Midcontinent Greater White-fronted Goose Banding in Alaska, 2014

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The mid-continent population of Greater White-fronted Geese (GWFG, *Anser albifrons frontalis*) breeds in tundra habitats from the eastern shore of Hudson Bay to the west coast of Alaska and south into boreal forests and taiga of interior and northwest Alaska (Ely and Dzubin 1994). Due to the scarcity of harvest distribution data and relative survival rates for greater white-fronted geese in Alaska, a banding program was initiated in the early 1960s and has been the basis for research partnerships with the University of Alaska, the U.S. Geological Survey, the University of Chihuahua, several National Wildlife Refuges, and the Division of Migratory Bird Management (MBM), Anchorage. Since 1969, more than 50,000 midcontinent white-fronts have been banded in major molting areas in interior, northwest, and Arctic Coastal Plain Alaska (Figure 1, Append. 3). An active banding program for GWFG in Canada has also provided valuable survival estimates to compare with geese at Alaska sites. Band recovery, collar resight data, radio telemetry and satellite tracking results have helped discover and verify flyway corridors, migration timing and wintering areas used by midcontinent GWFG that breed in Alaska (Ely et al. 2013). Further, results of ongoing banding efforts have shown that the interior and northwest Alaska segment of the midcontinent population differ from those breeding in tundra habitats throughout Canada and Alaska, demonstrated by earlier initiation of autumn and spring migration, use of unique wintering areas in Mexico, and lower annual survival (Ely and Schmutz 1999, Spindler et al. 1999). Annual banding activities are recommended in the Midcontinent Greater White-fronted Goose Management Plan (Sullivan 2010) to assess population size and survival, and to monitor harvest rate and geographic and temporal distribution of the harvest.

In 2003, the Alaska MBM GWFG banding program was expanded to the Arctic Coastal Plain (ACP). The purpose of this expansion was to examine migration timing and winter distribution, disease prevalence (Samuel et al. 2005, USFWS/USGS 2010) and annual survival of mid-continent white-fronts in the Alaskan ACP versus interior boreal forests of Alaska. Banding on the ACP has also helped to determine the degree of interchange between boreal and tundra nesting GWFG in Alaska, which appears to occur to only a very small degree. Migratory Bird Management objectives of banding on the ACP were completed in 2011; thus, subsequent banding of GWFG was restricted to interior Alaska. However, banding on the ACP continues through efforts by USGS to examine the physical and biological factors in relation to the population increase in white-fronted geese on the ACP (3,335 birds banded since 2011).

A minimum annual sample of 1,000 banded white-fronts in interior/northwest Alaska over 10 years is needed to ensure a 90% chance of detecting a 5% difference in survival rate (Schmutz 2001). Hence, MBM has sought to band a minimum of 1,000 GWFG annually in interior Alaska and from 2003-2011, an equal number on the ACP. Interior Alaska banding sites at Koyukuk-Nowitna and Selawik NWR have not been visited since 2002 and 2005, respectively, because of the paucity of large molting flocks and concern about disturbance to these small populations. Geese in Kanuti NWR, in interior Alaska, were banded in 1973-96, but few large flocks of GWFG have been observed there in subsequent years and were only banded in 2003 when satellite transmitters were installed. In 2002, the lower Noatak River Delta in northwestern Alaska was added to the banding locations as was the Seward Peninsula in 2004. However, small numbers of trappable geese in these and other historical banding areas make these locations difficult to band. Neck collars were used for many years to mark a portion of the banded population but have not been deployed since 2002 (except for VHF radio-collar studies in 2002, 2003 and 2008). Satellite transmitters were implanted into GWFG in 2001-2003 (42 in interior Alaska and 9 on the ACP) to further examine migration and staging (Webb 2006).

In 2014, our objective was to band a minimum 1,000 GWFG in interior Alaska, specifically in the Innoko NWR.

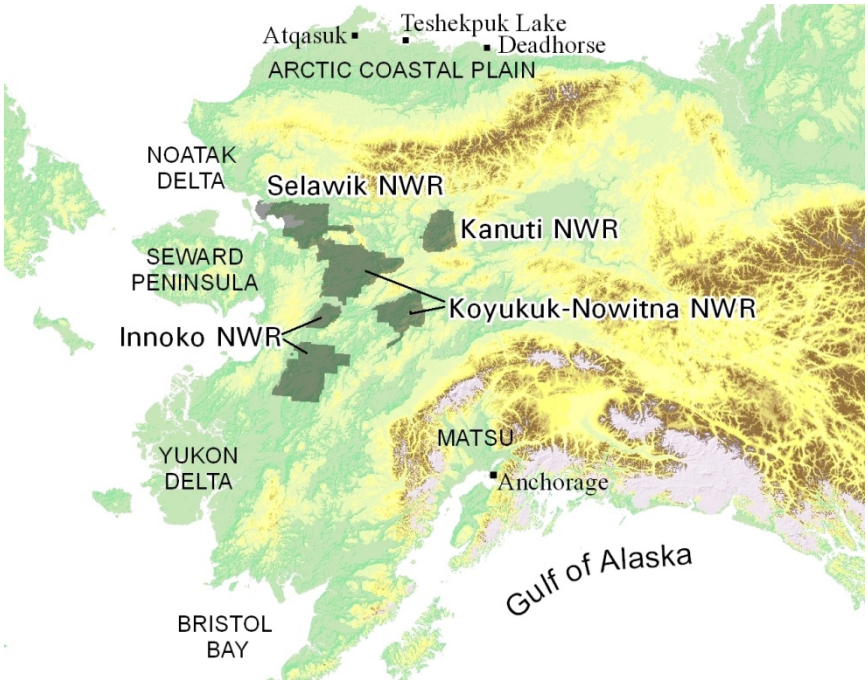

Figure 1. Location of current and past Migratory Bird Management, Anchorage, GWFG banding areas in Alaska.

2014 Itinerary

Monday, July 7

No banding. All aircraft and personnel to Innoko Field Camp (via McGrath and Galena, Alaska). Prep and plan crew logistics, safety meeting.

Tuesday, July 8

Banding at Innoko. Banded two lake sites. Overnight at Innoko Field Camp.

Wednesday, July 9

Banding at Innoko. Banded one lake site and finished banding. Overnight at Innoko Field Camp.

Thursday, July 10

Travel day. Crew to Galena and Anchorage (via Fairbanks).

Personnel and Duties

Julian Fischer (FWS MBM Anchorage) GWFG projects coordinator, bander
Ed Mallek (FWS Koyukuk-Nowitna NWR) Pilot, bander
Heather Wilson (FWS MBM Anchorage) Pilot, bander
Nate Olson (FWS Kenai NWR) Pilot, bander
Brad Shutz (FWS MBM Anchorage) Pilot, bander
Anna Anderson (FWS MBM Anchorage) Pilot, bander
Brad Scotton (FWS Koyukuk-Nowitna NWR) Pilot, bander
Boomer Bryant (FWS Koyukuk-Nowitna NWR) Pilot, bander
Dennis Marks (FWS MBM Anchorage) Banding schedules, bander
Janel Mayo (FWS MBM Anchorage) Bander
Bri Kilbourne (FWS Kenai NWR) Bander
Mike Bye (FWS Innoko NWR) Logistics

METHODS

Trapping. Locating GWFG flocks is accomplished through an aerial molting goose survey conducted just prior to banding and/or reconnaissance during banding. MBM protocol for trapping geese consists of locating a flock of molting geese on a lake or river that is deep and wide enough for aircraft maneuvers, with suitable shoreline for trap setup (dry, flat and shaded), and with mild winds (ideally, having the most difficult portion of the drive into the wind but with not too long a swim against it).

During setup (20-30 minutes), one plane remains in the air to keep geese flocked up on the water, and to herd disparate flocks together. Two lead nets are deployed from both sides of the pen net and lead to the shoreline. Most frequently, the long lead is set down the beach in the direction the geese are approaching, and a short lead, the "far" lead, running from the pot perpendicular to the shore out into the water. The bottom edge of the pot net and the leads are staked down so geese cannot escape underneath. When setup is complete, ground crew boards aircraft or hides in the vegetation near both ends of the leads, ready to reveal themselves (but only if instructed to do so by pilots via hand held radio as it is critical that persons on the shore not be seen). Aircraft depart, land and taxi behind the flock and begin moving the geese toward the trap. Preferably, one plane remains airborne to direct the operation and keep geese from going onshore prematurely. Input from the ground crew is rarely but sometimes necessary if the geese come to shore beyond the leads. In 2014, we used two float-equipped Piper Supercubs, two Cessna 206s on amphibious floats and a Cessna 185 on floats to locate and drive geese.

After the pot net door is closed off, available persons move around the outside of the net to keep geese from bunching up on one side which can cause injury and overheating. An evaluation is necessary to decide whether or not some of the geese need to be released immediately. In good conditions (cool, dry with shade and sufficient banders), 500 geese is the maximum number that can safely be kept in the net during processing. Excess geese are released immediately upon capture.

Banding. Crews avoid placing banding station too close to the catch pen, as human movements and noise may increase stress to the geese. After determining age and sex of each goose, banders carefully close the ends of size 7B USGS metal leg band together squarely and smoothly. Bands wear more evenly if applied round and can rotate freely. Banders carefully read band numbers to a data recorder who reads back the data to verify. Sex is determined via cloacal exam, and age is determined through plumage characteristics. Location coordinates, date, time, presence of brood patches or injuries, and other relevant observations are recorded. Prior to releasing banded geese, all obstacles are removed between the banding site and lake shores (planes, equipment etc.) and leads are positioned to direct birds back into the water where they can cool off and flock up. Data are entered directly into BBL banding software or imported from spreadsheet, processed, checked and e-mailed to USGS Bird Banding Laboratory. Banding permits must be renewed every 3 years.

RESULTS

The Innoko River in interior Alaska floods every spring recharging waterbodies in the Innoko NWR creating productive molt habitat to large numbers of geese. Geese are found on both lakes and rivers, but lakes are preferred banding sites due to ease of operations for float plane maneuvers. However, in some years low lake water levels require capture operations occur on banks of rivers and sloughs. In 2014, water levels were above average and there was sufficient water in lakes to accommodate large flocks of geese and for aircraft to maneuver, but not too flooded to restrict trap sites.

With a seasoned and well organized crew, another very successful banding effort was completed in 2014. Banding sites were located in an established banding area in the Iditarod River drainage upstream from the confluence of the Innoko River, Innoko NWR (Figure 1; Appendix 1 for location

details). The goal to band a minimum of 1,000 GWFG in interior Alaska was met (Tables 1 and 2). With two days of banding, two days of travel, 1,165 GWFG were captured from three sites in interior Alaska: 1,087 GWFG were newly banded and 78 previously banded geese were recorded.

In 2014, after second-year (ASY) GWFG made up 85% of all banded geese for all areas, Higher than the mean of 80% (2001-2014, Table 3) and higher than most years. Fifty-two percent of newly banded GWFG were male, lower than the mean of 57% (2001-2014) and the lowest recorded since 2001. All bands were 7B except for one 8 sized band (#1048-09607) placed on a goose with larger tarsi (though not an obvious tule white-fronted goose (A.a. gambelli). One hybrid goose (possible Canada x GWFG) was banded and recorded.

TABLE 1. Summary of newly banded GWFG in 2014 banding effort for all banding sites in interior Alaska by location, date, age and sex.

		8 July		9 July	
		Site 1	Site 2	Site 3	Total
After Second Year	**Total**	**438**	**335**	**147**	**920**
	Female	181	145	99	425
	Male	257	190	48	495
Second Year	**Total**	**62**	**66**	**39**	**167**
	Female	34	34	29	97
	Male	28	32	10	70
Total		**500**	**401**	**186**	**1087**

Recaptures

An encounter is any reporting of a previously marked bird, by recapturing, sighting, or killing and is used to assess population size and survival, monitor harvest rate and geographic and temporal distribution of the harvest. Of the 1,165 birds handled (banded and recaptured) in 2014, only 78 were previously banded birds (Table 2) comprising 7% of the total GWFG handled, compared with 10% and 14% in 2012 and 2013, other years when only Innoko was banded. One new band was used to replace a worn band on a recaptured ASY male in 2014.

TABLE 2. Numbers of recaptured GWFG for each banding site for geese captured in the 2014 banding effort in interior Alaska.

	8 July		9 July	
	Site 1	Site 2	Site 3	Total
Female	11	9	5	25
Male	30	17	6	53
Total	41	26	11	78

Since 1924, over 9,000 recoveries of GWFG banded in Alaska have been reported (Figure 2). Band returns from GWFG in Alaska have demonstrated a high degree of molting site fidelity and only a very limited degree of mobility between interior and North Slope populations. With few exceptions, GWFG recaptured in Innoko and the ACP were originally banded in those locations.

From band returns over the past several decades, it is known that birds from both Innoko and ACP molting areas have been hunted in more than 20 U.S. states, several Canadian provinces and Mexico.

For Innoko banded birds, Alberta, Texas, Saskatchewan and Mexico together accounted for about 77% of all GWFG reported by hunters (Figure 3).

TABLE 3. Summary of newly banded and recaptured GWFG by year for all banding sites combined in Alaska 2001-2014.

	New Bands			Recaps		
Year	**# New bands**	**% ASY**	**% Male**	**# recaps**	**% recaps**	**% Male**
2001	1299	81	55	43	3	74
2002	909	82	57	41	4	61
2003	2131	85	57	120	5	53
2004	2797	83	55	202	7	50
2005	2475	83	57	228	8	55
2006	2261	74	56	174	7	56
2007	2212	77	55	124	5	56
2008	2267	81	59	113	5	60
2009	2026	82	57	120	6	73
2010	2014	78	57	133	6	65
2011	2095	77	60	127	6	64
2012	1110	77	60	129	10	67
2013	1198	75	61	190	14	65
2014	1087	85	52	78	7	68
Mean	1849	80	57	130	7	62

Injury, mortality

From telemetry performed in 2008, we now know that some of the geese that appear healthy upon release die soon after banding (Fischer 2010). Time spent in the pen prior to banding is likely related to survival (Schmutz et al. 2013) and from past experience, having more than 500 geese in one pen, particularly at the Innoko sites, will lead to injuries and overheating. By limiting numbers in the pen to less than 500, setting up capture pens in dry and shaded sites, stationing observers around the capture pen to discourage concentrations of birds, corralling processed birds directly into lakes upon release, and immediate removal of Canada geese from the pen, birds remain healthy upon release. In 2014, no geese looked exhausted on release; all geese looked healthy and unharmed and swam away quickly. Geese were into the molt this year, with more than 50% feather growth, possibly contributing for their excellent condition in the net pen.

Serious injury to the leg can result from installing too small a band. The tule white-fronted goose (*A.a. gambelli*), a larger and darker subspecies found in small numbers with molting GWFG in western Alaska, and a very few large *frontalis*, require a size 8 band (inside diam.11/16") instead of the 7B band (inside diam.17/32") generally used for GWFG. In 2014, only one GWFG required a larger band, and did not appear to be an obvious tule goose.

Reporting Bands

The Bird Banding Lab, Patuxent Wildlife Research Center in Laurel, MD is encouraging all banders to publicize the new web site reporting capability at: http://www.reportband.gov. Finders receive instant feedback if the banding data is in our files and they receive a confirmation e-mail acknowledgement. This also gives the finder the choice of receiving their certificate by e-mail rather than standard postal service.

Acknowledgements

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Citations

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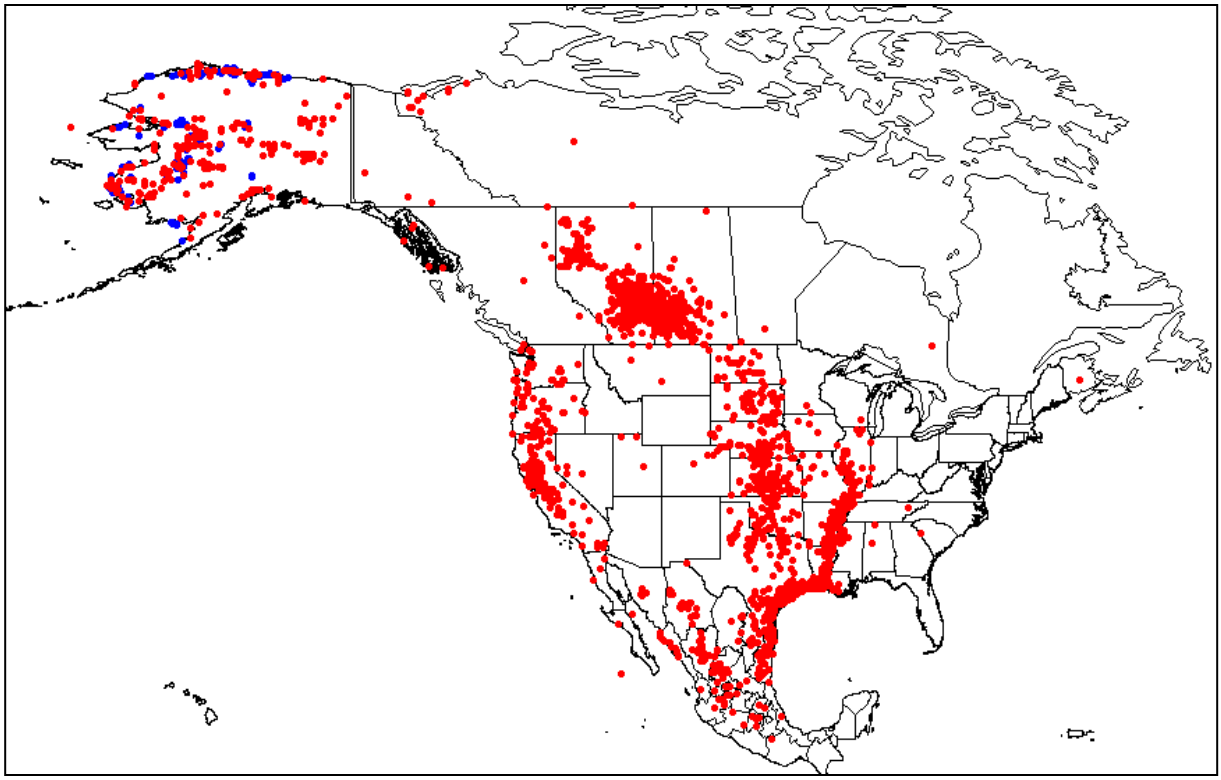
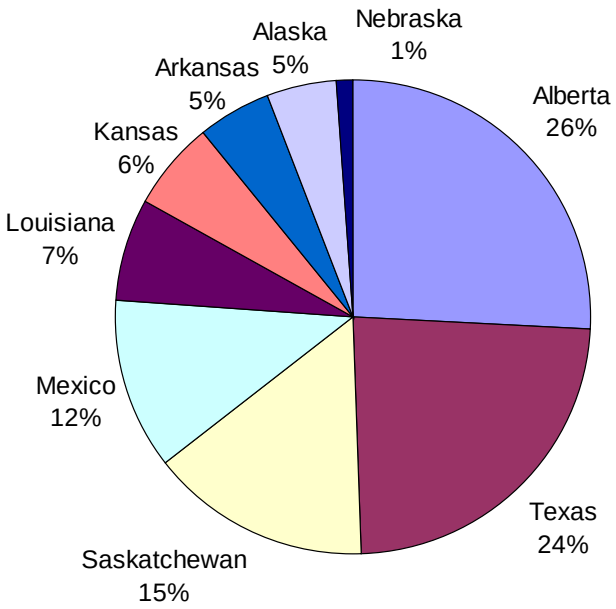


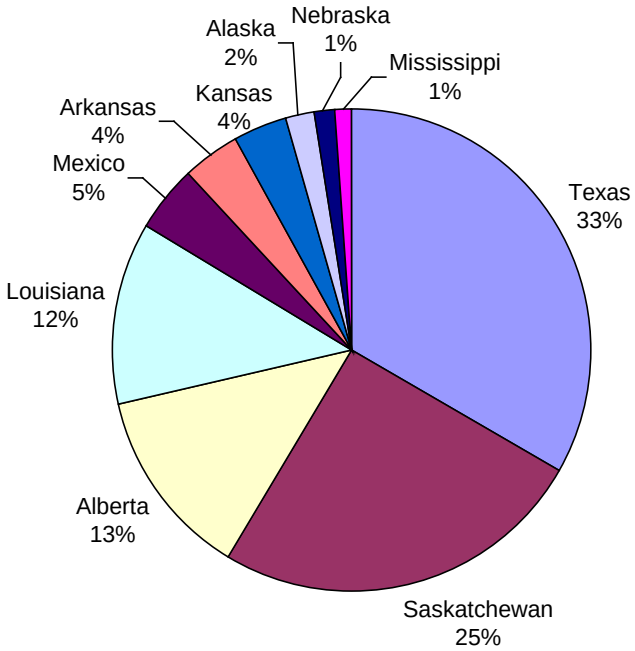
Figure 2. Encounters of all GWFG banded in Alaska, midcontinent and Pacific populations, 1941 to 2013. Banding locations in blue; individual recovery locations, red (n=9214 recoveries). Data from Game Bird encounters database, USGS Bird Banding Laboratory, Pautuxant, MD.

Innoko NWR



Less than 1% harvested	
Illinois	0.89
Oklahoma	0.75
North Dakota	0.68
Mississippi	0.48
South Dakota	0.48
Colorado	0.34
Missouri	0.20
Tennessee	0.20
Alabama	0.14
British Columbia	0.14
Minnesota	0.14
Montana	0.14
Utah	0.14
Kentucky	0.07
New Brunswick	0.07
Ontario	0.07
South Carolina	0.07

Arctic Coastal Plain



Less than 1% harvested	
Illinois	0.77
South Dakota	0.68
Oklahoma	0.53
Missouri	0.43
North Dakota	0.43
Northwest Territories	0.43
Iowa	0.24
Tennessee	0.10
California	0.05
Indiana	0.05
Montana	0.05

Figure 3. Distribution of sport harvest of midcontinent greater white-fronted geese that were banded in interior Alaska on the Innoko NWR (top) and on the ACP (bottom). Chart shows proportion of GWFG with more than one percent from each location; table lists those with less one percent contribution each to total recovered. N=1465 birds recovered by hunting for years 1948-2012 at Innoko and 2074 birds 1970-2012 for ACP. Data from GameBirds encounters database, USGS Bird Banding Laboratory, Pautuxant, MD.

APPENDIX 1. Banding locations for all interior Alaska GWFG banding sites for 2014 USFWS banding effort.

Date	Site	Map Description	Deg Min Sec	
8-Jul	"W" Lake	approx. 50 mi NE Shageluk, Alaska	63 09' 13"	158 32' 20"
8-Jul	Lake 3	approx. 50 mi NE Shageluk, Alaska	63 05' 30"	158 42' 00"
9-Jul	"V" Lake	approx. 50 mi NE Shageluk, Alaska	63 00' 39"	158 43' 25"

APPENDIX 2. Summary of Migratory Bird Management GWFG Banding Projects in Alaska 1997–2014.

1997 - FWS aluminum leg bands and neck collars installed. Koyukuk only.
1998 - FWS aluminum leg bands and neck collars installed. Innoko, Koyukuk and Selawik.
1999 - FWS aluminum leg bands only. Innoko and Selawik
2000 - FWS aluminum leg bands and neck collars installed. Innoko and Koyukuk.
2001 - FWS aluminum leg bands, satellite implants (Innoko 6, Koyukuk 3, Selawik 3), avian cholera: throat swabs (*Pasteurella multocida* carrier) and blood samples (for antibodies, prior exposure).
2002 - FWS aluminum leg bands and neck collars installed, satellite implants (Innoko 10, Koyukuk 3, Selawik 4, Noatak 5), VHF radio collars, blood samples and throat swabs (see above).
2003 – Interior/NW: aluminum leg bands, satellite implants (Kanuti 4, Noatak 4), VHF radio collars (Ely USGS only), subcutaneous VHF radio implants (17 at Noatak), blood/throat swabs. ACP**:** First ACP banding since 1994, to supplement satellite data and expand survival estimates. Satellite implants (9), blood/throat swabs for cholera testing.
2004 - FWS aluminum leg bands only. Innoko, Noatak, Selawik, Seward Peninsula and ACP.
2005 - FWS aluminum leg bands only. Innoko, Noatak, Seward Peninsula and ACP.
2006 - FWS aluminum leg bands and avian influenza sampling (cloacal swabs). Innoko, Seward Peninsula and ACP.
2007 - FWS aluminum leg bands and avian influenza sampling (cloacal and oral-pharyngeal swabs). Innoko and ACP.
2008 - FWS aluminum leg bands, AI sampling (cloacal and oral-pharyngeal swabs plus blood); 200 capture survival birds measured, bled, and 200 radio collars installed. Innoko and ACP.
2009 - FWS aluminum leg bands, AI sampling (cloacal and oral-pharyngeal swabs plus blood); 449 birds swabbed, 199 bled. Innoko and ACP.
2010 - FWS aluminum leg bands, AI sampling (cloacal and oral-pharyngeal swabs plus blood); 371 birds swabbed, 195 bled. Innoko and ACP.
2011 - FWS aluminum leg bands only. Innoko and ACP. No H5N1 detected in AK; AI sampling terminated post 2010.
2012 - FWS aluminum leg bands only. Innoko only.
2013 - FWS aluminum leg bands only. Innoko only.
2014 - FWS aluminum leg bands only. Innoko only.

APPENDIX 3 . Summary of all midcontinent GWFG banded by MBM in Alaska by region, 1969-2014. Numbers are totals of new bands reported. Excluded are 1 GWFG from Yukon Flats NWR and 23 from the Tanana-Kuskokwim region banded 1960-64. Data from Bird Banding Lab database, Patuxent Wildlife Research Center.

	Innoko	Kanuti	Koyukuk	Noatak	ACP	Nowitna	Selawik	Seward Peninsula	Total
1969	500			71				266	**837**
1970					1170				**1170**
1971					1527				**1527**
1972									**0**
1973		302	761						**1063**
1974									**0**
1975			575		761				**1336**
1976			1122		1107				**2229**
1977			282		981				**1263**
1978			1000		1146				**2146**
1979			1102		1147				**2249**
1980									**0**
1981									**0**
1982					31				**31**
1983									**0**
1984									**0**
1985	9								**9**
1986	545								**545**
1987	604	171				32			**807**
1988	944	56	2				125		**1127**
1989	22		224			4	91		**341**
1990	1158	340	443		20		217		**2178**
1991	138	302			257		25		**722**
1992	577		27		255		75		**934**
1993	686	291	171		173		64		**1385**
1994	567	141	451		407		196		**1762**
1995		73	145						**218**
1996		119	110						**229**
1997			289						**289**
1998	515		78		2		264		**859**
1999	168						52		**220**
2000	1082		92						**1174**
2001	918		132				257		**1307**
2002	628		98	176			17		**919**
2003	1311	13		56	790				**2170**
2004	976			182	1274		182	178	**2792**
2005	1150			198	921			206	**2475**
2006	1140				1069			241	**2450**
2007	1043				1169				**2212**
2008	1113				1154				**2267**
2009	1178				968				**2146**
2010	987				1160				**2147**
2011	1020				1067				**2087**
2012	1110								**1110**
2013	1198								**1198**
2014	1087								**1087**
Total	**22374**	**1808**	**7104**	**683**	**18556**	**36**	**1565**	**891**	**53017**

APPENDIX 4. Summary of GWFG banding permittees in Alaska, by banding location and year, 1969-2014. Key to permit office abbreviations, next page. From Bird Banding Lab database, Patuxent Wildlife Research Center, Laurel, MD.

	Innoko	Kanuti	Koyukuk	Noatak	ACP	Nowitna	Selawik	Seward Pen
1969	JUN			JUN				JUN
1970					JUN			
1971					JUN			
1972								
1973		JUN	JUN					
1975			JUN		JUN			
1976			JUN		JUN			
1977			JUN		JUN			
1978			JUN		JUN			
1979			JUN		JUN			
1980								
1981								
1982					JUN			
1983								
1984								
1985	INN							
1986	INN							
1987	INN	KAN				NOWI		
1988	INN/SEL	KAN	SEL				SEL	
1989	INN		KOY			NOWI	SEL	
1990	INN/USGS	KAN	KOY		FAI		SEL	
1991	INN	KAN			ANC/USGS		SEL	
1992	INN		KOY		ANC/FAI		SEL	
1993	ANC	KAN	ANC		ANC/TROY		ANC	
1994	ANC	KAN	ANC		ANC		SEL	
1995		KAN	KOY					
1996		KAN	KOY					
1997			FAI					
1998	FAI		FAI		HEL		FAI	
1999	ANC						ANC	
2000	ANC		ANC					
2001	ANC		ANC				ANC	
2002	ANC/USGS		ANC	ANC			ANC	
2003	ANC/USGS	ANC		ANC	ANC			
2004	ANC			ANC	ANC		ANC	ANC
2005	ANC			ANC	ANC			ANC
2006	ANC				ANC			ANC
2007	ANC				ANC			ANC
2008	ANC				ANC			ANC
2009	ANC				ANC			
2010	ANC				ANC			
2011	ANC				ANC			
2012	ANC							
2013	ANC							
2014	ANC							

APPENDIX 4 (continued). Key to abbreviations for table of summary of GWFG banding in Alaska, by region and permittee. From Patuxent Wildlife Research Center, Laurel, MD.

Permit Holder	
ANC	MBM Anchorage
FAI	MBM Fairbanks
USGS	USGS Alaska Science Center
INN	Innoko NWR
JUN	MBM Juneau
ADFG	Alaska Fish and Game
YD	Yukon Delta NWR
SEL	Selawik NWR
B	Alaska Pen/Becherof NWR
KAN	Kanuti NWR
KOY	Koyukuk NWR
NOWI	Nowitna NWR
T	Togiak NWR
TROY	Troy Ecological Research
LEN	Cal Lensink
HEL	James Helmericks