

Aerial Photographic Survey of Brant Colonies on the Yukon-Kuskokwim Delta, Alaska, 2013

HEATHER M. WILSON, U.S. Fish and Wildlife Service, Migratory Bird Management, Waterfowl Management Branch, 1011 East Tudor Road, Anchorage, AK 99503, USA. December 2013.

SUMMARY An aerial photographic survey of nesting Pacific black brant (*Branta bernicla nigricans*) was conducted at the five primary colonies on the Yukon-Kuskokwim Delta (YKD), Alaska, USA: Kokechik Bay (KB), Tutakoke River (TR), Kigigak Island (KI), Baird Peninsula (BP), and Baird Island (BI), between 24-26 June 2013. As indicated by the photos, total number of nests for all colonies decreased by 49% between 2013 (7,183) and 2012 (14,197), and the 2013 estimate was 55% lower than the long term average (15,978; 1992-2012). All colonies showed decreases in brant nests from the previous year (range: 37 to 57% decrease). Overall, the trend in annual YKD estimates of nesting brant among the five primary colonies continues to be negative (currently -3.4%/yr). Further, the long-term trends at TR and KB (including 2013) marked the fifth consecutive year of substantial negative departures from the long-term YKD log-linear trend (e.g., 5.2% annual declines at TR and KB versus 3.4% annual decline for all YKD), indicating that most of the long term decline continues to be attributed to reductions at KB and TR. Based on aerial imagery, 2013 reflected a poor nesting year for colonial nesting brant on the YKD. However, other YKD surveys suggested 2013 was a normal to good nesting year for brant on the YKD. Lower numbers of active nests based on imagery may have been at least partially related to delays in photography in 2013. Photos were taken ~2 wks later in 2013 relative to previous years, potentially allowing more time for nests to fail before photography occurred. Although no ground truthing occurred in 2013, there were few indications of predation and/or prior flooding from either the photos or observations from field researchers. Human activity (based on numbers of photos with footprints and vehicle tracks at locations without researchers) was slightly increased compared to the previous year, but overall, remained at a low, sustained level.

Abundance and trends of Pacific black brant at nesting colonies on the YKD are important management indices used by the Pacific Flyway. Previous Flyway prescriptions for Pacific black brant mandated harvest closure if: a) the 3-yr average of the midwinter survey was <90,000, and b) the YKD-wide colony nest population estimate declined by 50% relative to the previous year (Pacific Flyway Council 2002). The 2013 YKD colony nest population estimate (7,183) represented a substantial decrease (-49%) compared to the previous year's estimate, and was only 1% below the 50% reduction benchmark outlined by the Flyway. In 2009, the Pacific Flyway discussed adopting a revised brant management strategy which would dictate harvest closure when: a) the 3-yr average of the midwinter survey was <90,000 and b) the 3-yr average of the YKD-wide colony nest population estimate was <10,000 nests. In 2013, the 3-yr average was 11,112; more than 1,000 nests above the proposed alternative, conditional closure threshold.



Figure 1. Digital images from Kigigak Island in 2012 (11 June) and 2013 (24 June), demonstrating the difference in timing of photography and the concurrent changes in the landscape between the two years. In 2013, photographs were taken almost 2 weeks later than in 2012.

Table 1. Annual estimates and standard errors (± 1 SE, presented in # of nests) from photographic aerial surveys of brant nests at the five primary colonies on the Yukon-Kuskokwim Delta, Alaska (1992-2011); Tutakoke River (TR), Kokechik Bay (KB), Kigigak Island (KI), Baird Inlet Island (BI), and Baird Peninsula (BP).

Year	Colony Nest Estimates										
	TR	(SE)	KB	(SE)	KI	(SE)	BP	(SE)	BI	(SE)	Total
1992	4,600 ²	(202)	6,134 ²	(295)	3,440 ¹	(154)	2,157 ¹	(151)	3,258 ¹	(347)	19,589
1993	4,937 ²	(190)	4,667 ¹	(577)	1,727 ²	(90)	614 ¹	(77)	4,156 ¹	(357)	16,101
1994	4,807 ¹	(400)	6,978 ²	(196)	2,260 ²	(92)	2,441 ¹	(142)	4,461 ¹	(454)	20,947
1995	5,596 ²	(297)	7,573 ²	(351)	--- ³	---	2,591 ¹	(184)	4,720 ¹	(474)	23,998
1997 ²	4,588	(554)	9,144	(1092)	4,776	(595)	2,259	(282)	1,944	(242)	22,711
1998 ²	3,448	(292)	5,655	(471)	3,105	(238)	1,431	(169)	2,747	(264)	16,386
1999 ¹	4,100	(96)	4,072	(74)	3,962	(402)	448	(81)	1,777	(80)	14,359
2000	7,437 ²	(584)	8,021 ²	(866)	4,286 ¹	(647)	1,962 ¹	(142)	4,088	(324)	25,794
2001 ²	1,212	(73)	3,677	(215)	1,721	(107)	421	(36)	3,604	(198)	10,635
2002 ²	4,524	(314)	4,634	(362)	4,380	(255)	2,708	(147)	3,052	(199)	19,298
2003 ²	1,622	(79)	655	(52)	2,474	(118)	547	(46)	3,202	(135)	8,500
2004 ²	2,704	(153)	1,996	(116)	3,284	(208)	1,687	(76)	2,759	(160)	12,430
2005 ²	2,977	(205)	3,985	(177)	4,728	(213)	--- ³	---	4,093	(256)	17,023 ³
2006 ²	3,714 ⁴	(286)	5,280	(341)	3,920	(240)	793	(61)	3,628	(262)	17,335
2007 ²	1,842	(137) ⁴	4,521	(304) ⁴	3,924	(304) ⁴	2,241	(203) ⁴	4,106	(264) ⁴	16,634
2008 ²	669	(68) ⁵	2,062	(174) ⁵	1,856	(158) ⁵	3,695	(341) ⁵	1,713	(151) ⁵	9,995
2009 ²	2,197	(235) ⁶	3,958	(344) ⁶	2,398	(226) ⁶	1,154	(141) ⁶	2,499	(239) ⁶	12,206
2010 ²	1,963	(176) ⁶	2,560	(208) ⁶	2,061	(184) ⁶	1,146	(130) ⁶	1,739	(142) ⁶	9,469
2011 ²	2,481	(221) ⁶	3,682	(244) ⁶	2,104	(187) ⁶	580	(84) ⁶	3,109	(445) ⁶	11,956
2012 ²	3,332	(256) ⁶	3,811	(269) ⁶	2,795	(258) ⁶	819	(125) ⁶	3,440	(285) ⁶	14,197
2013 ²	1,436	(132)⁶	1,847	(145)⁶	1,214	(137)⁶	519	(82)	2,167	(168)	7,183
3-yr average (2010-2013)	2,416		3,113		1,960		639		3,275		11,112
Long-term average (1992-2012)	3,438		4,662		3,009		1,511		3,155		15,978

¹Estimates based on Lincoln-Petersen analysis of counts by two observers.

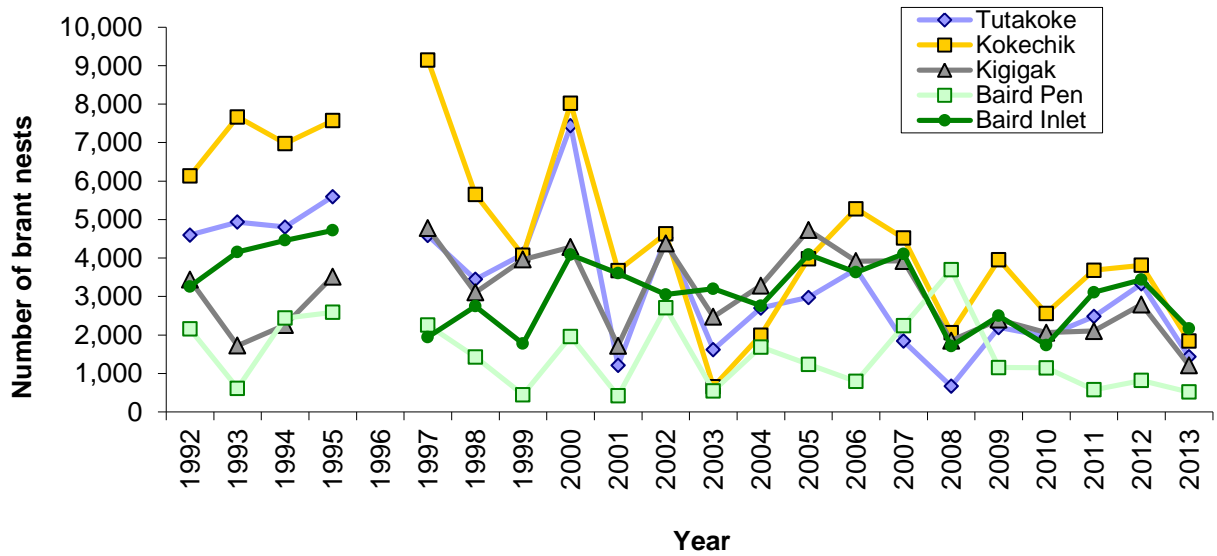
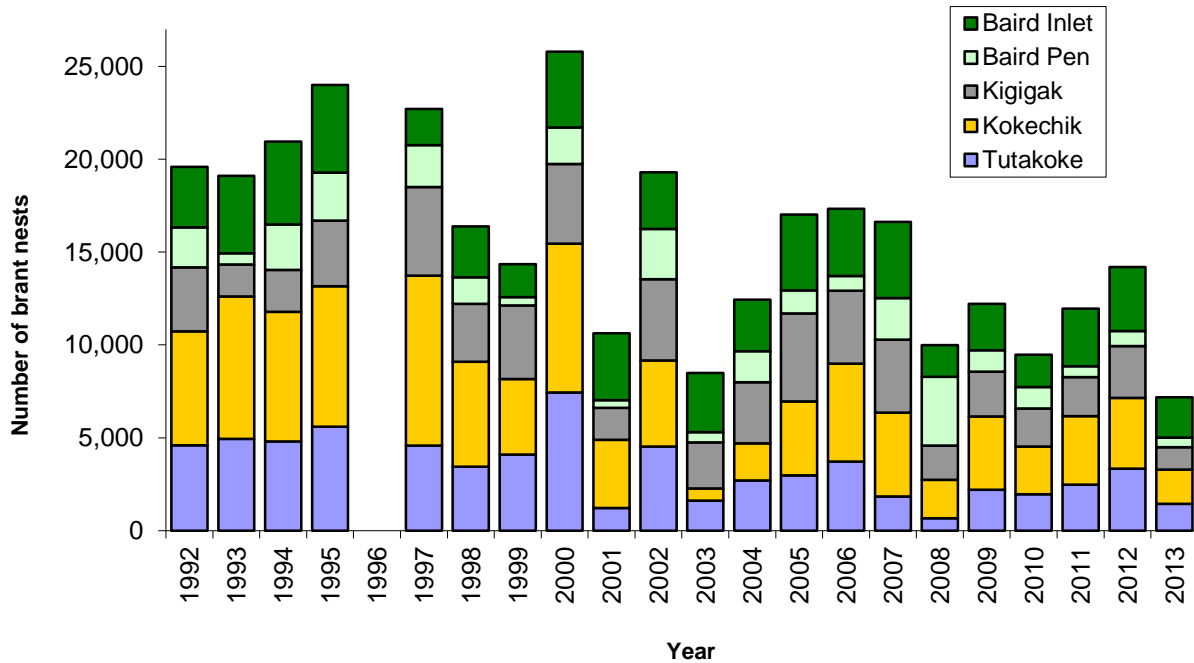
²Estimates based on correction factors from ground-truthed transects.

³Mean of 1994 and 1997 KI estimates included in 1995 KI total and average, and mean of 2004 and 2006 BP estimates included in 2005 BP total and average.

⁴2006 TR estimate based on 63% of the images analyzed.

⁵Standard errors in 2007-2009 calculated using the variance of the ratio estimate, rather than binomial variance (as in 1992-2006).

⁶Standard errors in 2009-present were calculated using inter-photo variance (photos as the sample unit), rather than inter-transect variance (as in 1992-2008).



Figures 3a and 3b. Estimates of number of nests at the five primary brant colonies on the Yukon-Kuskokwim Delta (1992-2013) from photographic surveys; Tutakoke River (TR), Kokechik Bay (KB), Kigigak Island (KI), Baird Peninsula (BP), and Baird Island (BI). Note: Due to lack of surveys at KI in 1995 and BP in 2005, the mean of the 1994 and 1997 KI estimates were used to derive a 1995 KI estimate, and the mean of 2004 and 2006 BP estimates were used to derive a 2005 BP estimate.

1992-2013 Average annual growth rate in brant nests across all colonies = 0.966 (95% CI: 0.959-0.978)

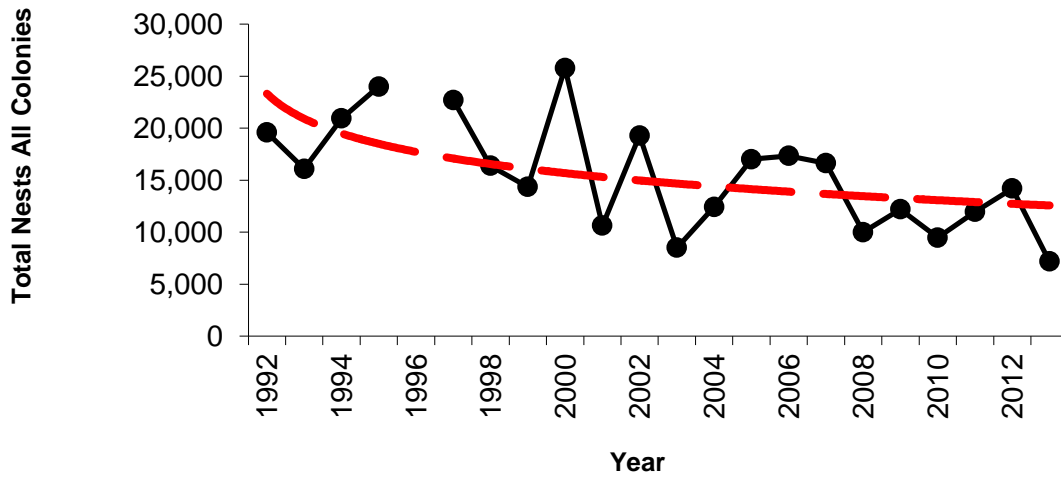


Figure 4. Log-linear trend of annual estimates of brant nests (red dashed line) from photographic surveys across all brant colonies on the Yukon-Kuskokwim Delta (1992-2013). Note: Estimates do not exist for 1996, and in 2005 only four of five colonies were surveyed.

ACKNOWLEDGEMENTS

Funding for this survey was provided by the NAWMP Arctic Goose Joint Venture and the U.S. Fish and Wildlife Service (USFWS). I thank the USFWS Yukon Delta National Wildlife Refuge (YDNWR) for ongoing assistance with the survey; particularly the 2013 contributions of Mike Callahan, who piloted the survey aircraft, and Kyle Sparagens, who photographed the colonies. I also thank Michelle St.Peters, Dennis Marks, and Chris Dau (USFWS, Migratory Bird Management, Anchorage), who worked long hours to complete the arduous process of image-processing.