

Seabird Group Report on Work 2005

Uncertainty of the Razorbill *Alca torda* in Atlantic Canada

Jennifer Lavers, Memorial University of Newfoundland, Department of Biology, St. John's, NL, Canada, A1B 3X9

Seabirds worldwide are threatened by human related mortality factors including oil pollution, hunting, entanglement in fishing gear, and global warming. In Newfoundland and Labrador, many seabird species are depleted to a fraction of former abundance by human activities, and one, the Great Auk, was slaughtered unmercifully until none remained. The Razorbill (*Alca torda*), the Great Auk's closest living relative, has experienced significant population declines due to human activities and has been slow to recover. Compared to other seabirds, such as the Common Eider (*Somateria mollissima*), which are increasing throughout Newfoundland and Labrador, the status of the Razorbill is much less clear and of great conservation concern. Given that Razorbills lay only one egg per year, and delay breeding until 5 or more years of age, the species has a much lower potential for recovery built in to their breeding biology. The Razorbill's vulnerability is further exacerbated by the fact that their North American population (most breeding in Newfoundland and Labrador) is very small, being only 38,000 breeding pairs. Additionally, Razorbills are the most geographically restricted of all auk species breeding in Atlantic Canada, making them vulnerable to local catastrophes such as oil spills.

Productivity

Razorbill productivity varied greatly between study sites and within years. At the Gannet Islands in southern Labrador productivity values in 2004 and 2005 (Table 1) were significantly lower than those reported by Birkhead and Nettleship (1983) and Hipfner and Bryant (1999). In 2004 Machias Seal Island hatching success (0.87) was the highest recorded in 10 years while in 2005 hatching success (0.71) was the lowest recorded. It is unclear at this time what may have caused such low and variable productivity, however at the Gannet Islands abnormally high sea surface temperatures may be to blame. Depleted fish stocks may also play an important role in the low productivity observed at the Gannet Islands. As evidence of this, in 2005 Razorbills were recorded carrying extremely small bill loads (1-2 fish) of larval capelin, something that has never been observed at the Gannet Islands.

Table 1. Razorbill productivity in Atlantic Canada in 2004 and 2005

Plot Type	Gannet Islands, Labrador (%)		Gull Island, Newfoundland (%)		Machias Seal Island, New Brunswick (%)	
	2004	2005	2004	2005	2004	2005
Hatch Success	54/119 (45.4)	71/102 (69.6)	35/50 (70.0)	31/44 (70.5)	50/58 (87.0)	33/47 (71.0)
Fledge Success	38/54 (70.4)	52/71 (73.2)	24/35 (68.5)	26/31 (83.9)	34/50 (68.0)	18/33 (54.5)
Overall *	38/119 (31.9)	52/102 (50.9)	24/50 (48.0)	26/44 (59.1)	34/58 (58.6)	18/47 (38.3)

* Egg laying to nest departure

Survival

Annual survival for Razorbills banded as adults and chicks at the Gannet Islands from 1996 to 2005 was found to be 88.4% (SE = 0.02) and 83.5% (SE = 0.03) respectively (Table 2). At MSI, annual survival for Razorbills banded as adults and chicks from 1995-2005 was 86.0% (SE = 0.04) and 83.9% (SE = 0.10). For both study sites, the annual adult survival estimates reported are slightly lower than other areas of Canada and Europe (Table 3) and are much lower than for other closely related species in Canada such as the Guillemot and Atlantic Puffin. In Newfoundland and Labrador, Razorbills experience significant mortality during the annual Guillemot hunt in which several hundred to several thousand are shot illegally each year (Chapdelaine et al. 2001, Elliot 1991). This level of mortality can clearly not be sustained by a population of only 38,000 breeding pairs and the persistence of these populations may be due to other factors such as dispersal (see below).

Table 2. Estimated annual survival of Razorbills banded as adults and chicks at the Gannet Islands, NL and Machias Seal Island, NB from 1995-2005

Study Site	Survival of birds banded as Adults (N)	Chicks (N)	c-hat	QAICc
Gannet Islands	0.884 (180)	0.839 (621)	1.368	819.49
Machias Seal Island	0.835 (130)	0.860 (252)	1.419	1948.10

Table 3. Estimated annual survival of Alcids banded in North America and Europe as reported in the literature

Species	Adult Survival	Location	Source
Razorbill	0.90	Quebec, Canada	Chapdelaine 1997
Razorbill	0.89	Britain and Ireland	Lloyd 1974
Razorbill	0.91	Britain and Ireland	Mead 1974
Razorbill	0.92	Skomer, Wales	Lloyd and Perrins 1977
Common Guillemot	0.94	Gannet Islands	Birkhead et al. 1985
Atlantic Puffin	0.97	Gulf of Maine	Breton and Diamond, unpub. data

Conclusions

The majority of Razorbill colonies in North America appear to be increasing, however we must be careful when making conclusions about the status of these populations given that they are significantly depleted from historical numbers. Furthermore, although the populations are increasing, they are doing so relatively slowly and exhibit significant variation in survival and productivity. Recently it has been observed that Razorbills may be dispersing between breeding colonies much more frequently and over longer distances than previously thought (see the Seabird Group Newsletter 99, February 2005). It is suggested that this dispersal behavior may be in response to instability in the populations caused by hunting mortality and climate change.

This year I will be developing a comprehensive population model for this species which will examine the impacts of hunting by-catch, mortality in fishing gear, oil pollution, and climate change on Razorbill populations in Atlantic Canada. This project is one of the first to examine the cumulative effect of multiple mortality factors on seabird populations through the use of advanced population modeling. In natural environments, mortality factors do not occur in isolation of one another; therefore, this model will more accurately represent the fluctuations in

the Atlantic Canadian Razorbill population that occur as a result of a combination of different factors.

Through the quantification of Razorbill demographic parameters and development of a flexible, predictive population model, this project will contribute significantly to the conservation of the species by providing valuable information on the current status of the population and as well as the ability to predict the future status of the population through modification of the model. It is imperative that we work to ensure the Razorbill does not suffer a similar fate to that of the Great Auk.

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