Wildlife Management Report, DWC/DWC/WMR-2012-1

Status of Grouse, Ptarmigan, and Hare in Alaska, 2012

Richard A. Merizon

August 2012

Alaska Department of Fish and Game Division of Wildlife Conservation

Cover Photo: Rock ptarmigan, *Lagopus muta*, along the Steese Highway. ©2012 ADF&G, photo by Richard Merizon.

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Introduction

Species considered small game in Alaska are defined by the Alaska Department of Fish and Game, Division of Wildlife Conservation (DWC) for regulatory purposes as grouse, ptarmigan, and hare. Alaska has 7 species of grouse and ptarmigan (Tetraonidae, Storch 2000) including ruffed (*Bonasa umbellus*), spruce (*Falcipennis canadensis*), sharp-tailed (*Tympanuchus phasianellus*), and sooty grouse (*Dendragapus fuliginosus*); and willow (*Lagopus lagopus*), rock (*L. muta*), and white-tailed ptarmigan (*L. leucurus*). In addition, Alaska has two species of hare (Leporidae) including snowshoe (*Lepus americanus*) and Alaska hare (*L. othus*). All 9 species of small game can be legally harvested in Alaska with liberal seasons and bag limits.

Starting in the 1960s, the DWC began studying small game, particularly rock and willow ptarmigan, in the Interior (Weeden 1965). However, by the late 1970s funding to support such efforts waned and the emphasis shifted toward big game management. Not until the late 1980s did DWC become more involved in small game research and management. As the human population steadily grew through the 1980s interest also grew in promoting the state's small game resources. In the late 1980s and early 1990s ruffed grouse were translocated from Anderson, Alaska to the Matanuska-Susitna (Mat-Su) valley near Palmer (Steen 1995). Due to the success of this effort, ruffed grouse were again translocated to the northern Kenai Peninsula in the mid 1990s (Steen 1999). Despite poorer success with the Kenai Peninsula translocation, permanent interest in small game had taken hold.

In 1996 the Alaska Legislature provided funding for a small game Capital Improvement Project (CIP). This money was put to use studying sharp-tailed grouse in the Delta Junction area. Additional abundance surveys that began throughout the 1990s were continued through 2001 (Taylor *In prep*). Between 2002 and 2006 very little effort was made to continue abundance survey efforts or research. However, beginning in 2007 modest financial support was created to hire a seasonal employee to continue springtime abundance surveys and hunter-harvested wing collections along the populated road system in Southcentral and Interior Alaska. The road system includes all of the major highways from Fairbanks to the Kenai Peninsula and east to the Canada / U.S. border in addition to the Dalton Highway (Figure 1).

In the summer of 2011, the DWC hired a full-time, statewide, small game program biologist to monitor statewide grouse, ptarmigan, and hare populations, and to promote this valuable resource. The new small game program objectives are diverse and comprehensive. In addition to education and outreach, the primary objective of the program is to better understand harvest composition and abundance trends of statewide small game populations—particularly those that are heavily used by hunters in game management units (GMU) that are along populated road systems (Figure 1). This is achieved through field surveys, hunter involvement, and focused research.

In order to understand annual grouse and ptarmigan harvest composition, the program developed and is continuing an effort to collect wings, tails, and heads harvested by hunters. By examining these samples, biologists can determine age (juvenile or adult) and sex of harvested birds. This is a very cost- and time-effective way for the DWC to index harvest composition and estimate brood production from the previous breeding season. With limited financial and personnel

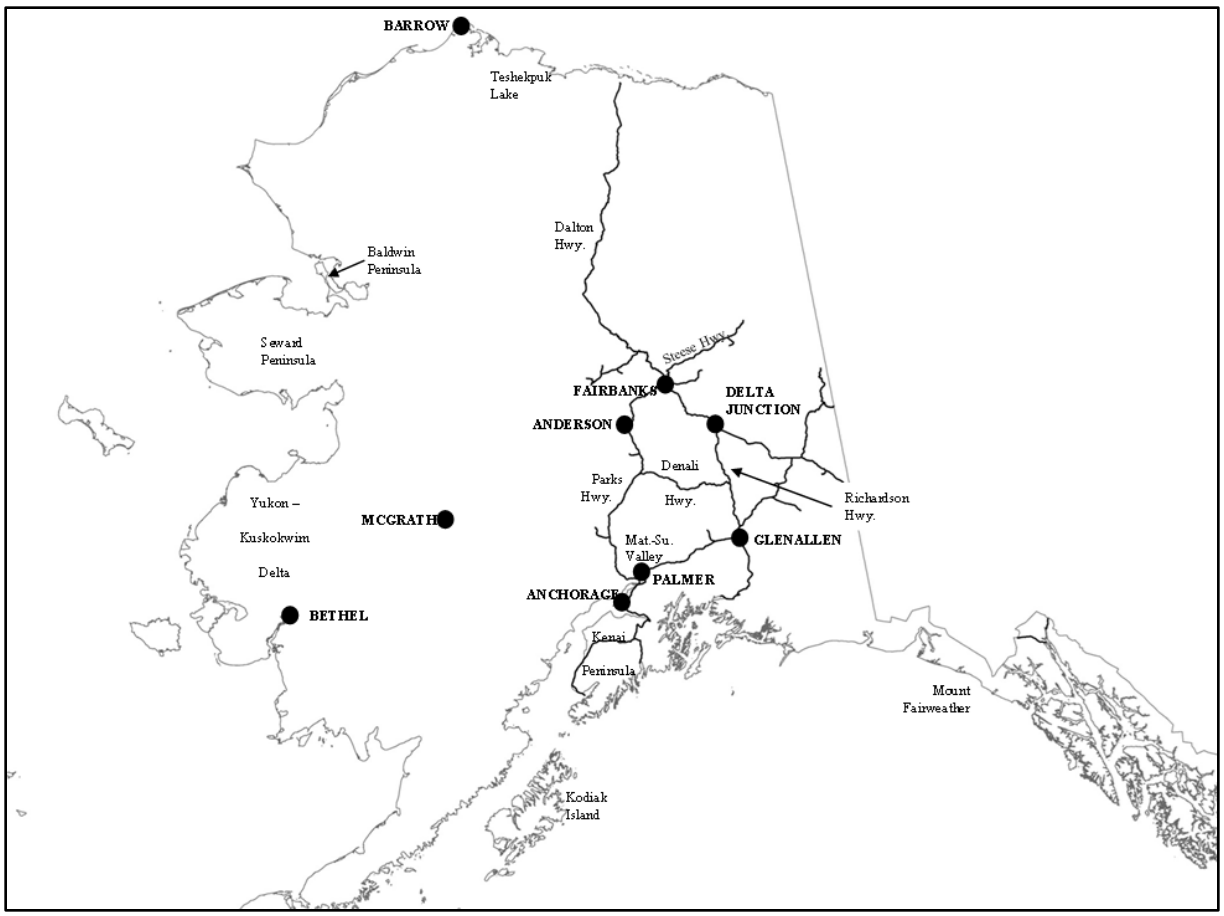

Figure 1. Alaska road system and general locations at which abundance surveys were completed or field observations were made.

resources, other more precise techniques are much less efficient in Alaska. In addition, Alaska is fortunate to have a very engaged small game hunter population willing to contribute to understanding of the resource.

Critical to the management of Alaska's small game is an understanding of population abundance, particularly heavily exploited populations and those adjacent to the road system. The program plans on continuing and expanding the work begun in 2007 monitoring abundance trends along many areas of the road system and in several remote populations of grouse, ptarmigan, and hare (Taylor *In prep*). This work will be expanded to include additional survey locations on and off the road-system when resources are available. Beginning in late April each year, numbers of breeding male grouse and ptarmigan are counted at fixed survey locations from north of Fairbanks to the Kenai Peninsula. This provides useful indices from which populations can be monitored and management action can be taken, if warranted. Snowshoe hares are also counted at fixed survey locations from the Steese Highway to the Kenai Peninsula for the same purpose.

This report details the activities conducted by the small game program during the 2011 regulatory year (RY11; 1 July 2011–30 June 2012). Specifically, it will address: 1) the harvest composition from the past season, 2) status of grouse, ptarmigan, and snowshoe hare

populations, 3) management concerns, 4) Board of Game (BOG) regulatory changes, and 5) future work.

Methods

HUNTER HARVESTED WINGS AND TAILS

Grouse and ptarmigan wings, tails, and heads were voluntarily collected from hunters throughout Alaska during RY11 (Table 1, Figure 2) and were used to estimate age and sex (Bergerud et al. 1963, Weeden and Watson 1967, Szuba et al. 1987, Gullion 1989). Grouse wings were used to determine age by examining the stage of molt and primary feather (P) wear. For spruce grouse only, calamus (feather shaft) diameter of P1 was measured (Szuba et al. 1987). For ptarmigan, wings were used for several purposes: 1) determine age by examining the degree of pigmentation on P8, P9, and P10 (Bergerud et al. 1963, Weeden and Watson 1967), 2) estimate sex by measuring P8, or 3) estimate sex by measuring wing chord (Taylor *In prep*). Grouse rectrices (tail feathers) were used to determine sex (Henderson et. al. 1967, Schulz 1983), however, internal examination of the carcass was required if a tail was not provided. Therefore, when only wings were provided sex determination was not possible. Heads, particularly those of ptarmigan, were used to verify species and estimate sex by examining the supercilium (eyelid) or coloration of feathers.

Table 1. Total number of wings collected from grouse and ptarmigan by game management unit across Alaska during regulatory year 2011.

Game Mngt.	Grouse				Ptarmigan			
Unit (GMU)	Ruffed	Spruce	Sharp-tailed	Sooty	Willow	Rock	White-tailed	Total
6	0	0	0	0	2	0	0	2
7	0	79	0	0	5	0	1	85
9	0	0	0	0	112	0	0	112
13	0	0	0	0	192	8	0	200
14	5	27	0	0	26	0	38	96
15	0	2	0	0	0	0	0	2
16	0	6	0	0	71	0	0	77
18	0	0	0	0	74	0	0	74
20	24	17	56	0	18	19	0	134
22	0	0	0	0	91	0	0	91
23	0	0	0	0	14	7	0	21
26	0	0	0	0	10	8	0	18
Total	29	131	56	0	615	42	39	912

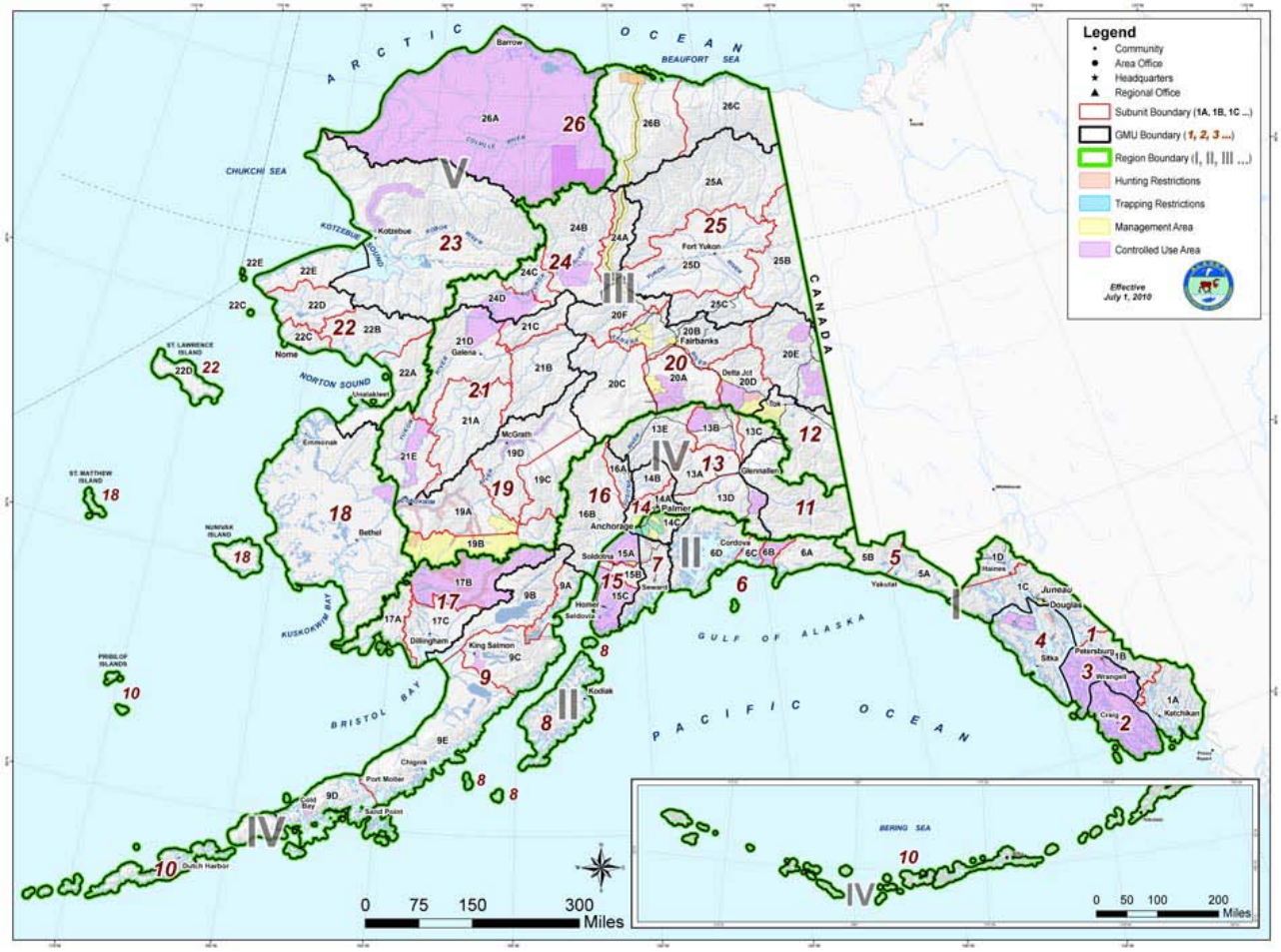

Figure 2. State of Alaska game management units.

SPRINGTIME ABUNDANCE SURVEYS

Springtime breeding behavior of many tetraonids allows biologist a means to index annual abundance and the cyclic nature of grouse and ptarmigan populations (McBurney 1989, Taylor 1992, Zwickel and Bendell 2004, Haddix 2007). In Alaska, male ruffed, sharp-tailed, and sooty grouse, as well as willow and rock ptarmigan perform conspicuous, springtime, territorial displays. Male spruce grouse and white-tailed ptarmigan also perform a springtime display, but it is one that is not easily located or viewed, making monitoring of population abundance through this behavior more challenging. These 2 species are monitored through wing collections, periodic site visits to areas where fall harvest occurs, and reports from DWC biologists, hunters, and outdoor enthusiasts.

The spring breeding season for grouse and ptarmigan in Alaska occurs from late April through early June (Weeden 1965, Taylor 2011). Due to the geography of Alaska, limited road system, poor access off the road system in the spring, and staff limitations, the small game program is restricted to species and areas in which population abundance can be assessed. Therefore, the program has focused on those populations that are either heavily exploited by hunters, popular outdoor recreational areas, or very close to large urban areas or road-systems, and afford

consistent and reliable access from year to year (Figure 3). A more detailed description of the methods used for specific species is included under the appropriate species section.

Cyclic fluctuations of snowshoe hare populations were also assessed by counting of adults and conducting pellet surveys along the road system by DWC, other agencies, and private individuals. However, currently no work is underway to estimate abundance or distribution of Alaska hare. Assessing population trends of Alaska hare poses unique challenges due to the inaccessible areas in which they live and their rangewide low abundance.

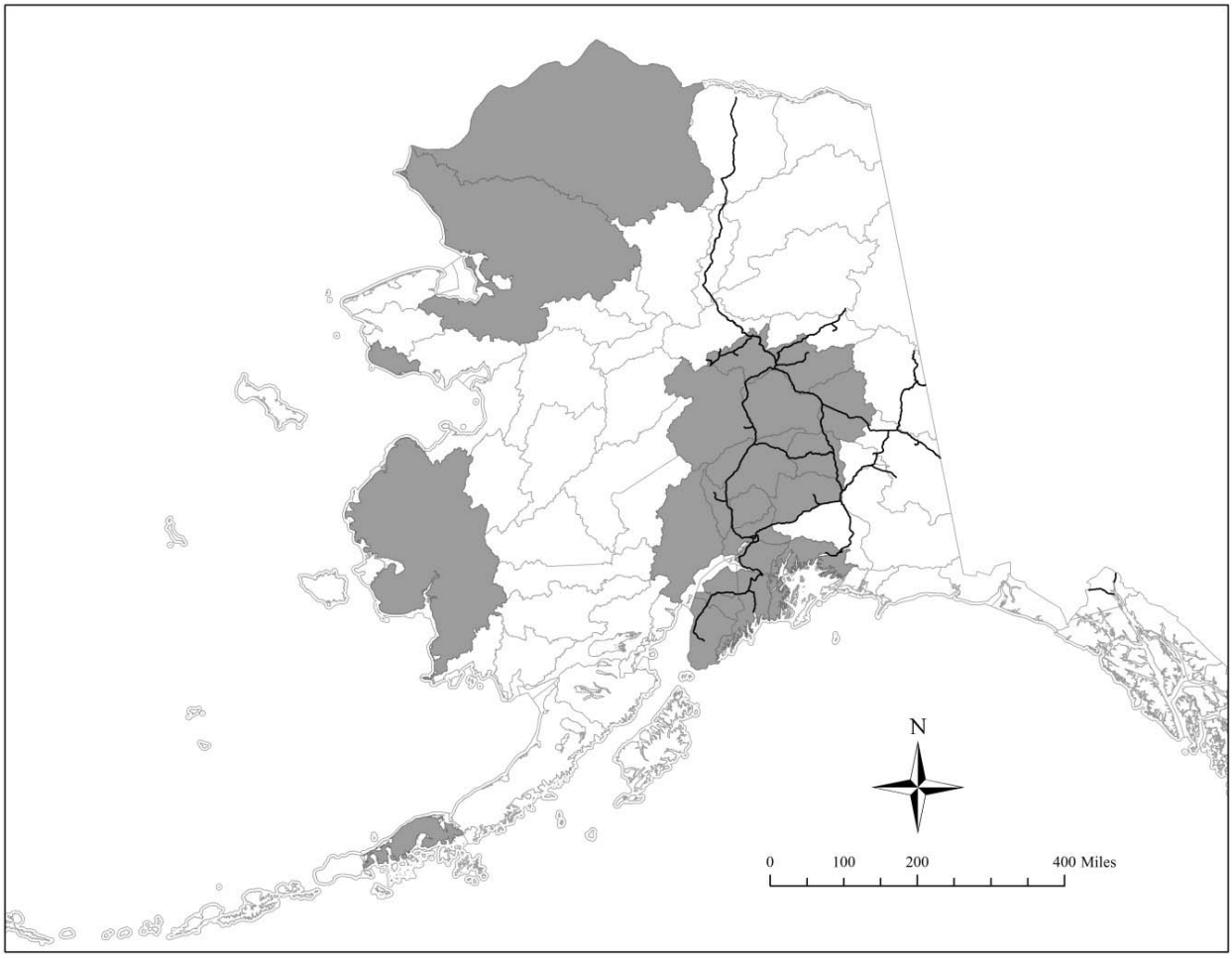

Figure 3. Game management units and subunits from within which grouse and ptarmigan wings, tails, and heads were collected from hunters during regulatory year 2011.

Ruffed Grouse

METHODS

Ruffed grouse currently reside in both Interior and Southcentral Alaska. Ruffed grouse are native to mixed forest areas in the Interior and the Copper River basin. Ruffed grouse were translocated to the Mat-Su valley in the late 1980s and to the Kenai Peninsula in the mid 1990s, from populations near Anderson (Steen 1995 and 1999). In the Mat-Su valley, translocated populations have expanded their range to include the entire lower Susitna River basin (just south of Cantwell), west to the southern slopes of the Alaska Range, south to Tyonek in west Cook Inlet, and up the Matanuska River (east of Chickaloon). On the Kenai Peninsula, translocated populations have expanded their range very little, yet small local populations can be found near the original release sites. The cause of this is unknown; however, the more maritime climate may be influencing population growth and range expansion.

From late April to early May, male ruffed grouse exhibit a behavior known as drumming. This time of year, males attempt to attract breeding females by standing on a prominent log, stump, or subtle rise on the forest floor and beat their wings against their body, making a sound like that of a quickening drum beat. Typically, male ruffed grouse have a preferred drumming post that is within an early successional trembling aspen (*Populus tremuloides*) or other mixed hardwood stand (McBurney 1989).

Survey methods utilized for ruffed grouse are consistent with state and national techniques (McBurney 1989, Taylor 1992). Survey routes generally consist of 10 to 12 stops along a trail or rural road. At each stop, the observer listened for drumming males for 4 minutes. All drums and their direction from the observer were recorded; however, the total numbers of ruffed grouse were reported rather than the total number of drums. Roadside and trail transects through known ruffed grouse habitat were established in Anderson (1993, GMU 20C), Delta Junction (2008, GMU 20D), and Palmer (1992, GMU 14A) and have been completed annually since their inception (Taylor *In prep*).

In May 2012, the DWC reestablished a drumming count route in McGrath that had been created in the late 1980s and not repeated for over a decade (GMU 19D, R. Seavoy, personal communication). This route was along a 2.5-mile reach of the Kuskokwim River east of McGrath. Observers used a boat to travel upstream to the start of the drumming route and then drifted (without power) 2.5 miles downstream and recorded all drummers over approximately 1 hour. This route was more than 8 miles distant from McGrath to eliminate human noise associated with town.

In 2011, DWC area staff members in Tok conducted ruffed grouse drumming surveys but were unable to locate any drumming males. Due to time constraints, similar efforts in 2012 were cut short.

In 2007, DWC established a drumming route along the Skilak Lake Road on the Kenai Peninsula. This route was surveyed in 2007 and 2008. Staff from the Kenai National Wildlife Refuge completed this route in May 2012.

In addition to the ruffed grouse survey routes established and completed by the DWC, other organizations and government agencies conduct drumming counts. The U.S. Army completed drumming counts on United States Army Fort Greely south of Delta Junction and on Fort Wainwright south of Fairbanks (Haddix 2007). The Ruffed Grouse Society completed drumming counts near Kepler-Bradley Lakes Recreation Area in the Mat-Su valley (GMU 14A) near Palmer.

STATUS

A total of 29 ruffed grouse wing samples were collected from hunters this season (Table 2). Despite very small sample sizes, samples collected from the Interior yielded a high percentage of juveniles (70%), suggesting very good brood production in 2011.

Table 2. Total number and percent juvenile ruffed grouse from the statewide harvest wing sample collection during regulatory year 2011–2012.

Region	Game Mngt. Unit(s)	Number of Samples				Percent Juvenile
		Adult	Juvenile	Unknown	Total	
Southcentral	6, 13, 14, 16	4	1	0	5	20%
Interior	12, 19, 20, 21, 25	6	17	1	24	71%
Kenai Peninsula	7, 15	0	0	0	0	0%
Total		10	18	1	29	

In 2012 drumming counts occurred between 24 April and 19 May. In Delta Junction, survey conditions were good; in Anderson survey conditions were mostly poor with persistent cold temperatures or strong winds. Despite the poor survey conditions in Anderson in spring 2012, since 1993 this has been a very reliable location to monitor ruffed grouse population cycles (the cyclic population growth and decline that occurs over 7–8 years). Southern Interior populations surveyed in Delta Junction and Anderson remain relatively low but continue to increase from the very low densities documented in 2010 (Table 3).All other surveys and observations throughout the Interior show a growing population (Table 3).

Populations of ruffed grouse in the Mat-Su valley declined in 2012 despite fair to good survey conditions on all 4 routes. Since the translocated ruffed grouse were released in the early 1990s, a typical population cycle has not been observed based on the ongoing springtime drumming counts. Yet, the Mat-Su population continues to maintain a stable population despite modest annual variation. Population expansion has continued to occur, and in 2012 ruffed grouse were observed in areas over 100 miles distant from the original release locations, including Tyonek, Talkeetna, north of Byers Lake (Chulitna River), Skwentna, south Anchorage, and east of Chickaloon.

This May, staff from the Kenai National Wildlife Refuge completed a route established on the Skilak Lake Road; however, observers were unable to hear or observe any ruffed grouse (T. Burke, personal communication). Ruffed grouse have never been heard or observed on this route.

Other efforts to observe ruffed grouse on the Kenai Peninsula this spring were unsuccessful due to record snow depth and inaccessible roads during the optimal time period to conduct a drumming count or hear drumming males. Based on observations from the recent past and hunter reports very few ruffed grouse have been observed or harvested on the Kenai Peninsula. Ruffed grouse populations on the Kenai Peninsula have had very limited range expansion and several observations of higher densities of ruffed grouse have not been verified. Small populations of ruffed grouse that had been previously documented near original release sites may be at risk of disappearing.

A number of factors can affect the natural population cycle of ruffed grouse, which began a growth phase in the Interior in 2011 (based on drumming counts in Anderson; Table 3). In 2006, severe spring weather had variable negative impacts on recruitment in the Interior with populations around the Parks Highway being more affected than from Fairbanks to Tok. More recently, larger populations of avian predators may have pushed grouse numbers to record lows. In 2012, far fewer avian predators were observed while conducting fieldwork, which could help grouse populations recover.

Early successional hardwood forest plays a critical role in the life history of ruffed grouse. Several large fires in the Interior are likely beginning to provide good to excellent nesting and brood-rearing habitat. In June 2012, over 8,500 acres burned southwest of Anderson. This area may begin to provide good habitat conditions for ruffed grouse in 10 to 15 years. The Ruffed Grouse Society (Anchorage chapter) has also been actively supporting annual habitat enhancement projects in the Matanuska Valley Moose Range near Palmer for the benefit of the translocated population of ruffed grouse in the Mat-Su valley.

Table 3. Ruffed grouse drumming count totals at survey locations in the Interior and Southcentral, 2003–2012.

Geographic	Survey	Year									
Area	Location	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Interior	Anderson	21	25	33	22	14	16	8	1	9	8
Interior	Delta Junction						7	3	3	3	7
Interior	McGrath										12
Southcentral	Palmer	7	3	6	12	11	9	7	12	10	5

REGULATORY YEAR 2012 HUNTING PROJECTION

Hunting projections were based on springtime abundance surveys, field observations, spring and summer weather patterns, other related factors like avian predator observations, and professional judgment.

In the Mat-Su valley populations of ruffed grouse are expected to remain at relatively low densities. On the Kenai Peninsula, continued, long-term, low density populations persist and are expected to remain low in RY12. However, in the Interior ruffed grouse populations are expected to be higher than during RY11.

Spruce Grouse

METHODS

Spruce grouse are the most ubiquitous grouse species in Alaska. They are found throughout most of forested Alaska. Spruce grouse do occur in Southeast Alaska, except on Prince of Wales Island (POW) and adjacent islands.

The springtime display of the male spruce grouse in Interior and Southcentral is quiet and inconspicuous, which makes it difficult to locate displaying males. Males in Southeast Alaska (POW) have been heard and observed making wing claps while displaying, making them slightly easier to locate; however, due to limited manpower, DWC has not been able to establish a springtime survey route for this population. Researchers with Minnesota Department of Natural Resources (MN DNR) are testing a springtime point count survey technique for spruce grouse that could hold promise for future abundance monitoring (M. Larsen, MN DNR, personal communication).

While displays are difficult to monitor, the presence of both male and female spruce grouse throughout the state has been noted by DWC staff during springtime field work, and these observations have proven to correlate with hunter observations of abundance in the fall. In spring 2013, several trails in known spruce grouse habitat in Southcentral will be walked early in the morning to begin to index abundance in popular hunting locations.

STATUS

A total of 131 spruce grouse wing samples were collected from hunters during RY11 (Table 4). It is difficult to make strong inferences from the small samples collected in the Interior; however, there was a high percentage of juveniles (76.5%) in the fall harvest. Based on DWC field observations, overall densities appear to remain low after several years of poor recruitment in the Interior. Spruce grouse, like ruffed grouse, are affected by avian predator densities, and wet and cool weather patterns in late June and July.

In Southcentral it is also difficult to make strong inferences based on the sample size, though it appears that brood production was fair in 2011. This was reflected in poor hunter reports from fall 2011 particularly adjacent to the road system. Hunters throughout Southcentral reported finding few spruce grouse in areas where they have traditionally been observed. Hunters off the road system, on the Yentna River and small remote communities, reported relatively high densities of spruce grouse. This is a theme that is repeated for many of our road-accessible small game species. Hunters report finding few birds adjacent to roads and trails yet hunters in remote, road inaccessible areas report good to excellent densities of grouse.

Based on a good sample size (n=81), populations on the Kenai Peninsula appeared to have had good brood production in 2011. This was also reflected by reports of good hunting for spruce grouse.

Table 4. Total number and percent juvenile spruce grouse based on wing samples from the statewide harvest collection during regulatory year 2011.

	Game Mngt.	Number of Samples			Percent
Region	Unit(s)	Adult	Juvenile	Total	Juvenile
Southcentral	6, 13, 14, 16	15	18	33	55%
Interior	12, 19, 20, 21, 25	4	13	17	76%
Kenai Peninsula	7, 15	27	54	81	67%
Total		46	85	131	

In Southeast Alaska, between 2005 and 2006, work was conducted to better understand the spruce grouse population on POW and adjacent islands (D. Rabe, personal communication). Spruce grouse populations on POW and neighboring islands are thought to be of the subspecies (*F. c. franklinii*) which have distinct plumage and size differences from the subspecies found throughout the rest of Alaska (*F. c. canadensis*) (Dickerman and Gustafson 1996). To further examine this distinction in more detail DNA tissue samples were collected and analyzed. Although genetic results identified several differences between Southeast and Southcentral/Interior populations, subspecies distinction was not possible (Neraas and Tallmon 2008).

REGULATORY YEAR 2012 HUNTING PROJECTION

Spruce grouse is a very popular game bird in Southcentral and parts of the Interior, and one of the most commonly observed and harvested grouse in Alaska. In 2012, road-accessible populations of spruce grouse in Southcentral should remain at relatively low densities based on brood production estimates from 2011. However, in road-inaccessible areas of Southcentral, the Kenai Peninsula, and in the Interior, populations should be higher than during RY11. On the Kenai Peninsula, this may be tempered by higher avian predator densities that have responded to relatively high snowshoe hare populations.

Sharp-tailed Grouse

METHODS

Sharp-tailed grouse reside in Interior Alaska. They are typically observed in the upper Koyukuk River, upper Yukon and Kuskokwim rivers, and upper Copper River areas. However, observations have been made of sharp-tailed grouse in the upper Nenana River, 20–30 miles west of Glennallen, and areas in southwest Alaska, where they are much less common.

Male and female sharp-tailed grouse return to lek sites during the breeding season during late April through early May. Females are often observed, though their presence is highly variable and they may be hidden in nearby vegetation while watching displaying males. Male sharp-tailed grouse exhibit a behavior known as lekking and their presence and behavior is much more predictable. Therefore, male counts form the basis of springtime abundance estimates. Males were distinguished from females by their engorged yellow supercilium, vocalizations, foot stomping, tail rattling, and body posturing. Lek sites were typically in open areas, including recent burns, cleared agricultural fields, or even roads. The peak of daily activity occurred just prior to sunrise and generally continued for 2 to 3 hours. Leks were approached quietly on foot and male birds were counted. In Alaska, the Delta Junction Agricultural Project (DJAP; GMU 20D) has been used as the primary survey location to assess Interior populations of sharp-tailed grouse from 2000 through 2012 (Taylor *In prep*).

In 2011, DWC staff in Tok searched for sharp-tailed grouse leks but were unsuccessful. Due to time constraints similar efforts in 2012 were cut short.

The U.S. Army also performed lek surveys on Fort Greely south of Delta Junction.

STATUS

A total of 56 sharp-tailed grouse wing samples were collected from hunters in 2011 (Table 5). It is difficult to make strong inferences from the samples collected in the Interior (Delta Junction) due to small sample size; however, it appears brood production in 2011 was fair. Despite sporadic reports of good hunting in Delta Junction, most hunters reported poor hunting in areas with traditionally high harvest levels.

Table 5. Total number and percent juvenile sharp-tailed grouse based on wing samples from the statewide harvest collection during regulatory year 2011.

	Game Mngt.	Number of Samples				Percent
Region	Unit(s)	Adult	Juvenile	Unknown	Total	Juvenile
Interior	12, 19, 20, 21, 25	20	35	1	56	63%
Total		20	35	1	56	

During June of 2006, brood production was severely affected by cold, wet conditions; this was reflected in age data from the fall 2006 harvest. In 2007, age data reflected good brood production; however, from 2008 to 2010 modest wing samples have suggested only fair to poor recruitment.

In 2012, springtime lek survey counts occurred from 23 to 30 April in the DJAP. Thirty-one (31) leks were visited and 13 leks had males present or actively dancing (Table 6). A total of 65 displaying males were counted between the 31 leks (2.10 males/lek; Figure 4). This is identical

to the 2011 count. Survey conditions were very good between 25 and 29 April. Fog and wind made survey conditions poor on 24 and 30 April. However, all lek sites were visited at least once with good survey conditions. On nearby Fort Greely, lek sites had an average of 4.0 males/lek. This is down from 2011 but nearly double that of the DJAP. Since 2007, the number of males observed on each lek have been double those observed on the DJAP except in 2008 (Table 7; E. Neipert, Fort Greely, personal communication).

Table 6. Total number of male sharp-tailed grouse documented on the Delta Junction Agricultural Project, 2007–2012.

	Year					
Description	2007	2008	2009	2010	2011	2012
Total	66	82	54	62	67	65
Leks Counted	25	30	32	33	32	31
Males/Lek	2.64	2.73	1.69	1.88	2.09	2.10

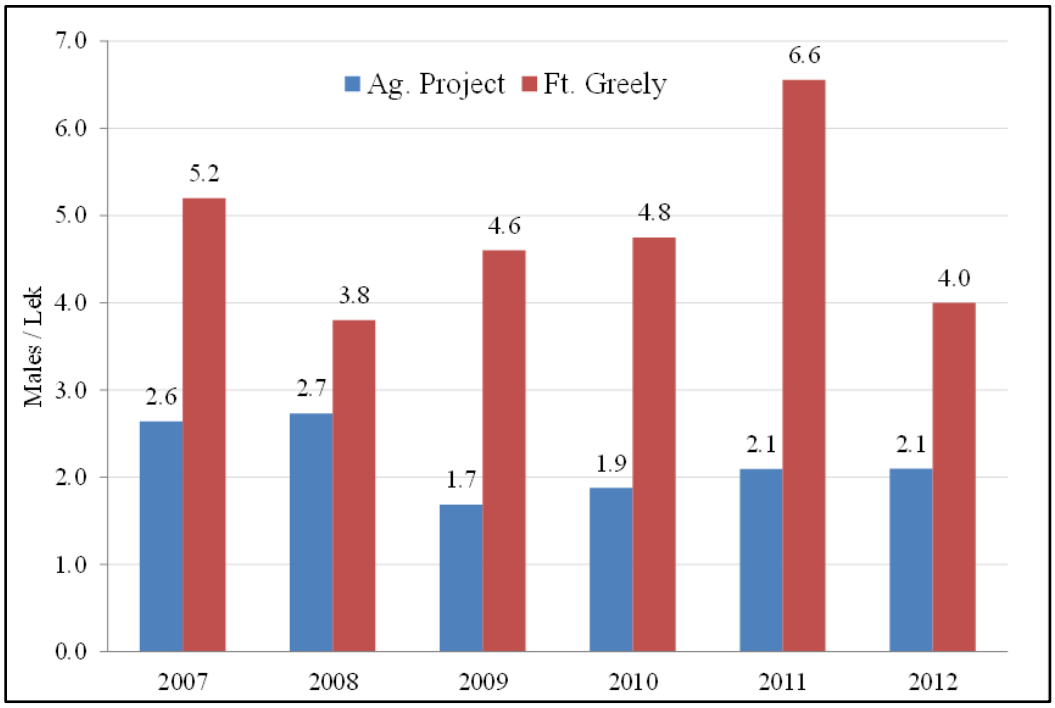

Figure 4. Average number of male sharp-tailed grouse per lek on the Delta Junction Agricultural Project and Fort Greely, Delta Junction, 2007–2012.

Table 7. Total number of male sharp-tailed grouse documented at U.S. Army Fort Greely base, Delta Junction, 2007–2012.

	Year					
Description	2007	2008	2009	2010	2011	2012
Total	26	19	23	38	59	36
Leks Counted	5	5	5	8	9	9
Males/Lek	5.20	3.80	4.60	4.75	6.56	4.00

A higher male/lek ratio on Fort Greely is driven by 1 of the 9 leks (Texas Range) that are monitored on the military base. Without this 1 lek, male/lek ratios would be nearly identical to those observed on the DJAP. However, there is value in separating estimates of males/lek between the DJAP and Fort Greely. The DJAP is a highly human-manipulated environment while grounds on Fort Greely are similar to much of the surrounding natural habitat.

Agricultural practices have changed dramatically throughout the DJAP since the late 1980s and early 1990s when sharp-tailed grouse populations were more robust. Sharp-tailed grouse in Alaska have most often been associated with edge habitats found in burns, muskegs, and agricultural clearings. On the DJAP, many or all windrows have been removed from various plots, creating very large uniform agricultural plots and thus reducing edge habitat. This may be contributing to the declining population trend of sharp-tailed grouse on the DJAP since the 1980s and early 1990s.

Overall densities remain low after a modest peak in 2005 on the DJAP (Taylor In prep). Beginning in spring 2007, additional effort was devoted to surveying sharp-tailed grouse lek sites in the DJAP. Since then 30 to 35 previously known lek sites have been examined each spring. These lek counts yielded a 20% annual decline in the total number of males from 2007 through 2009. In 2010 and 2011 the total number of male sharp-tailed grouse observed at these leks was similar as observed in 2009. Nine (9) former lek sites that supported numerous grouse in the late 1980s through the 1990s now have few or no males lekking at or near the site (Taylor 2011). Additional search effort this spring yielded 1 new small lek site. No sharp-tailed grouse were observed in Anderson, where 4 biologists conducted ruffed grouse drumming counts the first week of May. A few sharp-tailed grouse were observed in spring 2012 along the Glenn Highway west of Glennallen and along the Richardson highway between Sourdough and Paxson this winter. Sharp-tailed grouse were also observed along the Dalton Highway south of Coldfoot this spring.

Fire regimes play an important role in sharp-tailed grouse life history. In 2004, fires occurred in 2 extensive areas of mature boreal forest north of Tok bisected by the Taylor and Steese highways. Both areas are now providing areas of excellent sharp-tailed grouse habitat with anecdotal reports indicating sharp-tailed grouse are beginning to occupy some of those areas. Examination of old burns along the Dalton Highway in spring 2012 suggested excellent breeding and nesting habitat for sharp-tailed grouse north and south of the Yukon River and south of the Koyukuk River.

The DWC, in coordination with the U.S. Army, completed a research project examining sharp-tailed grouse habitat selection during nesting and brood rearing on Fort Greely in Delta Junction in 2010 (Paragi et al. 2012). Forty-six (46) sharp-tailed grouse were fitted with radio necklace transmitters. Using ground-based methods, radiocollared birds were relocated from late May to late September 2010. Forested habitat types were selected less than other habitat types. Also, visual and vertical concealment was greater than random locations near active nest sites.

REGULATORY YEAR 2012 HUNTING PROJECTION

Provided June and July are not too wet and cool, affecting brood production, sharp-tailed grouse densities in Delta Junction (GMU 20D) are expected to remain at low to moderate densities in fall 2012. . Sharp-tailed populations along the Richardson Highway (GMU 13B, 13C, and 12) will also likely remain at densities similar to those observed during RY11. In the greater Interior (GMU 19, 20, 21, 24, and 25), populations will likely remain at similar densities as observed during RY11. However, several recent large fires should begin providing excellent breeding and nesting habitat for sharp-tailed grouse.

Sooty Grouse

METHODS

Sooty grouse (formerly known as blue grouse) reside in the coastal rainforest of Southeast Alaska from approximately Mount Fairweather south to include GMUs 1–4 (Zwickel and Bendall 2004). However, they are not found on POW or adjacent islands where the only Southeast population of spruce grouse resides.

Like other Alaska tetraonids, male sooty grouse exhibit their breeding display most vigorously between late April and late May. Males emit a low, guttural “hoot,” typically from off the ground in Sitka spruce (*Picea sitchensis*), mountain (*Tsuga mertensiana*) and western hemlock (*T. heterophylla*), or an elevated surface near the alpine during this time period (Zwickel and Bendall 2004).

Beginning in 2012, DWC staff conducting Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) springtime pellet count surveys began recording the presence of sooty grouse on Gravina, Douglas, Sullivan, POW, Mitkof, Kupreanof, and Baranof islands (K. McCoy, personal communication). While conducting these surveys, crews recorded individual sooty grouse both heard and observed along a transect at designated stations.

Prior to 2012, sporadic data collection efforts were completed which included wing and tail collections from hunters and a regional grouse hunter survey (D. Rabe, personal communication).

STATUS

Unfortunately, no wings or tails were collected from hunters during RY11. Also, since 2012 was the first year of collecting all sooty grouse observations during springtime deer pellet surveys, it was not possible to determine population trends or annual variation in distribution. Overall hunting effort and harvest is greatest in areas adjacent to large population centers and decreases considerably on remote islands or more distant locations from population centers. However, based on field observations and hunter reports, sooty grouse populations in Southeast Alaska appear to be stable.

In 2012 sooty grouse observations were recorded on 7 islands in April and May. Sooty grouse observations were completed in 10 watersheds; 9 completed in full (3 on POW) and 1 (Baranof Island) was partially completed. Unfortunately data from these observations were not available for this report. They will be provided in future updates and reports.

Between RY04 and RY06, sooty grouse wings and tails were collected in order to estimate sex and age (D. Rabe, personal communication). During all seasons, adults composed the majority of samples among known age birds (100.0%-RY04, 72.7%-RY05, and 57.0%-RY06). With the exception of RY06, male sooty grouse composed the majority of the sampled harvest (86%-RY04 and 61%-RY05). Sample sizes were small, but female birds made up the majority of hunter-collected fall samples (60-74%) while males made up most of samples collected in late spring (88%-93%). Based on these samples, it appears that hunters use the hooting behavior in the spring to locate and harvest males. Recent efforts to collect hunter harvested wings and complete a statewide small game survey may provide some longer-term context to this information.

REGULATORY YEAR 2012 HUNTING PROJECTION

Considering the lack of available data from RY11 or 2012 springtime observations it is difficult to make projections for RY12. However, based on DWC staff observations, sooty grouse hunting in areas away from large population centers or on remote islands should remain good. However, near large human populations, sooty grouse densities are expected to be low or infrequent, with isolated pockets of moderate densities.

Willow Ptarmigan

METHODS

Willow ptarmigan are the most ubiquitous ptarmigan species in Alaska, occurring in most sub-alpine nonforested habitats. Willow ptarmigan are not found in the Aleutian Islands west of Unimak Island or the islands off the west coast of Alaska.

Age of willow ptarmigan was determined by examination of the degree of outer primary feather pigmentation (Bergerud et al. 1963, Weeden and Watson 1967). Willow ptarmigan wings compose 67% of all hunter harvested wings collected. However, most hunter samples included

only 1 wing, allowing age estimation but not sex determination. Because of the popularity of this game bird and the abundance of wing samples collected, it would be extremely useful to DWC if alternative sex determination methods could be gleaned from wing samples. Therefore, when whole carcasses were available to verify sex, total wing chord and P8 length were recorded to test for and examine possible differences between sexes (Taylor *In prep*).

Beginning in late April and continuing into early June, male willow ptarmigan vigorously defend breeding territories through calling and display flights. These territories are set up in alpine willow (*Salix* spp.) and dwarf birch (*Betula nana*) stands (Weeden 1965).

To assess statewide population abundance of willow ptarmigan, we used accepted methods of counting territorial males, broadcasting a recording of a territorial male at a set distance along a survey route to elicit a response from adjacent males (Choate 1963, Watson 1965, Bergerud and Mercer 1966, Bergerud 1970, and Braun and Rogers 1971, Taylor 2000). Surveys were completed by either driving a survey route along rural roads or walking on foot. Responding males were counted only within a one-quarter mile radius of each stop along the survey route. This method provided total counts for small areas ($\leq 2mi^2$).

Surveys were conducted along the Richardson (GMU 13B), Parks (GMU 13E), and Denali (GMU 13B and 13E) highways, and in Chugach State Park (GMU 14C). Survey routes occur along or within 2 miles of the highway or nearest road. In 2012, a remote location was chosen near Goose Creek (GMU 13A) to assess willow and rock ptarmigan abundance as a complement to regionally adjacent survey routes on the Denali Highway (40 miles north).

In addition to the willow ptarmigan surveys established and completed by DWC, the U.S. Army completed a territorial male count on Fort Greely south of Delta Junction.

STATUS

A total of 615 willow ptarmigan wing samples were collected from hunters during RY11 (Table 8). Large sample sizes were collected from Southcentral (n=145), Alaska Range (n=163), Alaska Peninsula (n=112), and Northwest Alaska (n=115). Overall percent of juveniles was fair (55-59%). In Southwest Alaska, 74 samples came from one hunter in the Bethel area; a low percent of juveniles reflected in the sample may be explained by the ptarmigan flocks the hunter targeted and the time of year they were harvested. These birds were harvested out of large migratory flocks immediately prior to the breeding season. Most of the birds were males that were likely moving toward their breeding territories.

Weeden (1965) and Irving et al. (1967) found that male willow ptarmigan often separate from female and juvenile groups elevationally or spatially in the fall. This separation continues through the winter and into the spring, when males begin to define and defend their breeding territory. Weeden (1965) found males typically inhabit higher elevations or more exposed habitats adjacent to spring breeding grounds throughout the fall and winter, whereas females and juveniles tend to spend time at lower elevation or more protected habitats during that same time period. These behavioral characteristics may bias the harvest composition and estimation of overall brood production from wing collections in these populations. Despite the potentially

biased brood production estimates for willow ptarmigan these data are still valuable for managers and indicators of which demographic groupings are being harvested.

In Southcentral and the Alaska Range willow ptarmigan age ratios could have been influenced by heavy snowfall. Depending on specific location, the winter of 2011–2012 had one of the highest snowfalls on record. Although this by itself may not have influenced survival rates of willow ptarmigan, it likely forced willow ptarmigan to search for available forage in alternative locations. This displacement from traditional wintering areas into new and potentially more human accessible, lower elevation areas may have influenced the age ratio documented from the fall and, particularly, winter harvests. Hunters in these regions reported good to excellent hunting in road-accessible locations throughout the winter.

On the Alaska Peninsula, all of the wing samples were collected near Cold Bay (GMU 9D) in September and October 2011. Abundant willow ptarmigan and good hunting were reported from the southern Alaska Peninsula. Populations appear to be stable despite a low percent of juveniles in the harvest. The low percent of juveniles may reflect local conditions where hunting occurred rather than actual population age ratios.

In Northwest Alaska, samples were collected from the Barrow and Teshekpuk Lake area (GMU 26), southern Seward Peninsula (GMU 22C), Baldwin Peninsula, and Noatak River drainage (GMU 23). Overall, the percent of juveniles from RY11 was fair. Weather conditions in July 2011 were unseasonably cold and wet on the Seward Peninsula. This likely had a large impact on survival rates of juvenile willow ptarmigan that were reflected in the 2011–2012 wing collections. Poor brood survival was observed in other species of ground nesting birds on the Seward Peninsula (D. Reed, personal communication).

Despite relatively low sample sizes from RY11, examining wing chord and P8 length in willow ptarmigan demonstrated promise for determining sex (Figure 6 and 7, Taylor *In prep*). Measurements were collected only from samples when sex could be verified by the presence of testis or ovary. The break points in wing chord length that appeared to distinguish sex were 193mm (<193-female, >193-male) for adults and 191mm (<191-female, >191-male) for juveniles (Figures 6 and 7). The potential break points on P8 measurements were 161mm (<161-female, >161-male) for adults and 160mm (<160-female, >160-male) for juveniles (Figures 6 and 7). All samples used in this analysis were harvested after 22 January 2012; therefore, size differences between adults and juveniles were likely not confounding the results. Based on these data, it appears that with additional samples and rigorous testing in future years it may be possible to identify lengths which distinguish whether a bird is male or female, based on wing chord or P8 length.

Table 8. Total number and percent juvenile willow ptarmigan, based on wing samples from the statewide harvest collection during regulatory year 2011.

	Game Mngt.	Adult				Juvenile				Grand	Percent
Region	Unit(s)	Male	Female	Unknown	Total	Male	Female	Unknown	Total	Total	Juvenile
Southcentral	6, 13A, 13D, 14, 16A	21	36	3	60	37	42	6	85	145	59%
Interior	12, 19, 21, 20B, 20E, 20F, 25	1	0	0	1	0	0	0	0	1	NA
Kenai Pen.	7, 15	0	0	0	0	0	3	2	5	5	100%
Alaska Range	13B, 13C, 13E, 16B, 20A, 20C, 20D	43	21	10	74	38	31	20	89	163	55%
Alaska Pen.	9, 10	0	0	47	47	0	0	65	65	112	58%
NW Alaska	22, 23, 26	24	21	6	51	30	27	7	64	115	56%
SW Alaska	17, 18	0	0	52	52	0	0	22	22	74	30%
Total		89	78	118	285	105	103	122	330	615	

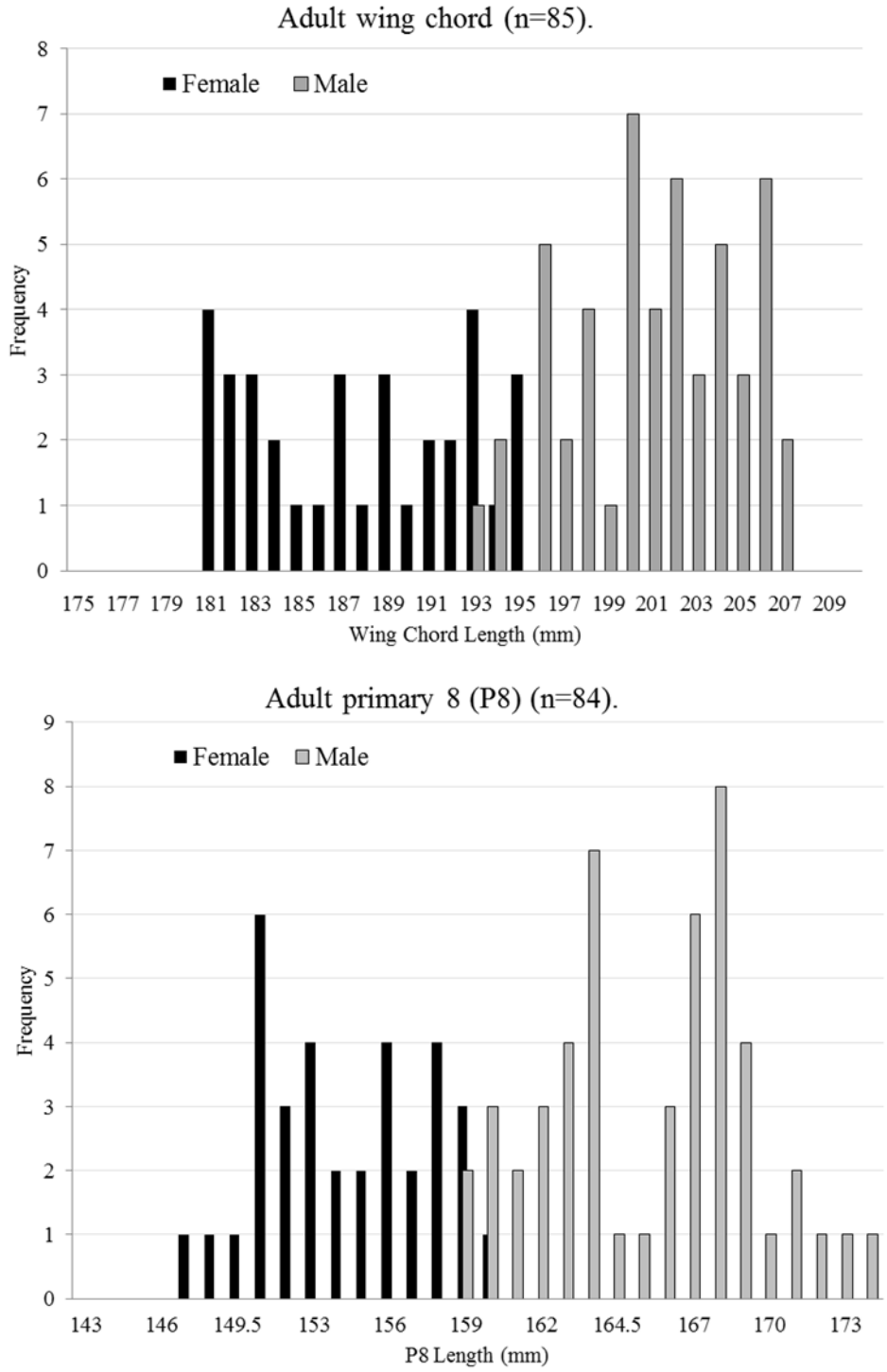

Figure 5. Adult willow ptarmigan wing chord and primary feather 8 length measurements used for testing an alternative means for determining sex during regulatory year 2011.

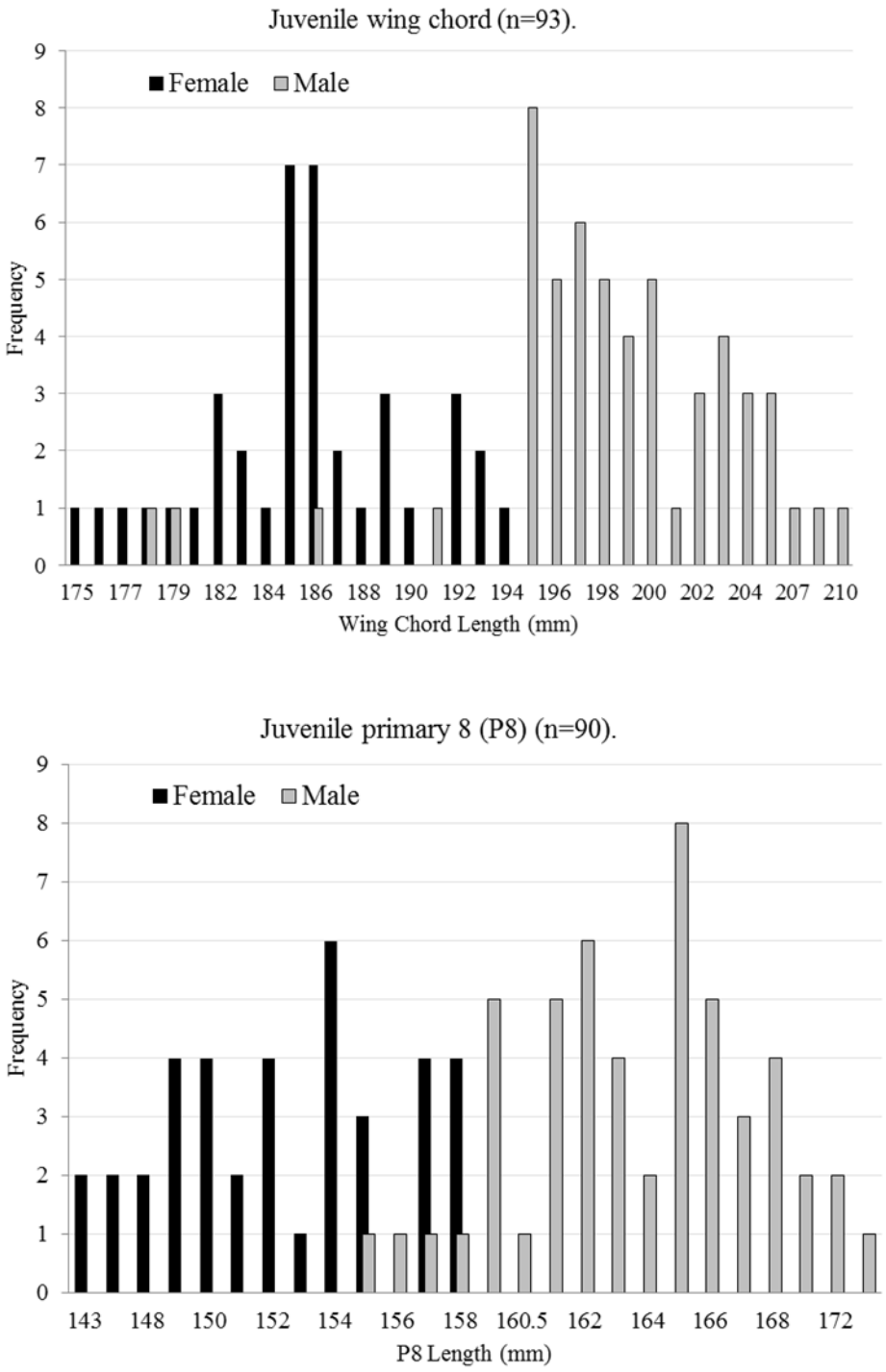

Figure 6. Juvenile willow ptarmigan wing chord and primary feather 8 length measurements used for testing an alternative means for determining sex during regulatory year 2011.

Abundance Survey Results

In 2012 willow ptarmigan surveys occurred between 4 and 31 May. Survey locations included 2 locations in Chugach State Park (GMU 14C), 1 location along the Richardson Highway (GMU 13B), 7 locations along the Denali Highway (GMU 13B and 13E), 1 location along the Parks Highways (GMU 13E), and 1 location off the road system in the upper Susitna River basin (GMU 13A; Table 9).

Along the road-system in 2012, there was a modest increase in male willow ptarmigan abundance except along the western Denali Highway (GMU 13E). In Chugach State Park there was a 20% increase over the previous 2-year (2010–2011) average. Along the Richardson Highway there was a 16% increase. Along the eastern Denali Highway there was a 20–46% increase over the previous 2-year average in number of willow ptarmigan along survey routes (Table 9).

Beginning in 2012, 1 remote survey location was established in the upper Susitna River basin near Goose Creek (GMU 13A). This survey will be used to complement the road-system surveys along the Denali and Richardson highways. In 2012, 12 individual territorial male willow ptarmigan were observed along the route near Goose Creek.

Although existing survey locations were adjacent to the road system, reports and DWC staff observations elsewhere in Alaska suggest willow ptarmigan populations were high. In Southwest Alaska (GMU18) willow ptarmigan were very abundant and high densities of birds were observed near Bethel, the Kilbuck Mountains, and on portions of the Yukon-Kuskokwim Delta (P. Jones, personal communication). On the northern Alaska Peninsula, willow ptarmigan abundance was quite variable based on location (S. Savage, personal communication). North of the Brooks Range, willow ptarmigan were also quite abundant and were frequently observed in large flocks throughout the area.

Attempts to increase springtime territorial male ptarmigan survey effort will be made in 2013. However, the extremely variable conditions associated with spring break-up in May throughout Alaska limit consistent access to most areas off the road system during the peak of the breeding season. Working with local cooperators in remote communities throughout Alaska may be the most practical and reliable way to increase survey effort.

Density Estimation

Although the data to calculate precise estimates of willow ptarmigan density were not collected, an effort was made to estimate relative density. While listening for territorial male responses at each listening post, survey crews only counted male willow ptarmigan within a one-quarter- mile radius. Individual listening posts were spaced one-half mile apart. Therefore, to estimate the geographic area in which counts were made, total survey transect length was measured using the Global Positioning System. Estimating density using the same method for all willow ptarmigan survey locations provides a crude means of comparing count data between areas of the state. Density estimates varied considerably between easily accessible, hunted locations in GMU 13B and 13E and either less accessible locations at Goose Creek (northwest GMU 13A) or nonhunted locations in Chugach State Park (western GMU 14C). In GMU 13B and 13E, density estimates

on the Denali, Parks, and Richardson highway survey routes ranged from 1 to 10 males/mi^2. However, in GMU 13A and GMU 14C, in areas with very little or no hunting pressure, density estimates ranged from 20 to 22 males/mi^2. Density comparisons were also very similar at the same survey location in 2010 and 2011. In 2010, GMU 13B and 13E density estimates ranged from 1 to 7 males/mi^2 versus 15 males/mi^2 in GMU 14C. In 2011, GMU 13B and 13E density estimates ranged from 2 to 9 males/mi^2 versus 18 to 19 males/mi^2 in western GMU 14C.

Due to the complexity of identifying ptarmigan species while hunting, the hunting regulations group ptarmigan species together. Prior to RY09, all of GMU 13 was open to wintertime ptarmigan hunting through 31 March with a reduced bag limit in GMU 13B after 30 November. However, after RY08, the BOG adopted a proposal closing the ptarmigan hunting season in GMU 13B on 30 November beginning RY09, due to concern over low rock ptarmigan abundance. In 2008, prior to the adoption of the early closure, willow ptarmigan densities ranged from 0 to 5 males/mi^2 (averaging 3 males/mi^2) in road accessible portions of GMU 13B and 2 to 3 males/mi^2 (averaging 2 males/mi^2) in nearby road accessible portions of GMU 13E. There have now been 3 complete seasons with 30 November closures and no wintertime harvest of ptarmigan in GMU 13B. In 2012, density estimates of willow ptarmigan in GMU 13B ranged from 3 to 10 males/mi^2 (averaging 5 males/mi^2). However, in nearby GMU 13E, where wintertime hunting has been allowed, density estimates ranged from 1 to 3 males/mi^2 (averaging 2 males/mi^2). Refer to the rock ptarmigan section of this report for a discussion of density comparisons between GMU 13B and 13E. The doubling of willow ptarmigan density in 13B from 2009 to 2012 could be explained by factors other than lack of wintertime hunting, including natural population cycle, predation, and weather patterns. However, those same factors would also have affected populations in nearby GMU 13E.

Despite this modest increase in willow ptarmigan density in GMU 13B, hunter reports reflected unsatisfactory hunting in the fall of 2011 in both GMU 13B and 13E. In 1999 hunter reports from GMU 13B were generally favorable, though no harvest estimates exist for that year. In 1999 density estimates in GMU 13B averaged 10 males/mi^2, compared with 2 males/mi^2 in 2008. In 2012, after 3 seasons of wintertime closures, density estimates averaged 5 males/mi^2.

Board of Game Proposals

During the winter of 2011–2012, the Alaska Board of Game (BOG) heard several regulatory proposals requesting a change to season dates and bag limits in GMU 18 and a season extension in GMU 22. In GMU 18, the BOG adopted a change increasing the bag limit from 25/day to 50/day and extended the season from 30 April to 15 May each year. In GMU 22 the BOG adopted a change creating an earlier season start date of 10 August; the previous start had been 1 September These changes will take effect during this coming season (RY12).

Table 9. Territorial male willow ptarmigan count data by survey location, 2003–2012.

GMU	Highway	Site / Milepost	Year									
			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
13B	Richardson	McCallum			11		6	10	13	14	18	20
13B	Denali	Mi 10-14	6	10	10	11	6	8	6	9	8	11
13B	Denali	Mi 15						6	4	6	9	14
13B	Denali	Mi 29-33.5	7	10	9	13	7	8	4	12	3	11
13B	Denali	Mi 34-36	1	2	1	6	1	2	2	3	0	2
13B	Denali	Mi 52-58							1	6	2	7
13E	Denali	Mi 90 - 93.5					5	5	7	3	5	5
13E	Denali	Mi 94-97			5	6	3	3	4	3	3	5
13E	Parks	Mi 194-208	1	2	4	9	3	5	5	2	5	4
14C	ANC Bowl	Powerline						12	11	15	18	20
14C	ANC Bowl	S. Fork ER						4	3	5	6	7
13A	Remote	Goose Creek										12

REGULATORY YEAR 2012 HUNTING PROJECTION

Provided weather patterns in late June and July do not negatively influence brood production this summer, willow ptarmigan densities along the western Denali Highway (GMU 13E) will likely remain at very low densities this fall. Willow ptarmigan densities along the eastern Denali Highway (GMU 13B) will be more abundant than the western highway; however, they will still remain well below the highs observed during the 1990s. Snowshoe hare densities are at or near the low point in their population cycle and as a result there appears to be fewer avian predators; this may allow willow ptarmigan to remain at higher densities than observed during the snowshoe hare high (2007–2009). Populations in the Chugach and Kenai Mountains should be at higher densities this hunting season. In the Interior and western Alaska, willow ptarmigan densities are expected to remain high.

Rock Ptarmigan

METHODS

Rock ptarmigan is the second most abundant ptarmigan in Alaska and can also be found throughout the state, including the Aleutian Islands. Rock ptarmigan typically inhabit higher elevation, more exposed rock faces, scree slopes, and alpine ridges.

Beginning in late April and continuing into early June, male rock ptarmigan defend breeding territories through calling and display flights. These territories are set up in high elevation alpine areas often adjacent to stands of dwarf birch (Weeden 1965).

Methods used in researching rock ptarmigan were the same as those described in this report for willow ptarmingan.

Surveys were conducted along the Richardson (GMU 13B), Steese (GMU 20B), and Denali (GMU 13B and 13E) highways, and in Chugach State Park (GMU 14C). Survey routes occur along or within 2 miles of the highway or nearest road. In 2012, a remote location was chosen near Goose Creek (GMU 13A) to assess willow and rock ptarmigan abundance as a complement to regionally adjacent survey routes on the Denali Highway (40 miles north).

STATUS

A total of 42 rock ptarmigan wing samples were collected from hunters during RY11 (Table 10). Due to the low sample sizes that were collected it is difficult to make meaningful inferences about brood production by region. However, both Southcentral and Interior samples suggest low brood production in 2011. This is further supported by springtime abundance surveys that documented low overall abundance in the same areas. However, brood production from Northwest Alaska (including Barrow and Seward and Baldwin peninsulas) appeared to be good despite similar sample sizes.

Table 10. Total number and percent juvenile rock ptarmigan based on wing samples from the statewide harvest collection during regulatory year 2011.

	Game Mngt.	Number of Samples				Percent
Region	Unit(s)	Adult	Juvenile	Unknown	Total	Juvenile
Southcentral	13, 14, 16, 6	4	4	0	8	50%
Interior	12, 19, 21, 20, 25	10	9	0	19	47%
Kenai Peninsula	7, 15	0	0	0	0	0%
NW Alaska	22, 23, 26	5	10	0	15	67%
Total		19	23	0	42	

In 2012, rock ptarmigan surveys occurred between 12 and 29 May at 1 location in Chugach State Park (GMU 14C), 2 locations along the Richardson Highway (GMU 13B and 20D), 4 locations along the Denali Highway (GMU 13E), 2 locations along the Steese Highway (GMU 20B), and 1 off the road-system in the upper Susitna River basin (GMU 13A; Table 11).

Overall, based on territorial male counts of rock ptarmigan along the road system, it appears that monitored populations remain low. Total counts by survey location varied little from 2010 to 2012 (Table 11). Throughout the remainder of Alaska densities appear to be higher than those observed along the road system, based on other DWC staff reports. Rock ptarmigan densities were reported to be very high throughout the western Brooks Range and Southwest Alaska this spring.

In addition to assessing willow ptarmigan, the new survey location at Goose Creek (GMU 13A) was also used to survey rock ptarmigan abundance trends. This survey will be used to

complement the road-system surveys along the Denali and Richardson highways. Despite only counting 2 territorial male rock ptarmigan within one-quarter mile of each listening post, 4 additional males were observed immediately outside the survey area.

Using the same density estimation method described for willow ptarmigan, rock ptarmigan densities were lower in easily-accessible road system hunt locations in the western Alaska Range (GMU 13B, 13E, 20A, and 20D) while densities were higher in less accessible or nonhunted locations in northwest GMU 13A and Chugach State Park (GMU 14C). In 2012, easily accessible hunt area density estimates on the Denali, Richardson, and Steese highway survey routes ranged from 0 to 4 males/mi^2. However, in GMU 13A and Chugach State Park, density estimates ranged from 4 to 5 males/mi^2 in areas that were not road accessible or where hunting was prohibited.

Prior to RY09, all of GMU 13 was open to wintertime ptarmigan hunting through 31 March. However, after RY08, the BOG adopted a proposal closing the ptarmigan hunting season in GMU 13B on 30 November beginning RY09, due to concern over low rock ptarmigan abundance. In 2008, prior to the adoption of the early hunting season closure in GMU 13B, zero rock ptarmigan were observed along 4 road accessible survey routes. There have now been 3 complete seasons with 30 November closures and no wintertime harvest of ptarmigan in GMU 13B. However, in 2012 density estimates of rock ptarmigan in GMU 13B continued to remain very low and ranged from 0 to 4 males/mi^2 (averaging 2 males/mi^2). Due to the predominance of willow ptarmigan habitat along the western Denali Highway, rock ptarmigan survey routes were not established in GMU 13E.

In 2007 springtime rock ptarmigan surveys were initiated along the Steese Highway at Twelve-mile and Eagle summits. Surveys were again conducted at these sites in subsequent years with similar results: 6 territorial males in 2007 and 5 each year from 2008 to 2011. The Eagle Summit survey bisects a portion of the rock ptarmigan study area in which Robert Weeden conducted surveys from 1960 to 1972. Weeden found densities that ranged from 5 to 12 males/mi^2 using thorough ground searches. Densities observed on Eagle Summit between 2007 and 2011 were 2 males/mi^2 each year and 1 male/mi^2 in 2012. In 2009 and 2010, an extensive ground search of a portion of Weeden's study area was completed. In each of 2009 and 2010 only 1 territorial male was located, indicating very low density. Habitat conditions were excellent with abundant dwarf birch. In 2011 and 2012, one additional area was explored both north and south on Twelve-mile Summit, an effort that found only 1 territorial male in 2011 and 2 in 2012, indicating an extensive area of low density similar to that observed on Eagle Summit. This is tempered by hunter reports from late winter 2012 (February through March) along the Steese Highway that suggest rock ptarmigan densities were higher than those observed during the springtime breeding season in May. Considering the proximity to Fairbanks and the popularity of this late winter hunt, this is a challenging management issue that should be a high priority for future research efforts.

Despite the low densities of rock ptarmigan observed along the road system DWC staff reports from elsewhere in the state suggest much higher densities in Northwest and Southwest Alaska. The small game program will work to develop rock ptarmigan survey routes in other areas of the state to begin assessing more remote or less heavily exploited populations.

Beginning in 2010, the Bruce spanworm (*Operophtera bruceata*) and autumnal moth (*Epirrita autumnata*) have occurred at very high densities in the western Copper River valley, Mat-Su valley and the Kenai Peninsula. The larval stage of these insects defoliates several species of deciduous trees, particularly willow and dwarf birch near the subalpine/alpine transition. The buds of these two species are the primary overwinter food source for willow and rock ptarmigan respectively (Taylor *In prep*). It is unknown what impacts these insects will create on bud production of willow and dwarf birch or what long-term effects will be to local ptarmigan populations. During late June of 2012, moderate to complete defoliation was observed within a several hundred vertical foot band in the Chugach State Park, southern Talkeetna Mountains, western Copper River valley, and various locations in the Kenai Mountains.

Table 11. Territorial male rock ptarmigan count data by survey location, 2003-2012.

			Year									
GMU	Highway	Site / Milepost	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
13B	Richardson	McCallum			2		1	0	1	0	0	2
20D	Richardson	Donnelly					1	1	0	1	1	2
13B	Denali	Mi 10-14	0	0	0	1	1	0	2	0	0	0
13B	Denali	Mi 12.5 N								6	7	7
13B	Denali	Mi 29-33.5	1	0	0	0	0	0	1	1	2	0
13B	Denali	Mi 34-36	2	1	0	2	0	0	0	1	3	1
14C	ANC Bowl	S. Fork ER									6	5
25C	Steese	12-Mile Summit					1	0	0	0	1	0
25C	Steese	Eagle Summit					5	5	5	4	4	3
13A	Remote	Goose Creek										2

REGULATORY YEAR 2012 HUNTING PROJECTION

Provided the weather does not negatively influence brood production this summer, rock ptarmigan densities along the Steese Highway are expected to remain low this fall. Rock ptarmigan densities along the eastern Denali Highway (GMU 13B) will remain low to very low. Populations in the Talkeetna, Chugach, and Kenai Mountains should be at moderate densities this hunting season. In Southwest and Northwest Alaska, rock ptarmigan densities are expected to remain high to very high.

White-tailed Ptarmigan

METHODS

White-tailed ptarmigan are the smallest species of ptarmigan and inhabit high elevation alpine habitat throughout Southcentral Alaska, including the Alaska Range, south through the

southeastern panhandle. This species is endemic to North America and small scattered populations can be found in the western United States.

Male white-tailed ptarmigan also perform springtime displays for females, though it is more difficult than other ptarmigan species to monitor in Alaska. Access to the high alpine ridges and peaks on which they breed during the breeding season is very poor in Alaska because there are few roads to these areas and the high mountains are frequently covered in deep snow. During summer 2012, access routes and potential survey routes in the Chugach and Talkeetna mountains will be explored to determine if discrete locations could be used as population index sites.

STATUS

A total of 39 white-tailed ptarmigan wing samples were collected from hunters during RY11 (Table 12). Despite low sample sizes in Southcentral, brood production was low. Most of the samples were harvested from the southern Talkeetna Mountains during the early fall. Few other reports from hunters or outdoor enthusiasts were available regarding abundance and presence of white-tailed ptarmigan.

Table 12. Total number and percent juvenile white-tailed ptarmigan based on wing samples from the statewide harvest collection during regulatory year 2011.

	Game Mngt.	Number of Samples				Percent
Region	Unit(s)	Adult	Juvenile	Unknown	Total	Juvenile
Southcentral	13, 14, 16, 6	17	19	2	38	50%
Kenai Peninsula	7, 15	0	0	1	1	0%
Total		17	19	3	39	

Very little scientific information on white-tailed ptarmigan in Alaska is available, and there are no population trend data available (B. Taylor, personal communication). Observations and limited reports of white-tailed ptarmigan in specific locations in the Alaska Range, Talkeetna, Chugach and Kenai mountains indicate a continued presence of modest density at each location. These observations are inadequate to determine if white-tailed ptarmigan numbers in Alaska periodically cycle. Long-term studies on hunted and unhunted populations in Colorado found extensive population fluctuations with evidence of a low amplitude, natural cycle (C. Braun, personal communication).

To date, it appears the white-tailed ptarmigan's mostly inaccessible habitat has protected them in most of their historical range in Southcentral Alaska. However, white-tailed ptarmigan often rely on their cryptic plumage to avoid predation rather than fleeing and are thus very approachable. This behavior exposes them to potentially high exploitation rates in areas that are targeted by hunters. In the future, if additional harvest pressure is exerted on white-tailed populations near urban centers, additional management tools may need to be employed to avoid overexploitation.

REGULATORY YEAR 2012 HUNTING PROJECTION

Due to the lack of population monitoring and small sample sizes for our wing collection efforts on white-tailed ptarmigan a hunting projection is difficult. Due to the inaccessible nature of most of Alaska's white-tailed ptarmigan populations it is likely that isolated areas with road access (e.g., Hatcher, Turnagain, and Thompson passes) will have lower densities than most populations more distant from access points.

Snowshoe Hare

METHODS

Snowshoe hares are found throughout Alaska although they are much less abundant throughout Southeast Alaska. Their populations are subject to large cyclic fluctuations that normally occur over a 10-year period (Krebs et al. 1987 and 2001). The DWC does not estimate population size but rather monitors population fluctuations. DWC has relied upon several methods and numerous partners, including the National Park Service, U. S. Fish and Wildlife Service (USFWS), and private individuals to obtain data and other information.

Methods for assessing population fluctuations include: 1) hare pellet counts on the Kenai Peninsula, 2) hare counts conducted in Denali National Park (GMU 20C, completed by the National Park Service), 3) hare counts while conducting the Breeding Bird Survey in Delta Junction, and 4) twilight road-side hare counts along the Richardson, Parks, Steese, and Denali highways (Table 13). The USFWS has been completing pellet counts (Krebs et al. 1987) in the Kenai National Wildlife Refuge since 1983 (T. Burke, personal communication). These counts have provided a reliable method of monitoring the fluctuating populations on the Kenai Peninsula. However, habitat change may be influencing the future reliability of existing survey plots (T. Burke, personal communication). Carol McIntyre of the National Park Service has been indexing snowshoe hare abundance within Denali National Park since 1988 by compiling an average count over the course of the summer. Jeff Mason, near Donnelly Dome (US Army), and Steve DuBois in Delta Junction (retired DWC) have counted hares while completing the Breeding Bird Survey routes since 2000 and 1995 respectively. Since 2007, twilight road counts of hares have been completed while traveling to grouse and ptarmigan survey locations by DWC personnel 1 hour prior to sunrise. Routes include short portions of local roads and highways near Delta Junction, Anderson, Cantwell and the Steese Highway (B. Taylor, personal communication).

STATUS

Snowshoe hare road-side count monitoring methods provide an index for comparison between years. They are cost effective and efficient and can be completed while transiting to other small game survey locations prior to sunrise.

Within the road system the hare population cycle seems to progress from north to south and east to west (B. Taylor, personal communication). Historically, Interior populations peaked in an extreme high in 1971, and then dropped to very low numbers by 1976. Hares peaked again in 1981 at much more modest numbers, followed by progressively higher peaks in 1989, 1999–2000, and 2007–2008 (Table 13). The most recent high was very protracted and in some areas of the Interior and Southcentral lasted nearly 3 to 4 years. In Southcentral, hare populations began declining in 2009 and have continued a steady decline since. Hare populations will likely continue their decline through 2012 and 2013 prior to reaching the low point in their population cycle. While hare populations remained high on the Kenai Peninsula in spring 2012, they are expected to drop in the summer and fall. In the Interior, hare populations are expected to reach the bottom of their population cycle in 2012. North of the Brooks Range, hare populations appear to exhibit lower amplitude cycles and continued to persist at moderate levels in spring 2012 (G. Carroll, personal communication).

Table 13. Statewide snowshoe hare population survey data, 2002–2012.

			Breeding Bird Survey		Road-side Counts			
Year	Kenai Pen.[a]	Denali Nat. Park[b]	Delta Jct.[c]	Donnelly[d]	Delta Jct.[e]	Anderson[f]	Steese Hwy.[g]	Cantwell[h]
2002	1.6	0.5	2	0				
2003	4.6	0.9	2	1				
2004	1.5	1.2	11	4				
2005	1.6	6.3	57	10				
2006	2.4	25.2	129					
2007	4.2	26.2	96	50	109	24[i]	21	25
2008	8.5	28.3	89	21	91	82	14	16
2009	13.1	40.6	87	14	54	27	8	6
2010	13.8	32.9	18	12	37	10	3	4
2011	22.9	9.6	7	3	16	4	1	4
2012	NA	NA	12	3	27	3	0	0

[a] Kenai Peninsula pellet survey is conducted by the Kenai National Wildlife Refuge (T. Burke pers. comm.).

Methods used are described in Krebs et al. (1986); pellets/m^2.

[b] Denali National Park count survey is conducted by the National Park Service (C. McIntyre pers. comm.).

Methods include indexing hare numbers per site within Denali Nat. Park.

[c] The Delta Junction Breeding Bird Survey (BBS) hare count is conducted by retired ADF&G biologist S. DuBois.

Hares are counted while conducting the BBS.

[d] The Donnelly Dome Breeding Bird Survey (BBS) hare count is conducted by Fort Greely biologist J. Mason.

Hares are counted while conducting the BBS.

[e] Hare counts in Delta Junction include 3 road-side count areas.

[f] Hare counts in Anderson include 4 road-side count areas.

[g] Hare counts along the Steese highway include 1 road-side count area.

[h] Hare counts in Cantwell include 1 road-side count area.

[i] In 2007 only 3 of the 4 survey areas were counted.

Although snowshoe hares reached very high densities in most of the Interior from 2006 to 2009, hares in the southern Mat-Su valley (GMU 14A) reached only a modest peak. This occurred even though there were extensive areas of early-successional habitat as a result of fires and mechanical clearing of mature forest in areas like Big Lake, Matanuska Valley Moose Range, and sporadically throughout the southern valley. Historically hare densities have peaked at much higher levels in this area. It is unknown why the two most recent peaks have been so modest. There are several issues that may be contributing to the modest population peaks, including urbanization, high hunter densities, and possibly even high moose densities. Moose and snowshoe hare share similar browse species throughout the year, including willow. Willows are capable of producing secondary chemicals such as tannins and resins in defense of browsing from herbivores (Krebs et al. 2001). A contributing factor to the lower snowshoe hare abundance in the southern Mat-Su may be a higher prevalence of these toxins in hare forage due to high moose densities in GMU 14A and 14B. This issue is likely very complex and multifaceted; however, it is a topic worthy of research support.

Regulatory Year Hunting Projection

During RY12 hunters can expect low snowshoe hare densities in the Interior, Southcentral, and areas of Northwest Alaska. Small isolated pockets of higher densities will be found; however, overall densities will remain low and likely begin growing after this season. In Southcentral the low will likely persist through 2013 or even 2014. On the Kenai Peninsula, hunters can expect higher densities of snowshoe hare this season than elsewhere in the state; however, the population is expected to decline and reach its low over the next 2 to 3 years.

Alaska Hare

Methods

The Alaska hare is one of the most poorly understood game species in the state. The species ranges from the Baldwin and Seward peninsulas to the lower Yukon and Kuskokwim rivers and throughout the Alaska Peninsula. It is larger than the snowshoe hare and often dwells on the open tundra.

Currently, there are no active programs aimed at long-term population monitoring of Alaska hares. This species is one of the least accessible small game species to view and hunt, yet it is often harvested opportunistically by trappers and remote winter travelers in western Alaska.

Status

Based on field observations throughout its range, populations continue to remain well below what was historically observed in the 1950s and 1960s. It remains uncertain whether this has been a long-term decline or a mid-century crash with a continued low but stable population in recent years. In 2012, several individuals reported observing more Alaska hare between Bethel and the Ahklun Mountains than have been observed in the recent past. However, many long-term residents within their range report much lower abundance throughout the entire range than was present in the 1980s (P. Jones, personal communication).

Beginning in the fall of 2012, DWC, in cooperation with the University of Alaska-Fairbanks (UAF), will begin a study on Alaska hare examining the genetic variability of the species throughout its range (T. Booms, personal communication). This study may begin to reveal the movement patterns, distribution, and abundance of this unique species. This study will provide a strong first step toward understanding some of the important management issues facing this species.

REGULATORY YEAR 2012 HUNTING PROJECTION

Due to the lack of population monitoring, unknown population status and distribution, making a hunting projection is not practical.

Management Implications

Populations of grouse, ptarmigan, and hare are likely more heavily exploited throughout geographic areas along the road system from Fairbanks to the Kenai Peninsula than populations off the road system. Thus far, the small game program has focused the majority of its efforts assessing population abundance, increasing public outreach, and addressing management concerns along the road system.

Currently, the greatest management concern along the road system is the potential effect of hunting on readily accessible populations. Road densities between Fairbanks and the Kenai Peninsula are relatively low despite having the vast majority of the state's human population and urban centers. However, the technological improvements of off-road vehicles over the past 10 to 15 years, including four-wheelers, snowmachines, and jet boats, has provided a great deal of access away from the primary roads. Game management units 13, 14, 15, and 16 are accessible on almost every side by highways, trails, or large river corridors, allowing access to what have become very popular hunting areas. Hunters frequently complain, however, that easily accessible hunt areas have resulted in reduced small game hunter success in many places. These areas include roads and trails near urban centers in Anchorage, the Matanuska-Susitna Valley, and Fairbanks. Density estimates of willow and rock ptarmigan in GMU 13 suggest hunting may be reducing population abundance along road corridors like the Denali Highway, though limited data exist for more remote portions of the unit. In addition to accessible hunting, late winter hunting may also be further reducing the abundance of grouse and ptarmigan. In GMU 13B, late winter (December through March) ptarmigan hunting has been closed for 3 seasons and willow ptarmigan densities are twice as high as in adjacent GMU 13E. In virtually every other state, winter and particularly spring (February through April) hunting is not allowed for grouse or ptarmigan species because of the additive mortality to the breeding individuals that survive winter (Sandercock et al. 2011).

As the human population in Alaska continues to grow, additional harvest and disturbance pressures will be placed on small game populations that may already be nearing or have surpassed their ability to absorb that pressure. Focused research will be required to fully examine and understand these impacts. Through additional public outreach and active monitoring of

abundance trends, we will continue to increase our understanding of population dynamics and what impacts these populations the most. Also, as the Division of Wildlife Conservation better understands what the public would like from small game hunting areas, it will be better prepared to make appropriate recommendations to the Board of Game.

Future Work

In order for the new statewide small game program to best understand and serve Alaska small game hunters it must first understand what small game hunters prefer to pursue, where, and during what seasons. As a result, during the winter of 2011–2012, a statewide small game hunter survey was designed and implemented. Due to the long hunting season dates for most small game species, the survey was broken into 2 time periods. The first was deployed in spring 2012 to assess the winter season (December through April). A second survey will be deployed to assess the fall season (August through November) in January 2013. This survey has 3 goals:

1. To understand the demography of small game hunters,
2. To document where and when small game are pursued, and
3. To estimate harvest by species.

The survey was created as an online response survey to reduce overall cost to the department and inconvenience to the respondent. Respondents were notified of their desired participation by postcards during the first 2 weeks of April, 2012. Respondents were asked to visit a website and complete a brief survey asking them a variety of questions about their small game hunting efforts between December 2011 and April 2012. Results of this effort will be forthcoming in an additional report to be released in the fall/winter of 2012.

In addition to increasing our knowledge of hunting patterns around the state, the small game program, in cooperation with UAF, was successful in securing funding for a willow ptarmigan spatial distribution project in Southcentral through the Alaska Energy Authority (AEA). The AEA has proposed building a new hydroelectric facility in the upper Susitna River basin in the vicinity of Watana Creek. This willow ptarmigan study will begin in April 2013 and continue through summer 2015. Radio necklace collars will be applied to adult and juvenile willow ptarmigan each spring and summer. Their annual movements and habitat use will be mapped to understand the value of the proposed hydroelectric project site to local willow ptarmigan populations.

To better prepare for the AEA-funded study, 6 radio necklace transmitters were deployed on willow ptarmigan in May 2012. Male willow ptarmigan were captured near Goose Creek in northwestern GMU 13A in the upper Susitna River basin using a net gun (Animal Care and Use Committee protocol number 2012-027). Radiocollared birds will be tracked every 4 to 6 weeks for the duration of the radio collar battery life (~2 years). Case history information on these birds will provide valuable information for effectively and efficiently planning field efforts for the AEA-funded study.

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