

2002 Aerial Surveys of Grey Seals in the Northeastern United States

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ABSTRACT

In the past 20 years, grey seals have become established in coastal waters of the Northeastern United States. There are 3 sites where pupping and breeding occurs in January and February, 2 in Maine and 1 in Massachusetts. In 2002 we recorded a minimum of 1,040 pups born, primarily on Muskeget Island in Massachusetts. Pupping peaks in January on Muskeget Island but is significantly later on the 2 islands in Maine. A total of 3,326 grey seals (adults, juveniles and pups) were counted.

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INTRODUCTION

Grey seals (*Halichoerus grypus*) have recolonized areas of the northeastern United States (U.S.) over the last 20 years. The population in this region appears to be increasing. Prior to this period, grey seals were rare in the United States for most of the 20th century (Andrews & Mott 1967). In their species accounts, both Allen (1880) and Davies (1957) stated that Nova Scotia, Canada, was the southern limit of the grey seal. Yet, data from Native American shell middens show they were present along the coast of the northeastern U.S. from Maine to Connecticut (Ritchie 1969, Waters 1967, Spiess and Lewis 2001) prior to the 18th century.

The states of Maine and Massachusetts had non-species specific seal bounties during the late 19th and early 20th century and Andrews & Mott (1967) reported several grey seal bounty kills in Nantucket Sound from ~1920-1965. The kills included male and female adults, and pups.

Although grey seals were infrequently sighted in the 1970s and early 1980s, they have now established at least 3 permanent pupping sites (Fig.

1). The first U.S. site was documented in 1988 on Muskeget Island, MA; the second in 1994 on Green Island, ME; and the third in 2000 on Seal Island, ME (Rough, Wood unpublished data). Pups have also been intermittently observed on Monomoy Island (Wood unpublished data).

The grey seal population at Sable Island, Nova Scotia, Canada has increased significantly during the period of grey seal re-colonization in the U.S. (~1988 to present). The annual rate of increase in pup production on Sable Island, Canada, has been estimated at 12.8% and this rate has been constant for more than 25 years (Bowen *et al.* 2003). The annual rate of increase in pup production for the non-Sable Island (Gulf of St. Lawrence and east coast of Nova Scotia) component of this population is 7.4% (Hammill *et al.* 1998).

Aerial surveys of the 5 U.S. pupping sites were undertaken in 2002 as part of a larger study of grey seal recolonization.

MATERIALS & METHODS

Study sites

Muskeget Island, MA, is a sand island with dunes and beach grasses, approximately 2 km long and 1.5 km wide, located near Nantucket Island. During 2001 a large sandy shoal (~0.25 km long) emerged approximately 5 km west of Muskeget Island, referred to here as the West Shoal. Grey seals used this shoal for pupping in 2002. Monomoy Island is a narrow, 13 km long, barrier island located approximately 20 km northeast of Muskeget Island, just off southeast Cape Cod, MA. It is part of the Monomoy National Wildlife Refuge and is under the jurisdiction of the U.S. Fish & Wildlife Service. All 3 of these sites are located in Nantucket Sound.

Green Island and Seal Island, in the coastal waters off Central Maine, are rough granite islands with shallow soil covering some areas. Green Island is a round outcropping approximately 200 m in diameter. Seal Island is approximately 2 x 0.25 km.

Aerial Surveys

In 2002, aerial surveys were conducted opportunistically during the pupping season between 10 January and 5 February. Photographs of the pupping sites were taken 3 times over Green Is-

land, ME, twice over Seal Island, ME, and twice over Muskeget Island and West Shoal, MA (Fig. 2). Surveys were flown in a variety of small aircraft (Cessna 172, 202, and 337), at an altitude of approximately 180 m. A 35-mm camera with a 300-mm lens and 400-speed color slide film were used to photograph the pupping sites. Photographs were taken such that there would be overlap, to minimize the risk of missing animals.

Counts

Slides to be used for counts were identified so as to avoid any spatial overlap in the counts,

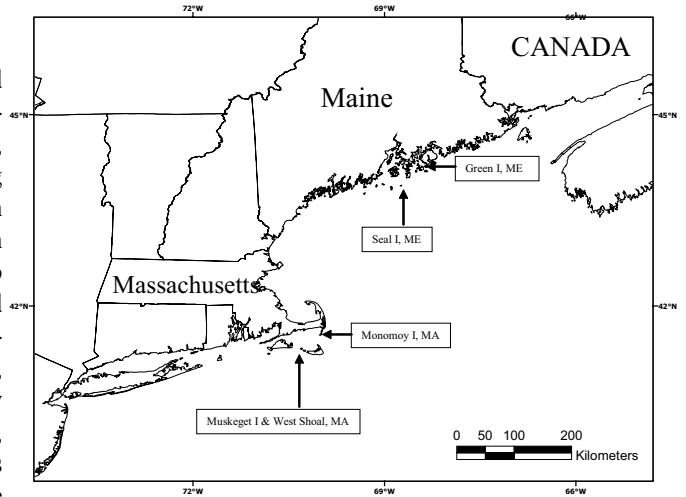


Fig. 1. Locations of 2002 grey seal survey sites in the U.S.

Survey Date	Muskeget Island	West Shoal	Monomoy Island	Green Island	Seal Island
10 January 2002	858	68	0	-	-
16 January 2002	-	-	-	22	54.5
22 January 2002	-	-	-	34	147
29 January 2002	454	51	0	-	-
5 February 2002	-	-	-	13	-

Survey Date	Muskeget Island	West Shoal	Monomoy Island	Green Island	Seal Island
10 January 2002	1,170	339	677	-	-
16 January 2002	-	-	-	51	167
22 January 2002	-	-	-	50	164
29 January 2002	448	1,137	493	-	-
5 February 2002	-	-	-	13	-

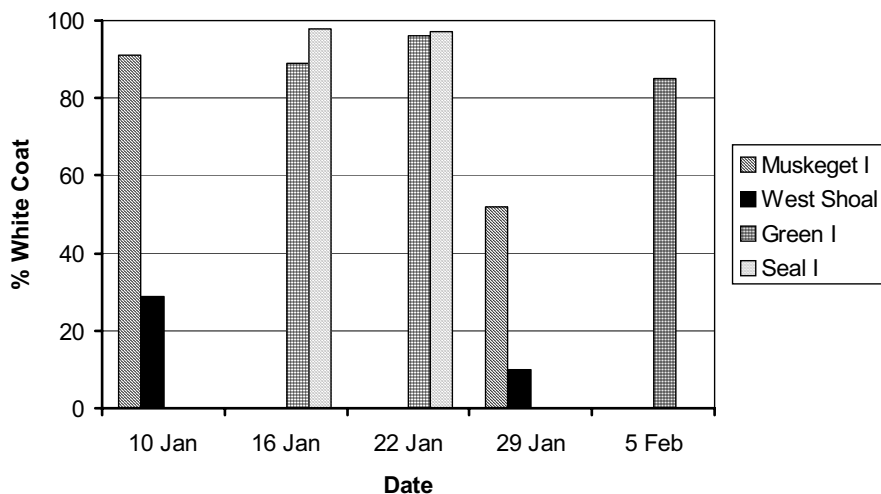


Fig. 2. The average proportion of pups categorized as white coats at the 4 pupping sites off the Northeastern U.S. for each survey date.

while providing complete coverage of pupping sites. The slides were projected onto a white board. Two scientists independently counted pups and adults from the chosen slides. Once independent counts were completed, the results (of pup counts only) were compared and when possible, differences were rectified by reviewing the slides; otherwise, an average of the 2 total counts was taken. Adult counts were averaged, not rectified. The West Shoal and Monomoy Island slides were only counted once. Additionally, pups were classified into 1 of 2 stages based on Kovacs and Lavigne (1986):

1. White Coat: a pup with any visible lanugo (~Stages I-IV, Kovacs and Lavigne 1986)
2. Moulter: a pup that has shed all of its lanugo (~Stage V, Kovacs and Lavigne 1986)

In instances where it was impossible to determine the stage of a pup, they were classified as "Unknown." The unknown pups were prorated based on the percentage of White Coat and Moulter pups counted on that slide. The moult information was used to estimate the timing of the surveys in relation to the pupping season.

The area of overlap in the Seal Island photographs was extremely difficult to identify because there were very few landmarks. Therefore, for Seal Island only, a print of the whole island was used to map out what area individual slides covered and this map was then used to identify which slides to use in counting. Because this methodology led to under-counting rather than over-counting, the Seal Island counts should be interpreted as minimum numbers.

RESULTS

The maximum 2002 counts for all sites totaled 1,040 pups. Muskeget Island (including the West Shoal) has the largest pupping site in the US, with 83% of the pups born there, followed by Seal Island (14%) and Green Island (3%) (Table 1). Almost half (46%) of the pups observed on Muskeget Island on 29 January were in the moult stage. The highest percentage of moulted pups observed (3%) on Seal Island, ME, was on 22 January while on Green it was 15% on 5 February.

Some of the seals counted on the West Shoal and Monomoy Island appeared to be juveniles. To simplify the counts, we have included these animals in the West Shoal and Monomoy adult counts. No juveniles were observed on Muskeget. The total adult counts for Muskeget Island and surrounding shoals (including the West Shoal) do not differ much between 10 January ($n = 1,509$) and 29 January ($n = 1,585$). But, when the counts are separated (Muskeget Island vs. West Shoal) it appears that most adults were on Muskeget on 10 January (78%) but by 29 January most were on the West Shoal (72%). The adult counts on Monomoy Island decreased during the survey period from 677 on 10 January to 493 on 29 January. A total of 3,112 grey seals were counted in Nantucket Sound on 10 January and 2,078 on 29 January (Table 2).

No juveniles were observed at either of the Maine pupping sites. The adult counts at these 2

sites did not vary much between the 16 January (Green = 51; Seal = 167) and 22 January (Green = 50; Seal = 164) surveys. Only Green Island was surveyed a third time on 5 February, when only 12 adults were counted. For the 2 surveys that covered both Maine sites a total of 218 and 214 grey seals were counted respectively (Table 2).

DISCUSSION

Field observations and an analysis of the pup moult stages indicate that peak pupping probably occurred on Muskeget Island in early to mid January. This progression of the pupping season appears similar to that observed at the “west colony” on Sable Island (Bowen *et al.* 2003). The fact that almost half of the pups observed on Muskeget Island on 29 January were in the Moulter stage indicates the population was near the end of the pupping season. A more extensive analysis of the moult information is underway in order to better interpret the aerial survey data and compare survey results from other years.

The pup moult information on Green and Seal Islands is more difficult to interpret. On Seal Island and Green Island, only 3% and 4% respectively, of the pups observed on 22 January were categorized as Moulter. On 5 February, only 15% of the pups observed on Green Island were in the Moulter stage. This is a much smaller percentage than observed on Muskeget Island a week before (29 January). These results could indicate that peak pupping occurs earlier on Muskeget Island, or perhaps that the pups born on Green and Seal islands leave the islands more quickly after moulting than pups born on Muskeget Island. More than likely, the peak of the pupping season is later on Green and Seal islands.

The pattern of adult counts on Muskeget Island and West Shoal is interesting. There is little difference in the total counts between the 2 surveys (10 January and 29 January), but the distribution of adults is quite different. Most of the adults (78%) counted on 10 January were on Muskeget Island while most of the adults (72%) counted on 29 January were on the West Shoal where a minimal amount of pupping occurred. Many of the adults counted on the West Shoal on 29 January had probably moved there after pupping and/or breeding on Muskeget. This supports the

assertion that peak pupping occurs on Muskeget in early to mid January. Some of the pups on the West Shoal were White Coats and presumably were born on the Shoal. In addition to adults and pups, juveniles were counted on the West Shoal. Monomoy Island was also an important haul-out site for adult and immature grey seals.

The number of adults on Green & Seal Island, ME, was similar on the 2 survey dates: 16 January and 22 January. Only Green Island was surveyed for a third time on 5 February. It appears that the number of adults decreased rapidly in the ~2 weeks between the 22 January (n = 50 adults) and 5 February (n = 13 adults) surveys at Green Island.

These surveys contributed to the current understanding of the status of grey seals in the U.S. in several ways:

1. A minimum of 1,107 grey seal pups were born in the U.S. in 2002.
2. A minimum of 3,326 grey seals were counted at the 5 surveyed sites in January 2002.
3. A basic analysis of pup moulting stage showed that peak pupping occurs earlier on Muskeget Island (MA) than on Green and Seal Island (ME).

The continued surveying of the 4 sites included here, in addition to reconnaissance flights (especially along the Maine coast) and a more extensive analysis of the pup moulting stages will contribute substantially to our understanding of the U.S. grey seal population.

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