are distinguished from adults by their white forehead (brownish-black hind crown and black nape), brownish plumage, and weak carpal bars.

In the case that more terns arrived to an island following a nest and egg count, another count was conducted 21-24 days (tern gestation period) after the previous count, and both counts were combined to get the total number of nests and eggs. This methodology ensures that there is no double-count of eggs or chicks, therefore avoiding an overestimate.

## **PREDATOR SURVEYS**

During tern surveys, potential predators, anthropogenic disturbances, and any storm events observed in the area were recorded. A video camera was placed on Westhaver Island in order to observe the tern colony continuously; however, due to technical difficulties this technology was not able to be used in 2011.

## **GRASSY ISLAND STEWARDSHIP**

Grassy Island stewardship was commenced in the summer 2010 and continued in 2011. Decoys, nesting boxes, a sound system, and seabird nesting signs were placed on the island as a means of attracting terns to the historical tern nesting grounds.

54 plastic tern decoys were filled with sand and placed around the nesting area of the island in order to simulate an actual nesting colony and attract terns to the island. 17 nesting boxes were placed out above the high tide line, on the NE side of the island facing SW, so as to provide the most shelter from the elements. Preferred nesting substrate such as small gravel and coarse sand was placed and leveled inside the boxes, if not already there. Seaweed and other natural materials such as shells, sticks, etc., were placed around the nesting boxes for a more natural appearance and also to provide nesting materials. A large rock was placed on the roof of the nesting box to hold the box in place (Figure 1).

A sound system playing mixed colony tern sounds was placed above the high water line on the rocks, outside of the suitable tern nesting habitat so as not to take up valuable space. MotoMaster Nautilus marine batteries ranging from 625 to 1000 marine cranking amps were used to power the sound system. Batteries were changed about once per week as the used battery was brought back to the office to charge. The battery and sound box were covered with plastic garbage bags to avoid damage from the elements, and the speakers were covered with small rocks to stay in place and blend in with the surroundings. Once an adequate number of terns were colonizing on the island, the sound system was removed.



**Figure 1.** Nesting boxes on Grassy Island, May 2011.

## **PERMITS**

Grassy Island and Pearl Island are both Wildlife Management Areas owned by Nova Scotia Department of Natural Resources (NSDNR) and permits were received to monitor seabird populations up to three times a week from the boat. BCAF staff are permitted to land on Pearl and Grassy Islands three times during the breeding season to assess the productivity and reproductive success of the terns, with the accompaniment of Andrew Boyne of Canadian Wildlife Service (CWS) or other CWS staff.

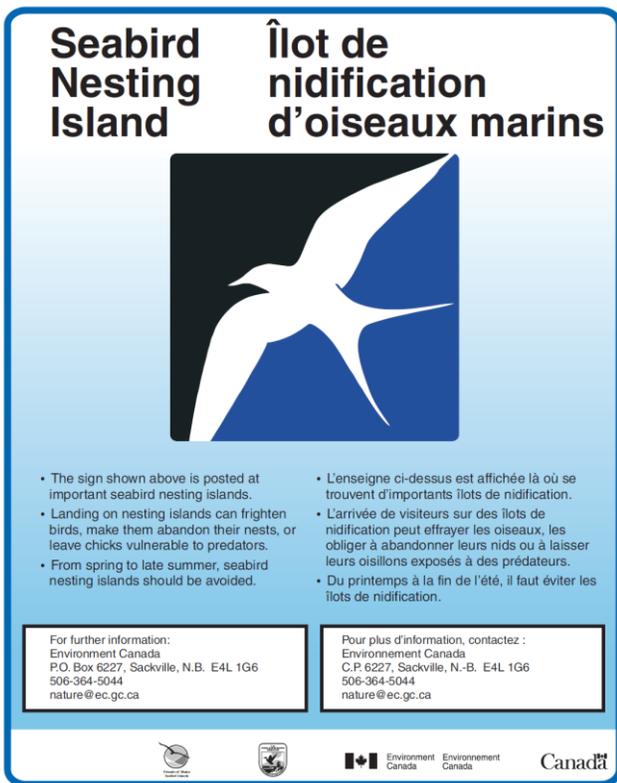
In addition to the aforementioned permit, another permit was granted from CWS regarding the removal and destruction of gull eggs on Westhaver and Grassy Islands. The permit allows nominees to destroy up to 250 Herring Gull (HERG) eggs and 75 Great Black-backed Gull (GBBG) eggs on Grassy Island, and up to ten GBBG eggs on Westhaver Island.

## **GULL DETERRENCE**

In an effort to deter gulls from seabird nesting islands, HERG and GBBG eggs were destroyed. A rock was placed in the nest to ensure the gull would not attempt to re-nest. Up to 250 HERG eggs and up to 75 GBBG eggs could be removed from Grassy Island, while up to ten GBBG eggs could be removed from Westhaver Island.

**SEABIRD NESTING SIGNS**

Permanent interpretive signs were posted at wharves and yacht clubs (Figure 2a). Seabird Nesting signs were placed on islands with active tern colonies (Figure 2b). Two signs were placed on either side of islands with tern populations to make visible to boaters on either side. Signs were mounted on a post and placed in a holding box filled with large rocks (taken from the island the sign was posted on) to provide stability. Signs were placed a safe distance above the high tide line to prevent them from being dislodged during storm events. In the case that a colony was abandoned, the signs were removed from that island so locals and boaters would not question the credibility of the signs (and hence, reduce their effectiveness at active colonies). A sign was also posted for the breeding season on Westhaver Beach and removed in the fall to avoid damage or loss over the winter.



**Figure 2a.** Interpretive sign placed at wharves and yacht clubs active colonies



**Figure 2b.** Seabird Nesting Island sign placed on islands with

## OUTREACH AND EDUCATION

The Outreach and Education Program was established by the Roseate Tern Recovery Project in April 2008. The 2011 field season was no exception for this program, as many events, wharfs and/or marinas, schools, and festivals were attended in order to reach a maximum number of individuals within various interest and age groups. The program was created to inform users of Mahone Bay’s islands and local groups in Lunenburg County of the presence, conservation status, and recovery actions required for the endangered Roseate Tern. By educating local residents and boaters, the RTRP team hopes to increase involvement in, and support of, recovery activities. To accomplish the objectives, various educational pamphlets were developed and distributed along with local school and yacht club presentations.

## TERN COLONY SIGNAGE PROGRAM

The Tern Colony Signage Program was initiated in Mahone Bay in the summer of 2008. This program was created to enhance public recognition of, and respect for, tern colony avoidance signs which indicate nesting seabirds and their habitats. BCAF ultimately hopes that this will decrease human disturbance to tern colonies, leading to healthier Common and Arctic tern colonies in Mahone Bay. Boater surveys were conducted throughout the 2011 field season in order to monitor the effectiveness of the seabird nesting signs. The RTRP team visited local wharfs and marinas and asked a series of five questions to participants (Table 1). Survey questions are listed directly below, and the responses are recorded in the “Results” section.

**Table 1.** 2011Boater survey questions.

Bluenose Coastal Action Foundation Boater Survey 2011	
Question	Answer
1. Are you aware that the Roseate Tern is endangered?	Yes / No
2. Are you aware of BCAF’s Roseate Tern Recovery Project?	Yes / No
3. Do you know what the “Seabird Nesting” sign looks like?	Yes / No
4. Do you know the precautions that should be taken when you come across a Seabird Nesting sign?	Yes / No
5. Do you have any suggestions about how to spread our message?	Yes / No

## RESULTS

### DISTRIBUTION AND ABUNDANCE

Terns were observed on several islands throughout the Mahone Bay area including Crow, Goat, Grassy, Gully, Mash, Pearl, Quaker, and Spectacle Islands and a small unnamed island near Corkum’s Island (Figure 3). Abundance of terns varied greatly at each of these locations, with the largest population occurring on Grassy Island and the smallest on Mash (Figure 4). Tern abundance per location changed throughout the field season as terns relocated.



Figure 3. Distribution and nesting sites of terns around Mahone Bay Area 2011. Distribution site indicates tern presence.

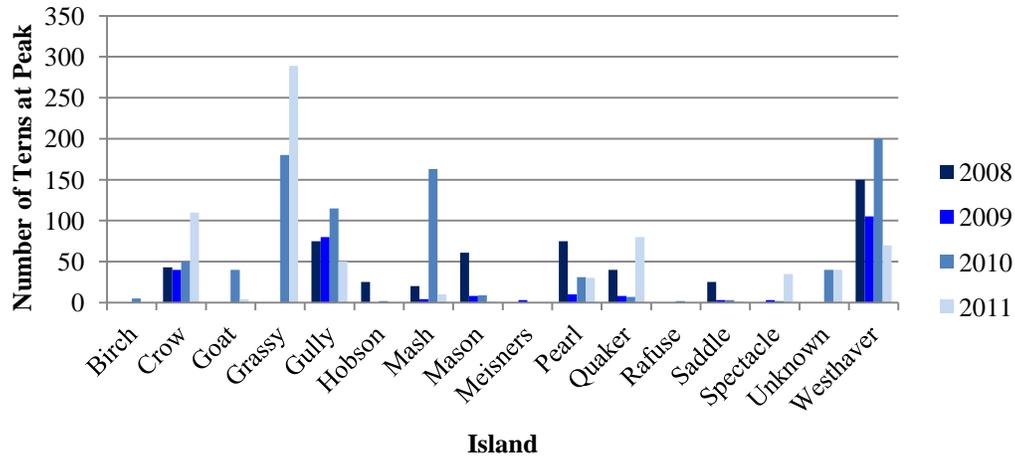


Figure 4. Number of terns at peak counts on Mahone Bay Islands 2008-2011.

**REPRODUCTIVE SUCCESS**

Nest counts were conducted on the islands where terns were thought to be nesting (Table 2).

Table 2. Days that nest counts were conducted in 2011.

Island	Date
Grassy	June 17, July 11
Westhaver	June 11
Crow	June 11
Quaker	June 16
Spectacle	June 11
Unnamed by Corkum's*	June 9
Gully*	June 9

\* Conducted by CWS.

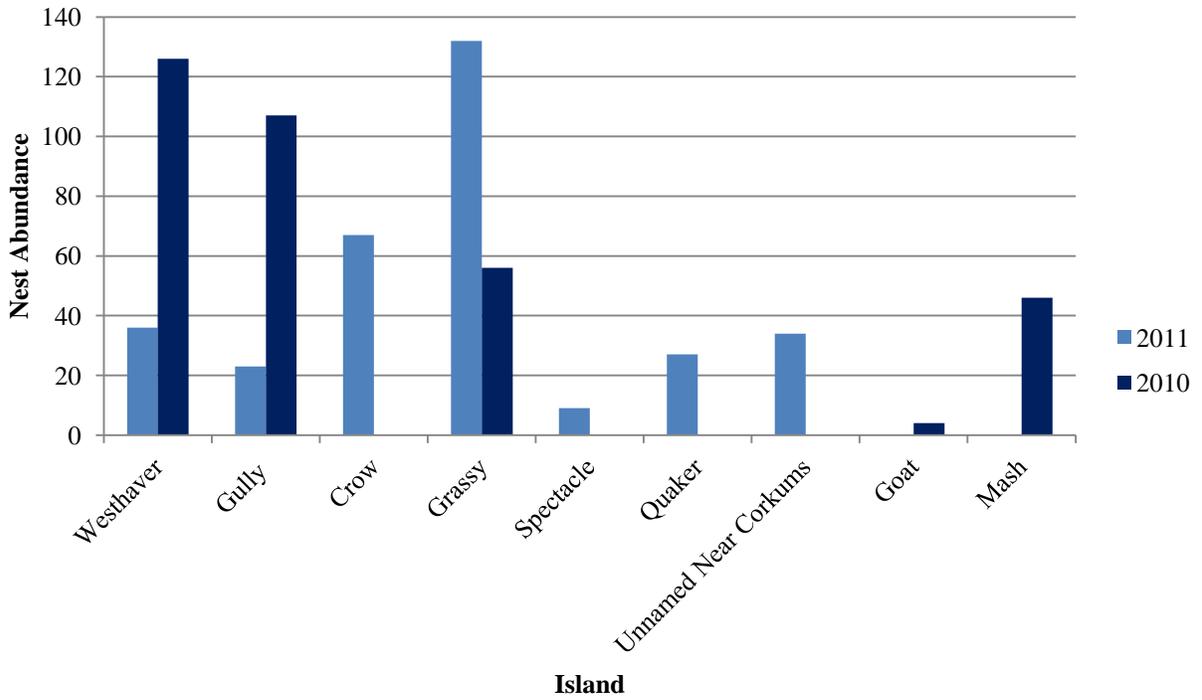


Figure 5. Nest location and abundance on Mahone Bay Islands 2010 and 2011.

Nest numbers decreased slightly from 339 nests in 2010 to 328 nests in 2011, a decrease of 11 nests. Nest numbers in 2011 were lower than in 2010, except for Grassy Island which had a higher nest count than in previous year (Figure 5). Fledgling counts

### GULL DETERRENCE

Gull deterrence proved successful on Grassy and Westhaver Islands, as the number of gulls decreased throughout the field season (Figure 6).

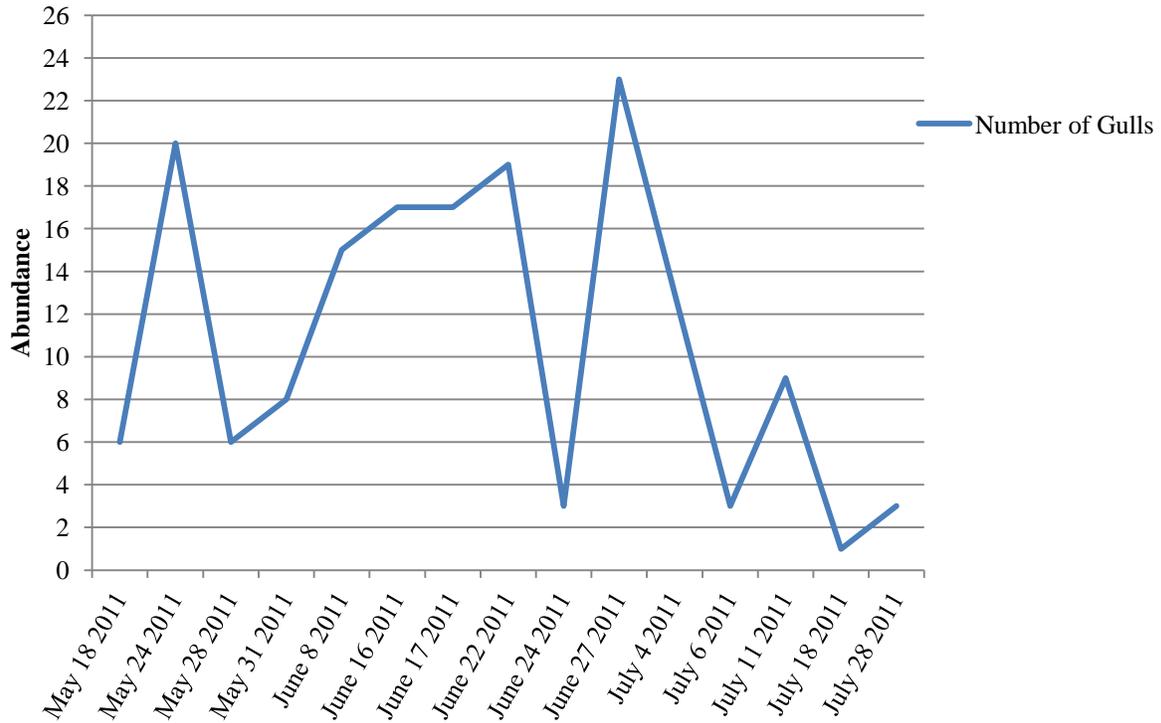


Figure 6. Gull and gull nest abundance on Grassy Island in 2011.

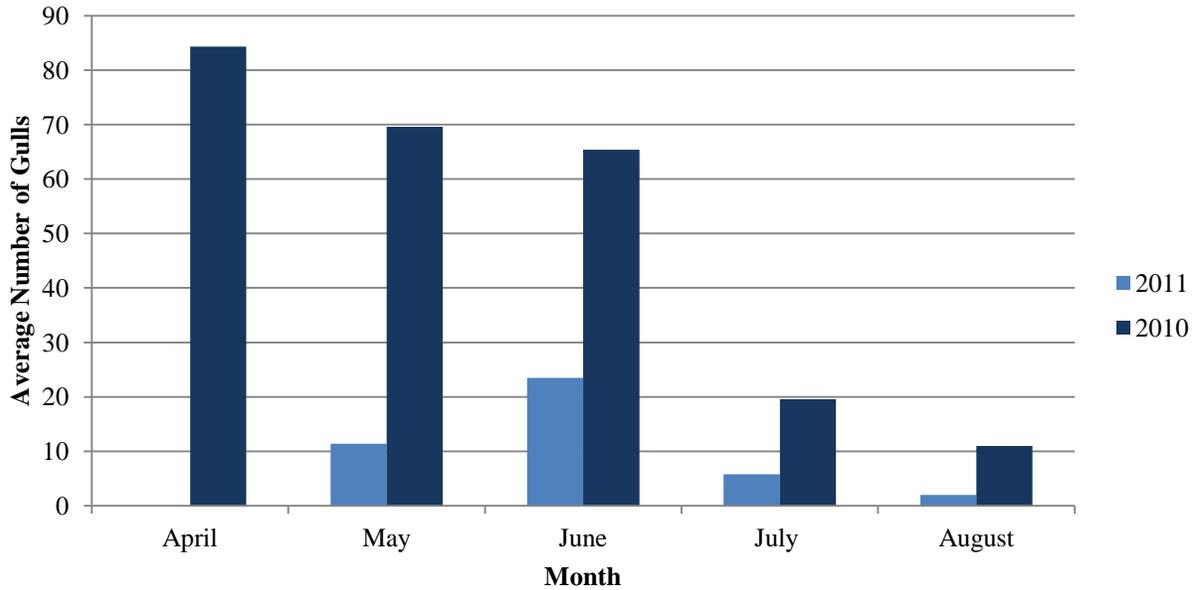


Figure 7. Average number of gulls observed per visit on Grassy Island 2010 and 2011.

## GRASSY ISLAND

Grassy Island was visited a total of 20 times from May 3<sup>rd</sup> to August 15<sup>th</sup>. The RTRP team landed on the island 11 times, and the length of visits were made as short as possible so as not to disturb the terns. The majority of the landings were to change the battery on the sound system and destroy gull eggs, as well as set up and collect the field gear. Gull deterrence occurred on Grassy Island between May 18<sup>th</sup> and June 27<sup>th</sup>. 75 percent of the eggs destroyed were HERG, while the remaining 25 percent belonged to GBBG. Gull presence has overall decreased in 2011 from 2010 (Figure 7). May 18<sup>th</sup> was the first sign of terns on the island, with numbers increasing until the peak count of 289 terns on July 11<sup>th</sup> (Figure 8). On July 6<sup>th</sup>, two ROST were spotted flying overhead by BCAF staff and Andrew Boyne; however, were not observed again. Gull and tern numbers both decreased substantially beginning the end of July and continuing into August. Two nest counts were conducted on Grassy Island: the first on June 17<sup>th</sup> where 41 nests were observed; and the second 25 days later (gestation period) on July 11<sup>th</sup> where an additional 91 nests were observed. CWS was not able to accompany the RTRP staff during these counts, but the results were immediately submitted to CWS following. Although there were 132 nests throughout the breeding season, no fledglings were observed.



Figure 8. Tern colony on Grassy Island, July 11<sup>th</sup>.

### **WESTHAVER ISLAND**

Westhaver Island was visited frequently, with a total of 30 visits, landing 11 times. A total of five eggs were removed from four nests, which were from one pair of GBBG. May 28<sup>th</sup> was the last time that the pair of GBBG attempted nesting; however, the pair was observed frequently roosting on the rocks. Tern abundance on Westhaver ranged from 10-80 terns throughout the entire season, but averaged 30-40 terns consistently through the nesting period.

Westhaver produced the only confirmed fledglings of the 2011 season, with a total of three fledglings.

### **PEARL ISLAND**

Pearl Island was visited twice throughout the season (July 6<sup>th</sup> and 20<sup>th</sup>), where a colony of approximately 30 terns was observed. Andrew Boyne of CWS accompanied two BCAF staff and a volunteer on both occasions; however, the RTRP was unable to land either time due to rough waters. Observations were made from the boat as it circled around the island. As Pearl Island hosts not only terns but many different bird species, numbers of species observed include: Razorbills (*Alca torda*) (42-61), Atlantic Puffins (*Fratercula arctica*) (75), Double-crested Cormorants (*Phalacrocorax auritus*) (180), Common Eiders (*Somateria mollissima*) (30), Black-legged Kittiwakes (*Rissa tridactyla*) (20), Black Guillemots (*Cephus grylle*) (at least 50) as well as a number and Herring and Great Black-backed Gulls.

## OUTREACH AND EDUCATION

The Outreach and Education Program was established by the RTRP in April 2008. The 2011 field season was no exception for this program, as many events, wharfs and/or marinas, schools, and festivals were attended in order to reach a maximum number of individuals within various interest and age groups (Table 3 and 4). The program was created to inform users of Mahone Bay’s islands and local groups in Lunenburg County of the presence, conservation status, and recovery actions required for the endangered Roseate Tern. By educating local residents and boaters, the RTRP team hopes to increase involvement in, and support of, recovery activities. To accomplish the objectives, various educational pamphlets were developed and distributed along with local school and yacht club presentations. Boater surveys were conducted to determine awareness of the RTRP and collect suggestions on how to increase awareness (Table 5).

### Educational materials distributed included:

- Roseate Tern Boater Cards
- Roseate Tern Placemats (Mug and Anchor 500, Big Reds 1000, Island View Restaurant 750, Salt Spray 250)
- Roseate Tern Posters (laminated and non-laminated to put up in restaurants)
- Roseate Tern T-Shirts
- Spring and Summer Newsletters
- Designed a new bookmark

**Table 3.** Events attended by the RTRP team in 2011.

Event	Date	Age Group	# in Attendance
Lunenburg Farmers Market	All Summer	Various	50
Bayview Community School Mushamush Camp	June 23 2011	8-12	50
7 <sup>th</sup> Annual Pubnico Tern Festival	June 24 – 26 2011	20-65	30
Bridgewater Growing Green Sustainability Festival	July 23 2011	Various	30
Mahone Bay Regatta (Pirate Festival)	July 29-31 2011	Various	40
Teachers Atlantic Tour	August 12 2011	Various	30
Chester Race Week	August 12 2011	Various	20
<b>Total Individuals Reached = 250</b>			

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**Table 4.** RTRP Presentations delivered in 2011.

Event	Date	Age Group	# in Attendance
Lunenburg Academy	May 18 2011	Grade 4	17
	June 15 2011	Grade Primary	17
Bayview Community School	May 26 2011	Grade 4	45
Shelburne High School	June 3 2011	Grade 10,11,12	23
Hebbville Academy	June 6 2011	Grade 3/4	25
	June 7 2011	Grade 4	20
Western Shore Elementary School	June 8 2011	Grade 4	20
Aspotogan Consolidated Elementary School	June 13 2011	Grade 3	15
<b>Total Individuals Reached = 182</b>			

**Table 5.** Boater Survey results and suggestions.

Question	%Yes	%No	Suggestions
Are you aware that the Roseate Tern is Endangered?	55	45	<ul style="list-style-type: none"> <li>• Post information on Tancook Island and Ferry</li> <li>• Poster contest for students</li> <li>• Pamphlets on cars, in grocery stores</li> <li>• Adds in the local newspapers</li> <li>• License plates and flags</li> <li>• Attend festivals and schools</li> <li>• Have information available at yacht clubs, shops, etc.</li> </ul>
Are you aware of BCAF's Roseate Tern Recovery Project?	47	53	
Do you know what the "Seabird Nesting" sign looks like?	72	28	
Do you know the precautions that should be taken when you come across a Seabird Nesting sign?	55	45	

## DISCUSSION

### DISTRIBUTION AND ABUNDANCE

Terns are colonial birds and the presence of Common and/or Arctic Terns is one of the most important habitat features to nesting Roseate Terns; specifically, Roseates preferentially nest in larger colonies of other terns (>100 pairs)(Gochfeld et al. 1998, Environment Canada 2010). The largest tern colonies in the Mahone Bay area during the 2011 breeding season were on Crow and Grassy Islands, with 110 terns occupying Crow Island, and 289 terns on Grassy Island.

Severe storm events such as thunder and lightning and higher than average high tides led to the abandonment of several islands (Crow, Unnamed by Corkum's Island Road) and relocation of populations to Grassy Island, hence the large population there. The large population of terns on Grassy Island attracted a pair of Roseate Terns to the island; however, nesting was not confirmed. A single Roseate Tern was also observed by CWS settling on a nest on Gully Island; however the nest was unsuccessful (as was entire colony on Gully) for unknown reasons.

Local residents informed BCAF staff of mink around Gully Island, although there was no evidence of mink on the island. On several occasions human disturbance was observed on Quaker Island, as local boaters and visitors landed near the tern nesting area, possibly disrupting the tern colony.

Westhaver Island held a relatively stable population of terns throughout the breeding season; however, it was a smaller population than in preceding years.

### REPRODUCTIVE SUCCESS

Due to severe storm events that caused tern colonies to relocate, there was a late nesting period on Grassy Island. Gulls appeared successfully deterred from Grassy and Westhaver Islands, which should have led to higher productivity and success than during the 2010 breeding season. However, predators, thought to be mink, as well as human disturbance also affected the success of tern colonies in the area, resulting in an almost complete breeding failure of terns in Mahone Bay. Human disturbance was observed on Spectacle Island beach as footprints were observed where the terns were nesting. Human disturbance was also observed on Quaker Island beach, near the nesting grounds, despite the seabird nesting signs.

Crow Island which contained 67 nests at the beginning of nesting season, and the unnamed island near Corkum's Island which had 23 nests, became saturated as abnormally high tides covered the islands. This is unavoidable and may continue to be an issue in upcoming years as a result of climate change.

Frequent thunderstorms throughout the summer may have also affected tern success; during a trip to Grassy Island on July 28<sup>th</sup> following a thunderstorm the tern population had declined from almost 300 to five terns. Similarly, on June 2<sup>nd</sup>, during a trip to Westhaver Island the day after a thunderstorm, the tern population had declined from 80 to about 40 individuals.

The beginning of the field season coincides with lobster fishing season and many traps were noted surrounding the islands, namely Grassy and Westhaver. Due to the proximity of the lobster traps to the islands, it is

possible that terns were deterred from nesting since numbers appeared to increase following the end of the lobster season on May 31<sup>st</sup>.

#### **WESTHAVER ISLAND**

Westhaver Island produced the only three fledglings observed in the 2011 breeding season. A possible reason that chicks successfully fledged here could be that the base of the lighthouse contains a rim in which the chicks were seen under during the first and subsequent visits, providing a safe and sheltered area. Fledging success in 2011 was similar to 2010 which had one fledgling on Westhaver and four on Crow Island, which is a substantial drop from previous years having 50 fledglings on Westhaver alone.

Although Westhaver Island is in a high boating traffic area, and there is evidence of human presence on the island, the terns do not appear to be bothered and continue to nest there. During the 2011 season, all tern colonies in the Mahone Bay area appeared to have begun to migrate by mid-August; however, a tern colony still remained on Westhaver until late August.

#### **GRASSY ISLAND STEWARDSHIP**

The stewardship program on Grassy Island was successful in the social attraction aspect. Terns were attracted to the island, however did not produce any observed fledglings. Tern decoys, nesting boxes, and the sound system attracted almost 300 terns, including a pair of Roseate Terns. Although the pair of Roseate Terns was only observed once, it was the first sighting since 2005 in the Bay. Displacement of the gull colony has been successful and in continuing with the stewardship program, there is hope that the tern colony will return and produce fledglings. If fledglings are not observed in the near future, Grassy Island may not be a viable site for tern reproduction and efforts will need to be refocused. Reproductive success will be closely documented in 2012 to try and gain insight into reasons for nest and chick loss.

#### **GULL DETERRENCE**

The gull population on Grassy Island was significantly smaller than during the 2010 field season. Gull deterrence began earlier in the 2011 field season than the previous year and continued frequently (2-3 times per week), resulting in successful deterrence of gulls from the island.

The pair of Great Black-backed Gulls that nest annually on Westhaver Island were also successfully deterred after a number of nesting attempts.

Overall, gulls were successfully deterred from nesting on active tern colonies, and in carrying on with this work should continue providing safe, managed nesting grounds for terns.

## **OUTREACH AND EDUCATION**

Many schools and events were attended over the 2011 field season. Presentations followed by relevant crafts and activities at schools proved successful in engaging the students, while teachers welcomed the information. Prizes and information cards were provided to the students as take home information to help spread the word. A presentation was also delivered to students at Shelburne High School, in which the students were very receptive of not only the RTRP but also environmental organizations such as BCAF, and potential job opportunities and future career paths. Informing high school students opens windows to future volunteer opportunities as well as spreading the message about BCAF's RTRP.

The Lunenburg Farmers Market was attended several times throughout the season, while information was passed on to both locals and tourists. Events attended were spread out over a wide area from Chester to Pubnico, reaching a large number of individuals who ranged widely in age.

Rather than just having seabird nesting information signs at wharves and on bulletin boards in the area, informational posters were created and distributed to provide information on not only the seabird nesting areas, but the entire RTRP project. Informational signs should be posted again in 2012.

Boater surveys were conducted during July and August at local wharves and yacht clubs. The RTRP team was able to interact and discuss the RTRP with locals and summer visitors, which overall had a good response from the public. Boater surveys should continue in 2012 to inform and educate more locals and summer visitors.

## **RECOMMENDATIONS**

Since 2003, the Roseate Tern Recovery Project staffs have worked towards establishing a secure and managed Roseate Tern colony in Mahone Bay. Throughout the years, various methods have been attempted such as a stewardship program on Quaker Island (4 years), tern attractants, and Bay-wide surveys. More recently (April 2010), a stewardship program was initiated on Grassy Island which incorporates gull deterrence. This method is proving to be successful in attracting a larger number of terns. However, further recommendations towards education, outreach, and field work are as follows:

- Attend the Mahone Bay Farmers Market on Friday morning. Although the farmers market is small, it attracts many local boaters and community members. It would be beneficial to educate such individuals since many tern nesting islands are based in Mahone Bay.
- The remote video camera system could be vital in determining causes of colony abandonment. The system was set up on Westhaver Island in early June; however, a consistent signal could not be maintained from Rick Welsford's house in Oakland, situated across the Bay from Westhaver Island, as in the previous year. The system was not fixed throughout the season in fear of more disturbances to the terns. It would be beneficial if the system was set up in late April or early May, in order to have time to fix issues before the terns arrived. Due to the large colony of terns on Grassy Island during the 2011 field season, a remote camera system would do well. CWS may be able to provide a similar camera system to the one on North Brother Island.
- Gull deterrence should be initiated as soon as the RTRP field technicians arrive. If gull deterrence can be started earlier, such as by the Project Coordinator, that would be beneficial. Bad weather prevented staff in 2011 to start gull deterrence early, as it was nearly impossible to land on Grassy

Island. A rubber dingy may aid in transportation from the boat to the island, as the boat operator remains in the boat as the project coordinator and field technician go on the island.

- If possible, it would be beneficial to teach the RTRP staff how to drive the boat and land on the islands. This would allow staff to go out on all nice weather days, and also save BCAF money by not having to hire a boat operator or use a charter service.
- In relation to the Outreach and Education Program, as well the Tern Colony Signage Program, presentations should be delivered to youth who participate in sailing lessons at Chester and Lunenburg Yacht Clubs. In addition, a presentation that can be held at the yacht clubs about terns, and what to do when you see them, or if they nest on your boat would be beneficial since during the 2011 field season complaints have been made about terns nesting on boats.
- Tancook Island should also be targeted as it is near Grassy Island, where the stewardship program is taking place. Tancook Island can be targeted through posting signs on the ferry and at the museum and gift shop. It would also be beneficial to visit Tancook Island and educate individuals about the project.
- Another issue is that many individuals from Chester visit Quaker Island during the summer; education should be focused on informing individuals at the marinas and yacht clubs about how human disturbance can affect the tern colony.
- As Quaker Island receives a large amount of human traffic, the tern nesting area could be roped off with additional signs added, to avoid traffic in or near the tern nesting area.
- Employees at the Mahone Bay Civic Marina are supportive of the RTRP and allowed RTRP staff to put up educational posters and boater cards around the wharf. If possible it would be great to team up with them in the future and perhaps set up a program where if a boater buys a mooring they can receive an educational package about the RTRP.

## CONCLUSION

Throughout Nova Scotia, recovery efforts are taking place in order to reverse the declining population of Roseate Terns in Canada. The RTRP has focused efforts on establishing another managed colony of Roseate Terns since 2003. With failure occurring on Quaker Island, recovery efforts were refocused to Grassy Island in 2010. The success of the stewardship program on Grassy Island thus far holds potential for supporting a large population of terns, including Roseate Terns, as long as gull deterrence efforts continue. Severe weather events and anthropogenic activities continue to cause disturbance to the tern colonies. With increased education and outreach, more members of the local community will recognize value in conserving this species at risk and anthropogenic disturbances will hopefully be minimized.

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