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New Longevity Record for Ivory Gulls (*Pagophila eburnea*) and Evidence of Natal Philopatry

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ABSTRACT. Ivory gulls (*Pagophila eburnea*) have been listed as "endangered" in Canada and "near threatened" internationally. In June 2010, we visited Seymour Island, Nunavut, Canada, where gulls were banded in the 1970s and 1980s. We recaptured and released two breeding gulls banded as chicks in 1983, confirming natal philopatry to this breeding colony. These gulls are more than 28 years old, making the ivory gull one of the longest-living marine bird species known in North America.

Key words: ivory gull, *Pagophila eburnea*, Nunavut, banding

RÉSUMÉ. La mouette blanche (*Pagophila eburnea*) figure sur la liste des espèces « en voie de disparition » sur la scène canadienne et des espèces « quasi menacées » sur la scène internationale. En juin 2010, nous sommes allés à l'île Seymour, au Nunavut, Canada, où des mouettes avaient été baguées dans le courant des années 1970 et 1980. Nous avons recapturé et relâché deux mouettes reproductrices qui étaient considérées comme des oisillons en 1983, ce qui nous a permis de confirmer la philopatrie natale de cette colonie de nidification. Ces mouettes blanches ont plus de 28 ans, ce qui en fait l'un des oiseaux aquatiques vivant le plus longtemps en Amérique du Nord.

Mots clés : mouette blanche, *Pagophila eburnea*, Nunavut, baguage

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INTRODUCTION

Seabirds are relatively long-lived organisms, exhibiting low reproductive rates, delayed breeding maturity, and high annual adult survival (Gaston, 2004). Some seabirds, particularly certain albatrosses and petrels, may live for more than 40 years (Lutmerding and Love, 2010). These longevity records are typically generated from banding data; thus, they are biased across species and geographic regions to some extent by the amount of banding and resighting effort directed at various species (Table 1). For example, we know relatively little about the survival, recruitment, and longevity of most breeding seabirds in the Canadian Arctic because long-term banding studies (> 20 years) have been limited, except those of thick-billed murres (*Uria lomvia*; Gaston and Hipfner, 2000). Nonetheless, banding returns give us important insights into the dispersal, migration, and survival of some species in this region (Allard et al., 2006, 2010; Gaston et al., 2009).

Since 2002, the ivory gull (*Pagophila eburnea*) has received considerable research and monitoring effort in Canada because breeding populations have declined by over 70% (Gilchrist and Mallory, 2005), leading them to be uplisted to "endangered" in Canada (COSEWIC, 2011) and "near threatened" internationally (Birdlife International, 2011). Although new Canadian banding efforts have not been undertaken because of concern from local Inuit communities, more than 1500 adult and hatch-year gulls were banded in Canada in the 1970s and early 1980s (Stenhouse et al., 2004). Here we report on two recent observations of gulls banded in Canada during that period that extend the longevity record for this species.

METHODS

The Seymour Island Migratory Bird Sanctuary in Nunavut (76.80˚ N, 101.27˚ W) includes a small island supporting one of the largest remaining breeding colonies of ivory gulls known in Canada (Robertson et al., 2007). As part of a study to investigate the dispersal patterns and overwintering areas of ivory gulls, we flew to Seymour Island on 30 June 2010. We counted 81 gulls at the island, separated by a distance of ~ 200 m into two nesting groups. We trapped 12 breeding gulls on their nests using self-deploying box traps. Within 20 min after each trap was triggered, we had removed the captured gull, attached a satellite transmitter using the leg-loop design (Mallory and Gilbert, 2008), applied a stainless steel leg band, and released the bird.

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RESULTS AND DISCUSSION

Two of the ivory gulls that we captured had been banded previously with lock-on bands (Fig. 1). The band numbers were consecutive, 614-28831 and 614-28832, and had been attached to ivory gull chicks from a nest at Seymour Island by V.G. Thomas on 3 August 1983 (Thomas and MacDonald, 1987). Calculating with the method of Lutmerding and Love (2010), which scores birds as being banded in June of the banding year, we concluded that these birds had been banded 27 years earlier. However, we continued to track the birds via their satellite transmitters until August 2011, when they had returned to their breeding colonies, by which time they were at least 28 years old. Moreover, these records constitute evidence of natal philopatry in this species, which has not been previously established (Mallory et al., 2008).

The plumage patterns of breeding ivory gulls suggest that they begin breeding only after reaching two years of age (Mallory et al., 2008), so 2011 could have been the 25th breeding season for these birds. However, ivory gulls appear to have low reproductive success (Mallory et al., 2008), and relatively few juvenile birds have been observed (e.g., Brown and Mactavish, 1988). Moreover, the Seymour Island colony is subject to frequent colony failure due to predation, and the number of pairs attending the colony annually varies considerably (MacDonald, 1976; Gilchrist and Mallory, 2005; M. Mallory, unpubl. data). These findings suggest that within this colony in a given year, large proportions of birds, in unison, 1) initiate nests but do not produce clutches; 2) produce clutches, but lose them catastrophically and subsequently abandon the reproductive attempt; or 3) do not attend the colony at all (Volkov and de Korte, 1996). Thus, it is likely that the two gulls we recaptured did not incur the full costs of laying eggs and rearing young each year.

Ivory gulls nest in three dissimilar habitats in Nunavut: 1) nunatak cliffs up to 50 km inland and at elevations up to 1400 m; 2) flat, rocky ground on high plateaus tens of kilometers inland; and 3) isolated, small, low, rocky islands like Seymour Island (Mallory et al., 2008). In six years of annual surveys within the first two types of habitats, we have never observed any other bird or mammal species at the colonies, and we interpret selection of those nesting locations by ivory gulls as part of a behavioral avoidance strategy that minimizes predation (Larson, 1960). On Seymour Island, in contrast, several other marine bird species also nest, and in 10 years of annual surveys, we have found the gull colony unoccupied on at least four occasions. We attribute these unoccupied periods either to abandonment of nests following early season predation—probably by Arctic foxes (*Vulpes lagopus*) and polar bears (*Ursus maritimus*), which we regularly must chase off prior to counting nests—or to intermittent breeding by the birds.

Evidence of widespread intermittent breeding in ivory gulls is limited, but compelling (Volkov and de Korte, 1996; Robertson et al., 2007; Gilchrist et al., 2008; Gilg et al., 2009). Intermittent breeding reported in the larger *Larus* gulls is typically associated with individuals of poorer quality or in poorer physical condition, both of which can result from poor feeding conditions in the environment (Calladine and Harris, 1997). Alternatively, intermittent breeding could result from a broader parental investment strategy, independent of environmental conditions, that involves balancing parental survival against the survival of offspring (Mayr, 1961; Ricklefs, 2010). One result of intermittent breeding could be greater-than-expected longevity (Williams, 1966).

FIG. 1. A lock-on band on the leg of an ivory gull 27 years after it was attached.

In the case of these ivory gulls, a combination of bet-hedging strategies (i.e., abandoning the breeding effort in response to stochastic events) and trade-off strategies, such as laying fewer eggs (expected modal clutch size in this species is less than 3; Mallory et al., 2008), is plausible (Bradley et al., 2000), if not expected, especially in Arctic conditions that are challenging for both adults and young (Erikstad et al., 1998). Indeed, these strategies together could in part explain certain behaviors of this species that contrast with those of other gull species, including the dramatic interannual variability in occupation and reproductive output that has been observed at certain colony sites (Volkov and de Korte, 1996; Gilchrist and Mallory, 2005; Robertson et al., 2007).

Eleven bands attached to chicks at Seymour Island, including the two reported here, are known to have been recovered; the mean survival age of these 11 birds was 10.4 ± 9.9 SD years. Lyngs (2003) reported a bird in Greenland that was at least 15 years old. On the basis of work conducted in the 1970s and 1980s, Thomas and MacDonald (1987) suggested that ivory gulls could live more than 15 years, and their oldest recorded bird was about 17 years old. More recent analyses indicate that adult apparent survival of ivory gulls is 0.86 ± 0.04 SE, with a mean adult life expectancy of 6.9 ± 1.4 yr (Stenhouse et al., 2004). However, three (12%) of the 25 birds used in that survival analysis lived 9.2–19.2 years. Since then, one other bird, banded after hatch year, was reported deceased after 23.9 years (Lutmerding and Love, 2010), meaning that it was

FIG. 2. A breeding ivory gull with a coloured plastic leg band that had been attached to it 20 years earlier, when it was already a breeding adult.

at least 25 years old, close to the age of the two gulls we captured. Moreover, in 2003 and 2006, we observed one breeding gull that had a worn plastic band on its leg (Fig. 2). These markers were last used in 1983 by V.G. Thomas and were attached only to captured adults. Thus, this adult was at least 25 years old, and this same bird or another colour-banded bird was observed in 2009, when it would have been at least 28 years old.

Finding four (possibly five) ivory gulls more than 25 years old seems particularly fortuitous, as banding and recovery effort has been one to two orders of magnitude lower for this gull than for many other gull or Arctic marine bird species in North America (Table 1). Our recent observations indicate that ivory gulls are among the longest-living gulls in North America, and among seabirds banded in the North American Arctic, only a thick-billed murre banded in Nunavut is known to be older (Table 1; that bird was shot when it was seven months older than our oldest ivory gull). Fewer than 30 bird species in the North American database have a greater reported longevity (Lutmerding and Love, 2010), represented principally by some geese, pelagic seabirds, and raptors. Moreover, at the time of this paper, these two ivory gulls were still alive.

The great range in the age of ivory gulls breeding at Seymour Island probably contributes to the large variation in the amount of mercury found in eggs at the site (Braune et al., 2006). Colony and population dynamics of ivory gulls in Canada probably vary markedly by habitat because of differences in predation. We strongly recommend that regional studies be conducted on the unusual breeding ecology of this species across its range, to determine whether reproductive parameters (e.g., catastrophic breeding failure, variable annual reproductive effort, high longevity) noted at the Seymour Island colony are representative of the species as a whole. This information will be key to developing management plans for the recovery of this species in Canada.

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TABLE 1. Longevity records for selected Arctic marine birds and other gulls in North America (from Lutmerding and Love, 2010). Number of birds banded and recoveries are for the period 1960–2012, taken from http://www.pwrc.usgs.gov/bbl/homepage/start.cfm.

Common name	Scientific name	Longevity (years)	Number of birds banded	Number of band recoveries
Arctic tern	*Sterna paradisaea*	34	25461	211
Western gull	*Larus occidentalis*	33.9	74275	3912
Atlantic puffin	*Fratercula arctica*	32.1	23852	336
Thick-billed murre	*Uria lomvia*	28.7	79425	1552
Ivory gull	*Pagophila eburnea*	28.1	1545	24
Herring gull	*Larus argentatus*	28	616155	22284
Red-legged kittiwake	*Rissa brevirostris*	27	1849	64
California gull	*Larus californicus*	26.5	122348	2971
Ring-billed gull	*Larus delawarensis*	25.4	627366	18836
Great black-backed gull	*Larus marinus*	25.4	36101	1651
Heermann's gull	*Larus heermanni*	24.3	30523	969
Glaucous-winged gull	*Larus glaucescens*	23.8	137953	17635
Laughing gull	*Larus atricilla*	22	190579	3457
Razorbill	*Alca torda*	18	15243	115
Black-legged kittiwake	*Rissa tridactyla*	18	28628	90
Long-tailed jaeger	*Stercorarius longicaudus*	14	843	7

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