

Aerial survey of wintering Pacific brant and other species at the Izembek Lagoon Complex and the Sanak Islands, Alaska, January 2016.

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ABSTRACT: This report presents results of the 22-23 January 2016 aerial survey of Pacific brant and other species wintering at the Izembek Complex and the Sanak Islands of Alaska. This survey serves as the Alaska component of the annual mid-winter survey for Pacific brant, as outlined in the Pacific Flyway Management Plan. Our estimate for 2016 is 46,772 brant, the third highest in the history of the survey (started in 1981). The estimate represents the sum of two components: 1) the average of replicate counts for Izembek Complex on 23 January (46,532 and 40,682) and 2) a single brant count of the Sanak Islands on 22 January (3,165). Counts of other species, including emperor geese and Steller's eiders are reported. The long-term growth rate of over-wintering brant in Alaska is 8.5% per year (1981-2016), and currently, Alaska supports ~30% of the mid-winter population of Pacific brant. Although the Alaska wintering population has grown at over 8.8% per year over the past decade (2007-2016), the population appears to have stabilized over the most recent 5 year period (2011-2016; 3% per year, average of 46,260 birds [SE 0.03]).

Key words: Mid-winter survey, Pacific brant, Izembek Complex, Sanak Islands, Alaska.

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INTRODUCTION

Aerial surveys of wintering Pacific brant at the Izembek NWR including refuge coastlines and adjacent marine estuaries, (hereafter Izembek Complex), have been conducted annually since the winter of 1980-1981 (Fig. 1, Tables 4 and 5). In 2010, the survey was expanded to include the Sanak Islands (hereafter Sanak; Figs. 2 and 3, Tables 4 and 5). This survey serves as the Alaska component of the Pacific Flyway mid-winter survey (hereafter PF-MWS) for brant, and documents winter distribution, abundance, population trend, and habitat use by brant and other species (Pacific Flyway Council 2002).

In Alaska, eelgrass beds are the primary foraging areas for brant and occur from Moffet Bay to Bechevin Bay along the north side of the Alaska Peninsula, and in Kinzarof Lagoon and Morzhovoi Bay along the south side of the peninsula. Brant also occur at Sanak, 80 km south of Cold Bay. Although numbers there were not consistently documented prior to 2010 (Jones 1952, 1955; McKnight 1971; Dau and Chase 1995), it appears brant regularly use this area; with numbers spiking during severe cold weather

events. At Sanak, brant utilize eelgrass beds and other shallow intertidal habitats which often remain ice free.

METHODS

The 2016 winter survey of Izembek Complex and Sanak was flown from 22-23 January by Migratory Bird Management (MBM) personnel using an amphibious Cessna 206 aircraft (N9623R; see Figure in Acknowledgements). Survey ground speed was approximately 160 km/hr (100 mph) and altitude was 45m (150 feet) above sea level (ASL). Georeferenced observations made from both sides of the aircraft were voice recorded into panel-mounted computers for later transcription using programs developed by Jack Hodges (USFWS-Migratory Bird Management, Juneau, AK).

Systematic flight paths provided coverage of all near shore and open water areas along shorelines and within estuaries (Fig. 3). For navigation we used a combination of panel mounted computers and GPS units providing moving map displays, as well as paper topographic maps (scale 1:63,360) with delineated segment boundaries. We recorded survey conditions including ice cover, wind speed and direction, temperature, sky condition, visibility, and tide stage during the course of the survey.

The Izembek Complex includes shorelines and estuaries from Moffet Bay to Bechevin Bay, along the north side of the Alaska Peninsula, and Kinzarof Lagoon and Morzhovoi Bay on the south side of the Alaska Peninsula (Figs. 1, 3). This collection of areas, including Izembek Lagoon, within Izembek National Wildlife Refuge, is collectively referred to as the “Izembek Complex”. The Sanak Island group includes Sanak, Caton, and surrounding islets (Figs. 2, 3).

All of the Izembek Complex (Segs. 60-65, 67-68, 80-81, and 84-85) was flown twice on 23 January, 2016 (morning and afternoon surveys, respectively), while the Sanak Islands (Segs. Sanak North, Sanak South, Caton North, Caton South) were flown only on 22 January.

SURVEY CONDITIONS

Winter conditions in southwestern Alaska had been very mild prior to our arrival in Cold Bay on 22 January (Mean temperature Jan 1-22 was 33°F), and continued to be mild during our survey (28-36 °F). We observed sparse lowland snow cover and very few fresh-water bodies with skim ice. Overall, we estimated ice cover at < 5% in the northern estuaries (Bering Sea) and 0% in the southern estuaries (Pacific Ocean). There was no marine or fresh-water ice cover at Sanak and there was less than 1% lowland snow cover throughout the survey area. During surveys, tide levels were mid-level in the Sanak and Caton islands on 22 January and high to mid-level in Bering and Pacific estuaries in the Izembek Complex on 23 January.

Visibility was excellent at Sanak on 22 January with broken clouds at >2000 feet above ground level and calm winds. Visibility was excellent in the Izembek Complex on 23 January with broken to overcast skies, relatively little sun glare, and northeasterly winds of <10 mph. The morning survey was conducted from 10:58-14:15 hrs with ideal survey conditions (>30 mi visibility and sufficient cloud cover to reduce glare). The afternoon survey was conducted from 15:15-18:07 hrs, also with excellent visibility, with the exception of the final 30 minutes of surveying at Morzhovi and Bechevin Bays, where mist and dim light slightly diminished survey conditions.

RESULTS

Pacific Brant

We estimated a combined total of 46,772 brant (Izembek Complex average [43,607] + Sanak [3,165]), of which, 93% were in the Izembek Complex. We calculated totals of 46,532 and 40,682 for the Izembek Complex during the 23 January surveys (Tables 1a-b). We also observed 3,165 brant at Sanak on 22 January (Table 2), which we added to Izembek Complex average (43,607) to calculate the Alaska mid-winter total of 46,772. Marine ice was non-existent in 2016, and not a factor in restricting the distribution of wintering brant in either area. The long-term average of Alaska mid-winter counts (Izembek Complex: 1981-2015 + Sanak: 2010-2015) is $16,862 \pm 2,523$ (SE), and the survey shows an increasing, long-term trend of 8.5% per year (Fig. 4, Table 3).

Emperor Goose

We estimated a combined total of 6,262 emperor geese (Izembek Complex average + Sanak), with Izembek representing 57% of the combined total. We observed totals of 3,760 and 3,495 emperor geese in the Izembek Complex on the 23 January surveys, (Tables 1a-b), resulting in an average of 3,628. In addition, we observed 2,634 emperor geese at the Sanak Islands on 22 January (Table 2). Izembek Complex winter counts (1981-2015) of emperor geese have been highly variable (range 542 – 6,261) primarily due to ice cover and habitat availability (long-term average $2,839 \pm 240$ [SE], trend - 0.3%/year, Migratory Bird Management). We observed incidental observations of emperor geese outside of our survey area as far north as Egegik, as of 24 January. With no ice present in the major lagoons along the northern Alaska Peninsula and consistently mild winter conditions, emperor geese did not appear to be limited to more typical southern wintering locations in the Izembek Complex.

Steller's Eider

We estimated a combined total of 34,649 Steller's eiders (Izembek Complex average + Sanak), with Izembek representing 96% of the total. We observed totals of 24,890 and 41,447 Steller's eiders in the Izembek Complex on 23 January (Tables 1a-b), resulting in an Izembek Complex average of 33,169. In addition, 1,480 Steller's eiders were observed at the Sanak Islands on 22 January (Table 2). The 2016 average Izembek

Complex count is nearly two-fold the long-term average count from 1981-2015 (20,941) and provides a current long-term average and trend of $21,164 \pm 1,661$ (SE) and $-0.001\%/year$ (MBM/Izembek NWR files). Sex composition of Steller's eider flocks ($n = 174$) observed by the right-seat observer was predominately equal (98% or 170 of 174 flocks had equal sex ratios), while the remaining 2% (4 flocks) were predominately female.

DISCUSSION / RECOMMENDATIONS

The Izembek count of wintering brant has been used as the Alaska component of the Pacific Flyway mid-winter survey (PF-MWS) since the winter of 1985-1986. The survey was expanded in winter 2009-2010 to include the Sanak Islands (USFWS 2011, Pacific Flyway Data Book). We continue to recommend the Alaska portion of the PF-MWS be composed of the average of replicate counts from the Izembek Complex with a minimum single count at Sanak. Annual counts for both locations, as well as segments within locations, will also continue to be reported separately. Historical within-winter replicate counts conducted at Izembek had not been consistently reported prior to 2015. We report these counts and information about each historical survey in Tables 4 and 5. We continue to recommend that survey crews strive to complete within-winter replicate counts during the months of January and February, coincident with PF-MWS counts conducted elsewhere in the Pacific Flyway. However, we include counts conducted between 28 November and 31 March in our historical record of annual estimates for the Alaska mid-winter brant survey (Table 4).

Sea ice averaged $< 1\%$ within the survey area during the 2016 survey, and presented no restriction to brant distribution in the area. Ice conditions determine habitat accessibility during winter months and can restrict brant distribution (particularly in high ice years) to remaining open-water areas (typically central Izembek Lagoon, Kinzarof Lagoon, and Hook Bay; C. Dau pers. obs.). However, winter weather conditions along the Alaska Peninsula have been very mild over the past three winters, including 2016; likely an important factor associated with increasing numbers of overwintering brant at Izembek (Ward et al. 2009; Fig. 4). Whereas Alaska historically accounted for $< 5\%$ of the winter brant population (in the 1980's and 90's), overwintering brant at Izembek currently comprise the second largest geographic component of the 2005-2015 PF-MWS ($\sim 30\%$), with Mexico representing the largest portion ($\sim 60\%$), and the remaining birds ($\sim 10\%$) occurring in California, Oregon, Washington, and British Columbia.

Brant counts at Sanak over the last 7 years (2010-2016) have averaged $4,676 \pm 1,312$ (SE), representing 11% of the overall Alaska winter count. We suspect larger proportions of wintering brant utilize Sanak when ice conditions restrict habitat use at Izembek, but we require more variation in ice-years to investigate this hypothesis. Anecdotally, we found an average of 77% of brant at Izembek when ice cover was $> 50\%$ (Izembek/Sanak surveys 2009-10 and 2011-12), versus $> 94\%$ when ice was reduced or absent (2010-11, 2012-13, 2013-14, and 2014-16). Additional studies will

be required to better elucidate use of Sanak and Izembek by wintering brant under different ice regimes. However, if Sanak serves as an adequate refuge for brant temporarily displaced by ice at Izembek, Alaskan over-wintering birds may not face the potential 'ecological trap' once hypothesized (Ward et al. 2009).

The findings and conclusions in this article are those of the author(s) and do not necessarily represent the views of the U.S. Fish and Wildlife Service.

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The 2016 Izembek mid-winter survey crew; Chris Dau (right-front observer) and Heather Wilson (left-front observer/pilot), with Amphibious Cessna-206 N9623R.

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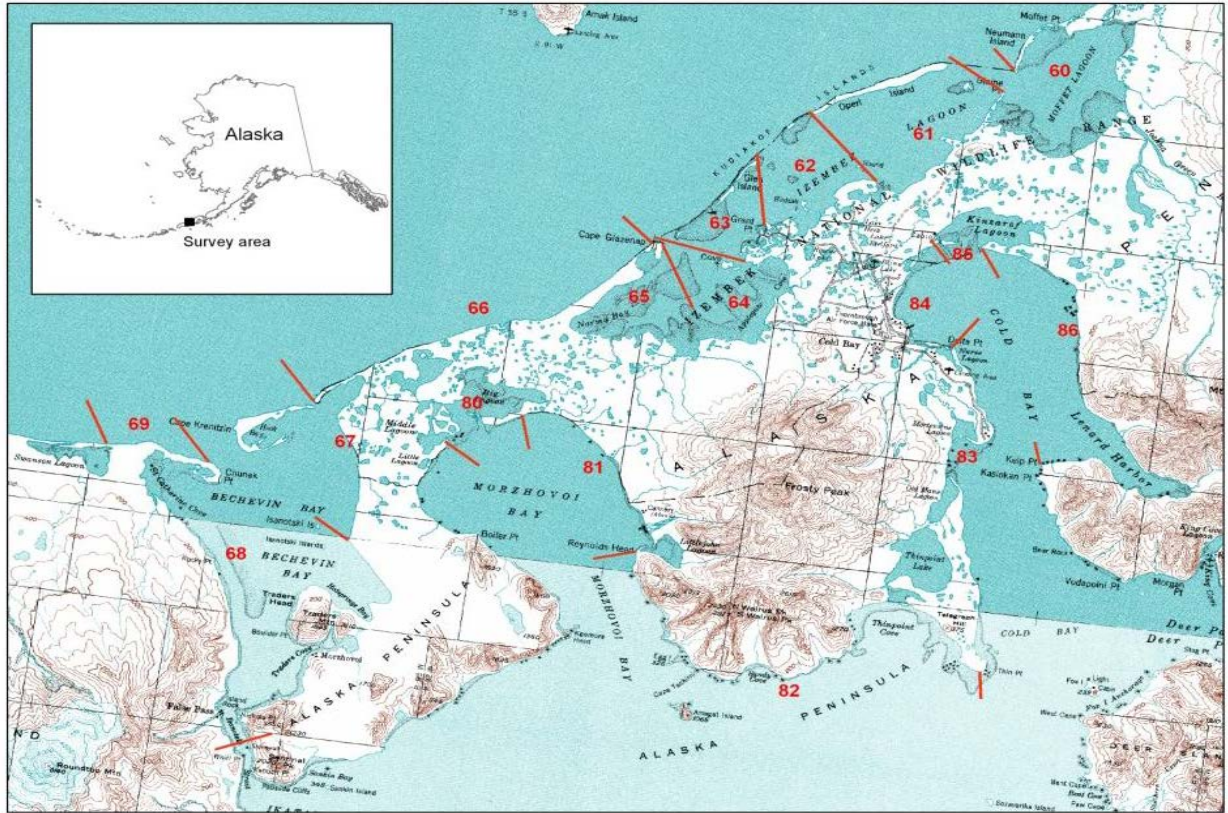


Figure 1. Pacific brant survey area by segment in the Izembek Complex.

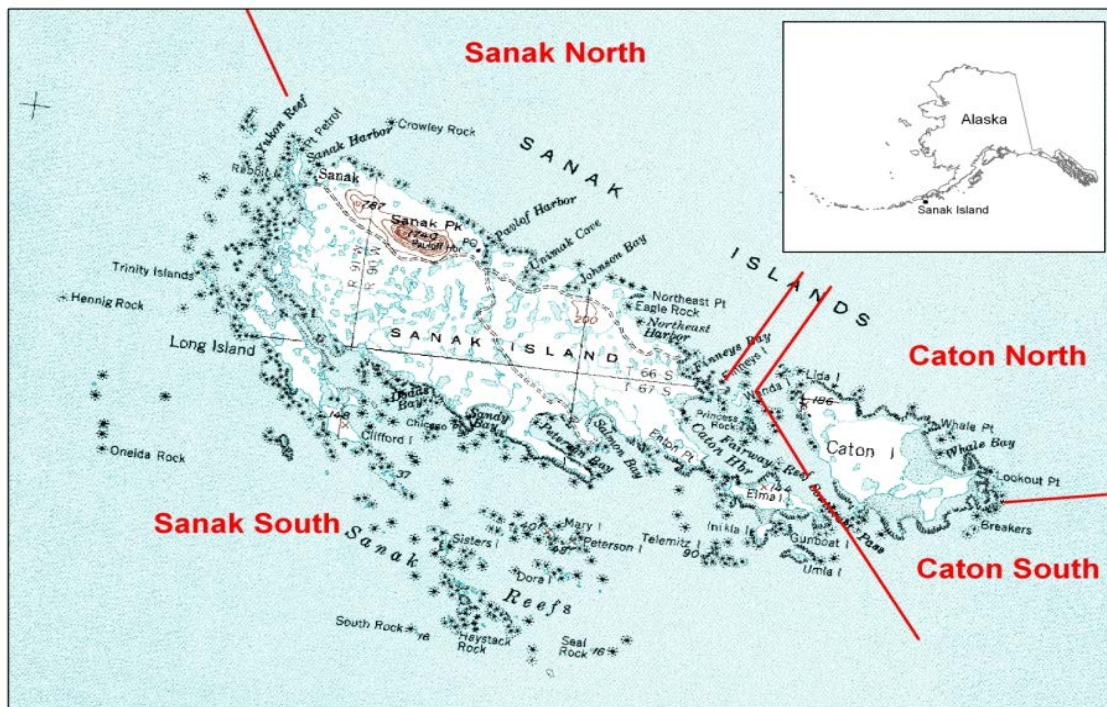


Figure 2. Pacific brant survey area by segment in the Sanak Islands.

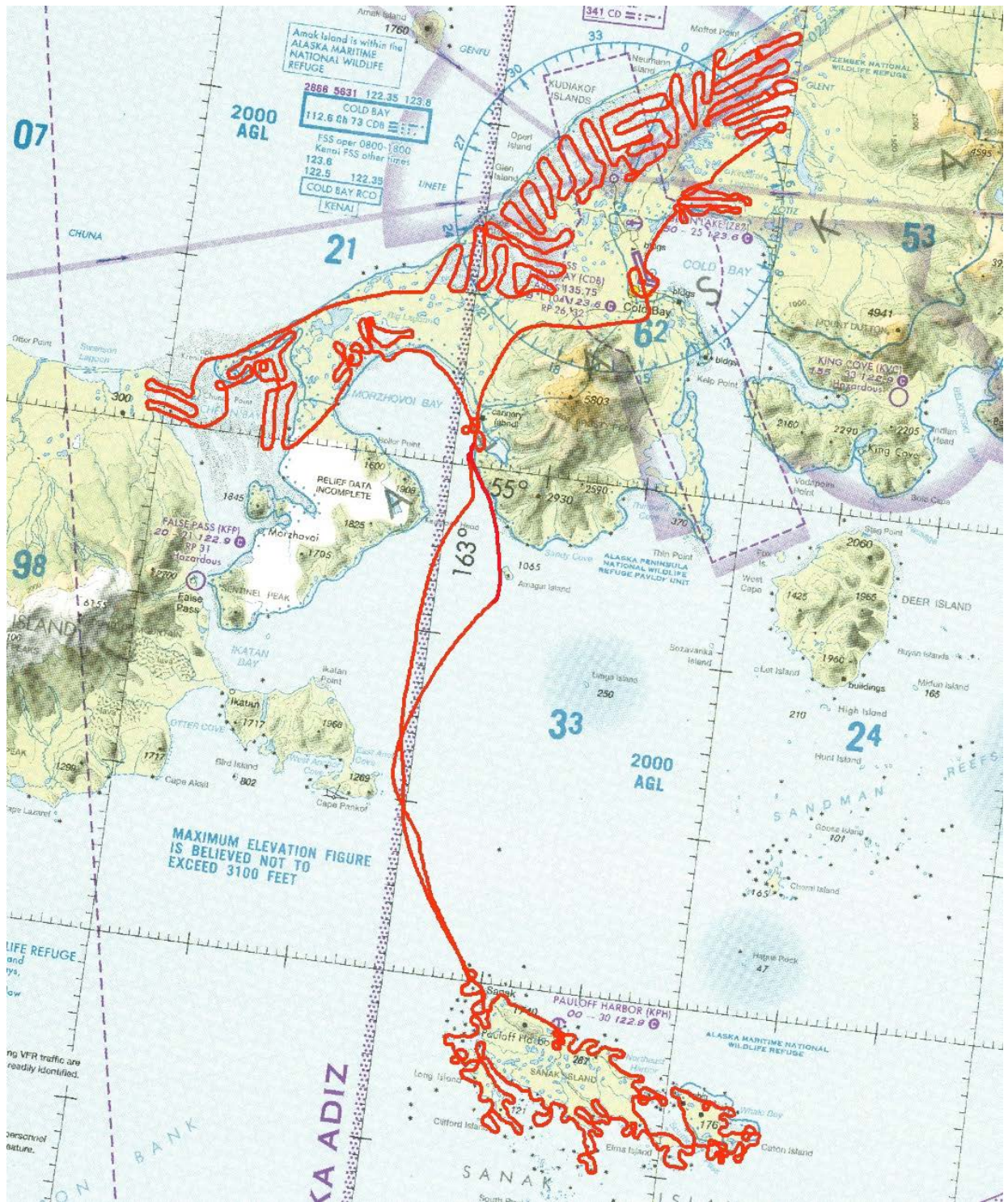


Figure 3. Aircraft track for 22 and 23 January 2016, showing survey path for the Izembek Complex (Izembek Lagoon and Morzhovoi and Bechevin Bays) and the Sanak Islands.

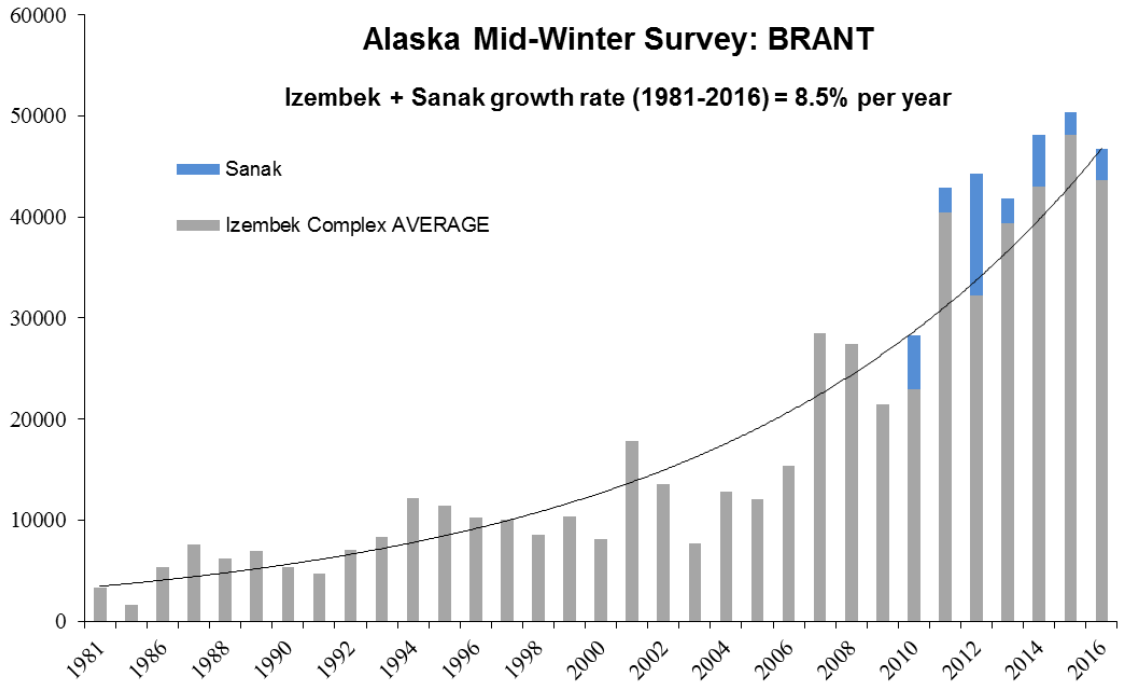


Figure 4. Population trend for the Alaska component of the Pacific Flyway Midwinter index for brant (1981-2016). Annual totals represent averages of within-winter replicates at Izembek (grey bars), plus counts at the Sanak Islands, Alaska (blue bars).

Table 1a. Waterbird and mammal observations by segment, Izembek Lagoon – Survey #1, 23 January 2016.

SPECIES	SEGMENT NUMBER												TOTAL	
	60	61	62	63	64	65	67	68	80	81	84	85		
Am. G. W. Teal													20	20
Bald Eagle	1	3				1		1	1	2			2	11
Black Scoter	550	522	225	65	50	35	542	750	185	66	80	22		3092
Brant	2436	18663	1103	2623	10663	10127	398	138	1				380	46532
Bufflehead	1									70				71
Common Eider								10		56				66
Common Loon										1				1
Common Murre											2			2
Common Raven		9					7				3	3		22
Emperor Goose	1266		80	637		104	240	8	971	75	18	361		3760
Goldeneye				3			4		10					17
Greater Scaup				20	18		345	200	137					720
Harbor Seal			3		105		46	8					9	171
Harlequin Duck				26			78		15		4	75		198
Large gull ssp.	25	18		1	15	19	28	16	24	53		23		222
Long-tailed Duck	51	58	6	17	77	77	11	11	2				2	312
Mallard	1774	400		6	75	200	18	15	201				50	2739
Mew Gull					140								2	142
Northern Pintail	80	7	25	11			2		151	12			350	638
Pacific Loon									1	2				3
Pelagic Cormorant													3	3
R-b Merganser	20		205		31	1	188	53	253				825	1576
Sea Otter	57	75	179	4	179	65	146	207	19		2	5		938
Steller's Eider	3213	7830	2635	1060	1805	3242	3371	229	185	30	1	1289		24890
W-w. Scoter	2	6		1	2			16	12		1			

Table 1b. Waterbird and mammal observations by segment, Izembek Lagoon – Survey #2, 23 January 2016.

SPECIES	SEGMENT NUMBER												TOTAL
	60	61	62	63	64	65	67	68	80	81	84	85	
Bald Eagle		1								2			3
Black Scoter	1493	1000	100	150	25	10	182	47	240	119	510	75	3951
Brant	3045	17693	60	5617	6059	7256	253	6				693	40682
Bufflehead									83				83
Common Eider								5		150	16		171
Common Raven												2	2
Emperor Goose	774		395	565	18	400			916	30	362	35	3495
Goldeneye									200			10	210
Greater Scaup					54		993		120			20	1187
Harbor Seal		1			137		65						203
Harlequin Duck			25	18	20		16	4	28		22	9	142
Large gull ssp.	599	24	72	22	9	9	19	5	17	43	2	13	834
Long-tailed Duck	1087		11	15	12	30	2	1				22	1180
Mallard	2010	135			17			2	199				2363
Mew Gull	261						1						262
Northern Pintail	565				2				216			50	833
Pacific Loon											3		3
Pelagic Cormorant												1	1
R-b Merganser	65	10		206	3	15	90		157		18	379	943
Sea Otter	94	35	59	16	256	127	103	166	19	7	3	4	889
Sm. Shorebird ssp.	3000						800						3800
Steller's Eider	7450	13375	1113	1566	6085	6692	3060	548	150		142	1266	41447
Tundra Swan	4								1				5
W-w. Scoter		35				4		2					41

Table 2. Waterbird and mammal observations by segment, Sanak Islands, 22 January 2016.

SPECIES	SEGMENT				TOTAL
	Sanak South	Caton South	Caton North	Sanak North	
Am. G. W. Teal			300		300
Bald Eagle	43	5	2	10	60
Black Oystercatcher	222	9	5	50	286
Black Scoter	1881	720	25	60	2686
Black-legged Kittiwake	1				1
Brant	536	923	1411	295	3165
Bufflehead	9				9
Cattle	692			104	796
Common Eider	1				1
Common Loon	2				2
Common Murre	3				3
Common Raven	9	4	10	4	27
Emperor Goose	1226	782	183	443	2634
Goldeneye	25	27			52
Harbor Seal	76	2			78
Harlequin Duck	454	61	72	121	708
Horse	109				109
Large gull ssp.	100	18	18	42	178
Long-tailed Duck	88	13	100		201
Mallard	5				5
Northern Pintail	1107	739	845	250	2941
Pacific Loon	2			1	3
Pelagic Cormorant	200	24	6	26	256
R-b Merganser	123	18	97		238
Sea Otter	11	7			18
Sm. Shorebird ssp.	600	600			1200
Steller's Eider	345	815	320		1480
Tundra Swan	12		5	2	19
W-w. Scoter	987		30		1017

Table 4. Alaska mid-winter survey (AK MWS) 1981-2016. YEAR reflects the year in which January, February, and March surveys were flown.

Alaska Mid-Winter Waterfowl Survey

YEAR	Recommended Pacific Flyway Databook AK MWS ^{1,2}	Previous Pacific Flyway Data book AK MWS	Izembek Complex AVERAGE + SANAK	Sanak	Izembek Complex PEAK	Izembek Complex AVERAGE	Izembek Complex Within-Year Counts in Chronological Order ^{3,4}						
							≥ Nov. 27th	December	January	February	March		
1981	<i>3271</i>		3271		5540	3271		1602	2670				5540
1984	<i>1611</i>	1611	1611		1611	1611			1611				
1986	<i>5338</i>	7665	5338		7665	5338	7665		3010				
1987	<i>7550</i>	5755	7550		9355	7550	9355				<u>5745</u>		
1988	<i>6180</i>	8385	6180		8385	6180		<u>3975</u>	<u>8385</u>				
1989	<i>6918</i>	7050	6918		9795	6918	9795	7050	<u>3910</u>				
1990	<i>5303</i>	5595	5303		5685	5303	5685		5595				4630
1991	<i>4742</i>	4350	4742	*	4950	4742		4950	4350		<u>4925</u>		
1992	<i>7043</i>	7200	7043		8386	7043		6790	5797		<u>7200</u>		<u>8386</u>
1993	<i>8369</i>	8008	8369		10551	8369			7407 8008	10551			8862 7015
1994	<i>12125</i>	13221	12125		21249	12125	21249		7580 13221	<u>8942</u>			<u>12389</u> <u>9366</u>
1995	<i>11381</i>	11978	11381		12461	11381	9703		11978		12461		
1996	<i>10278</i>	9795	10278		17218	10278		17218	<u>9795</u>		7534 <u>9735</u>		8730 8658
1997	<i>10049</i>	13147	10049		13237	10049		7460 9451	13237				
1998	<i>8562</i>	8773	8562		8773	8562			8350 8773				
1999	<i>10354</i>	8255	10354		12348	10354		12348	8255		<u>10460</u>		
2000	<i>8120</i>	8833	8120		11917	8120		<u>11917</u>	<u>3610</u>		8833		
2001	<i>17790</i>	17790	17790		17790	17790					17790		
2002	<i>13576</i>	13576	13576		13576	13576				<u>13576</u>			
2003	<i>7677</i>	9168	7677		9168	7677		9168					6185
2004	<i>12756</i>	12756	12756		12756	12756							12756
2005	<i>12041</i>	17240	12041		19303	12041			19303 2638 4563	17238 16463			
2006	<i>15404</i>	19616	15404		21394	15404			10700	<u>11685</u> <u>21394</u> 17838			
2007	<i>28533</i>	40041	28533		40041	28533				15018 40041 32814 26257			
2008	<i>27422</i>	28329	27422		28329	27422			28329 26515				
2009	<i>21482</i>	21482	21482		21482	21482				<u>21482</u>			
2010	<i>28234</i>	26443	28234	5303	26443	22931			22567 22550	26443 20165			
2011	<i>42937</i>	45477	42937	2517	46383	40420				46383 29145			45733
2012	<i>44252</i>	44252	44252	11996	32256	32256			<u>32256</u>				
2013	<i>41821</i>	41821	41821	2413	39408	39408							39408
2014	<i>48140</i>	48140	48140	5129	50257	43011			50257 35765				
2015	<i>50316</i>	50316	50316	2206	50815	48110			50815 45405				
2016	<i>46772</i>	46772	46772	3165	46532	43607			46532 40,682				
AVERAGE	17768	19151	17768	4676	19547	16776							
Growth rate	8.50%	8.43%			7.38%	8.11%							

¹ Change relative to Pacific Flyway Databook (2014): in italics

² Recommended totals for 2009-present include Sanak Islands counts

*An exploratory survey of Sanak was flown on 15 February 1991 (Dau and Chase 1995); 1,189 brant were observed, extrapolated to an estimated 3,052. The Sanak 1991 estimate is not included in the table, due to the substantial departure from later survey methods.

³ Partial surveys "corrected" for missed segments (i.e., segments flown on other days, in the same year, usually Bechevin/Morzhovi areas, substituted) are shown as shaded cells in table. Additions to Izembek Lagoon totals were: 2006-07: (729 and 1,314), 2007-08: (7,815), 2014-15: (4,329)

⁴ Surveys conducted under high ice conditions (e.g., 80%+ of lagoon iced over) are underlined.

⁵ 2012 totals (Sanak and grand total) have been corrected to match those in Mallek and Dau 2012 (11,996 and 44,252, respectively).

Table 5. Annual dates of all surveys, crews, and aircraft for the Alaska Mid-Winter Brant Survey 1981-2016.
 *Asterisks denote surveys in which the Sanak Islands were flown.

YEAR	REPS	DATES	PILOT OBSERVER	OTHER OBSERVER(S)	AIRCRAFT
1980-81	3	12/30, 1/26, 3/9	J.E. Sarvis	K.A. Metzner	PA-18
1983-84	1	1/16	J.E. Sarvis	M.L. Nunn	PA-18
1985-86	2	11/29, 1/24	J.E. Sarvis	M.D. Blenden	PA-18
1986-87	2	11/27, 2/27	J.E. Sarvis	C.P. Dau	PA-18
1987-88	2	12/11, 1/15	J.E. Sarvis	C.P. Dau	PA-18
1988-89	3	11/29, 12/27, 1/17	C.P. Dau	D. Strom/R.L. West	PA-18
1989-90	3	11/29, 1/10, 3/29	C.P. Dau	M.A. Chase/S.S. Simpson/R.L. West	PA-18
1990-91	3	11/30, 1/9, 2/21 *2/15 (Sanak only)	C.P. Dau *Charter Pilot (Sanak)	J. Chase/M.A. Chase *C.P. Dau/M.A. Chase (Sanak)	PA-18, *PA-31 (Sanak)
1991-92	4	12/17, 1/23, 2/10, 3/26	C.P. Dau	C.F. Zeillemaker/M.A. Chase	PA-18
1992-93	5	1/14, 1/16, 2/26, 3/8, 3/24	C.P. Dau	N. Schlicten/C.F. Zeillemaker	PA-18
1993-94	6	11/30, 1/19, 1/26, 2/15, 3/9, 3/28	C.P. Dau	M.A. Chase/R.P. Schulmeister/D.H. Ward/C.F. Zeillemaker	PA-18
1994-95	3	11/30, 1/2, 2/14	C.P. Dau	S.D. Schulmeister/R.P. Schulmeister	PA-18
1995-96	6	12/1, 1/12, 2/16, 2/26, 3/4, 3/18	C.P. Dau	G.E. Siekaniec/R.P. Schulmeister/ S.D. Schulmeister/D.H. Ward	PA-18
1996-97	3	12/19, 12/23, 1/17	C.P. Dau	G.E. Siekaniec/J.E. Sarvis/R.P. Schulmeister	PA-18
1997-98	2	1/2, 1/8	M. Roy	-	PA-18
1998-99	3	12/15, 1/2, 2/10	M. Roy/C.P. Dau	R. Portwood/T.A. Schafer	PA-18
1999-00	3	12/17, 1/16, 2/22	M. Roy	L. Ziemba	PA-18
2000-01	1	2/26	C.P. Dau	D.H. Ward	PA-18
2001-02	1	1/30	C.P. Dau	D.H. Ward	PA-18
2002-03	2	12/21, 3/4	K.B. Fox	K.M. Sowl	PA-18
2003-04	1	3/5	W.W. Larned	K.M. Sowl	PA-18
2004-05	5	1/19, 1/26, 1/27, 2/26, 2/28	J.K. Richardson E.J. Mallek	K.M. Sowl P.D. Anderson/T.F. Donnelly	PA-18
2005-06	4	1/26, 2/15, 2/17 (x2)	J.K. Richardson E.J. Mallek	K.M. Sowl C.P. Dau	PA-18
2006-07	4	2/9, 2/13, 2/14 (x2)	J.K. Richardson	K.M. Sowl	PA-18
2007-08	2	1/25, 1/26	J.K. Richardson	C.P. Dau	PA-18
2008-09	1	2/2	E.J. Mallek	C.P. Dau	PA-18
2009-10	4	1/29, 1/30, 2/1, 2/2	F. Mueller K.S. Bollinger	C.P. Dau	PA-18 C206 Amphib
2010-11	3	*2/27, 2/28, 3/1	K.S. Bollinger	P.D. Anderson	C206 Amphib
2011-12	2	*1/14	E.J. Mallek	C.P. Dau	Kodiak Amphib
2012-13	1	3/28, *3/29	E.J. Mallek	C.P. Dau	Kodiak Amphib
2013-14	2	1/27, *1/28	H.M. Wilson	C.P. Dau	C206 Amphib
2014-15	2	*1/24, 1/25	H.M. Wilson	C.P. Dau	C206 Amphib
2015-16	2	*1/22, 1/23	H.M. Wilson	C.P. Dau	C206 Amphib