

## Case Study:

Movement, Mortality, and Productivity of Rock Ptarmigan in Game Management Unit 13B, 2013-2015

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## Wildlife for the Future Correlations:

Section 2: Population Dynamics

Lesson 1 How Many Animals Live Here? (Pg. 47)

Lesson 2 Mark and Recapture (Pg. 53)

Lesson 3 Graphic Populations (Pg. 61)

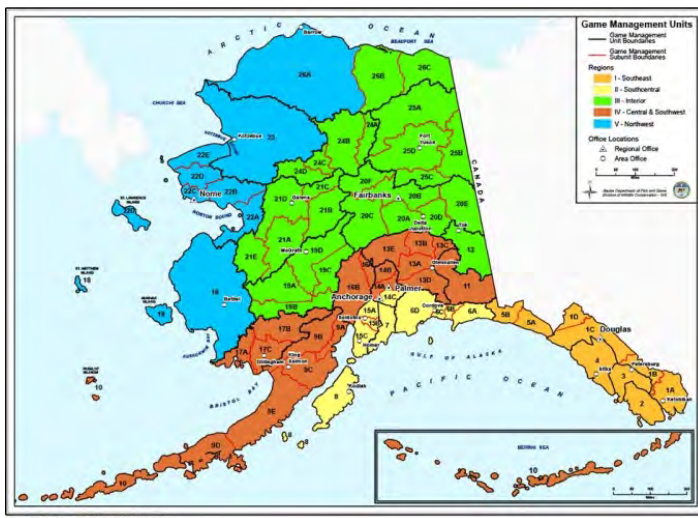
## Overview:

Ptarmigan are an important species in Alaska for subsistence and recreational hunters. Rock (*Lagopus muta*) and willow ptarmigan (*L. lagopus*) remain the most highly sought after statewide upland bird species. However, despite their geographic distribution in Alaska and popularity among hunters, little has been done since the early 1970s to further understand rock and willow ptarmigan life history, movement, mortality, population productivity, or effects of various harvest strategies.

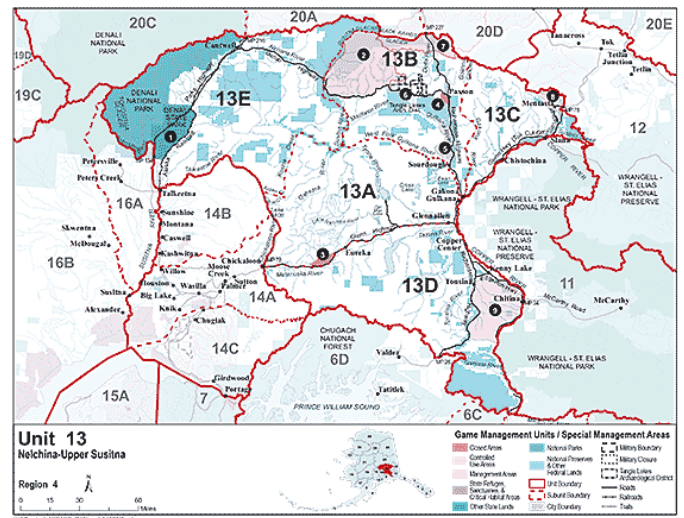
## Background:

Alaska experienced economic growth in the 1970s with the construction of the trans-Alaska oil pipeline, and the state continued to flourish through the 1980s and 1990s. At the same time, there was increased interest in hunting, fishing, and outdoor recreation. More areas were accessible by road, allowing easier access for hunting and wintertime recreational opportunities near road-accessible **game management units (GMUs)**. There are a total of 26 GMUs in the state and unit 13 is a popular hunting area in the eastern part of southcentral Alaska (see maps). It has large urban centers to the south (Anchorage and the Matanuska-Susitna valley communities) and to the north (Fairbanks) and is easily accessible from several roadways.

## Alaska Game Management Units



## Unit 13 Map



As a result of the increasing popularity of hunting in this region, Alaska Department of Fish and Game (ADF&G) staff initiated a study in 1992 to estimate the number of breeding male rock and willow ptarmigan along roadsides in unit 13 to serve as a **population index**. Counts continued in subsequent years and from the early 2000s through 2008, steady declines in the number of breeding male rock ptarmigan were documented, most notably within subunit 13B.

Season dates for ptarmigan hunting (current hunting regulations don't distinguish between rock, willow, or white-tailed) were historically liberal throughout unit 13 (August 10 – March 31), as were daily bag limits (10-20/day). However, in the spring of 2009, the **Alaska Board of Game (BOG)** changed the ptarmigan hunting season closure date from 31 March to 30 November. The earlier closure date remained in effect through the 2012-13 season. In March 2013, the BOG deliberated a proposal from the Paxson Advisory Committee (proposal 88) to “reinstate the 31 March season closure date.” However, no effort had been attempted by ADF&G since 2009 to (1) evaluate whether the roadside population index (completed in 1992) accurately reflected a unit-wide population index, or (2) document the **movement**, **mortality**, or **productivity** that drives this population. The BOG did not support the proposal to extend the hunting season, instead favoring a study that would attempt to evaluate the current population status of subunit 13B rock ptarmigan.

### **Study:**

Small game research biologists designed a study to address three primary components of population management including: (1) annual movement patterns, (2) rates and cause of mortality, and (3) productivity. Rock ptarmigan were captured and fitted with a **VHF radio necklace collars** to address movement patterns and mortality. These data would allow the evaluation of whether ADF&G's roadside population indices were representative of unit-wide population trends. This study would also evaluate population productivity through the use of motion sensitive digital cameras and closely monitoring radio-collared hens. This technology had never before been used to monitor ptarmigan nests and nesting behavior and now it is specifically being used to document behavior of nesting hens, nest harassment and predation, number of chicks departing the nest, and micro-scale climatological observations at each nest that affect nesting success and early chick survival.

Beginning in May 2013, crews began capturing and fitting rock ptarmigan with VHF necklace collars. Through December 2015, nearly 70 radio collars had been deployed on adult and juvenile rock ptarmigan of both sexes. **Aerial relocation surveys** were completed bi-weekly between July and April each year. Adult females were documented moving the greatest distance, averaging 90km<sup>2</sup> (56mi<sup>2</sup>) annually, while adult and juvenile males moved approximately 20km<sup>2</sup> (12.5mi<sup>2</sup>) annually. Both male and female rock ptarmigan had very high **breeding-site fidelity** with both sexes returning by late-April to the exact same or adjacent territory and/or mate. Overall, avian and terrestrial predators composed the majority of documented mortality (~50%). However, birds collared near roadways suffered much greater hunter mortality than those residing more than 10km from a roadway. **Brood** productivity was closely and successfully monitored using digital motion sensitive cameras. Average clutch size was 7 eggs (range 3-9). In 2014, chick production was very low due to a brief but intense snowstorm on June 18 that caused nearly complete nest abandonment among monitored nests. However, due to warm and dry conditions throughout the brood rearing period (mid-June through early July) chick survival was very high in 2015 with subsequent **recruitment** into the population also very high with 4-5 chicks / brood.

Through this study we have learned much about rock ptarmigan in subunit 13B. Generally, male rock ptarmigan move much less and stay much closer to their breeding territory than adult and juvenile females. However, females also exhibit very high breeding-site fidelity and appear to also compete for access to males as males do for access to females. This pattern of movement has implications for management. Individuals, particularly males, with breeding territories adjacent to roadways face a disproportionately higher probability of human harvest than males 10km or more away from roadways.

## **Future:**

This study will continue to apply radio necklace collars on rock ptarmigan through August 2016. Those birds will be monitored through spring of 2017. These data will then be summarized and reported in a research report available by December 2017.

## **Definition of terms**

**Alaska Board of Game-** The Board of Game consists of seven members serving three-year terms. Members are appointed by the governor and confirmed by the legislature. The Board of Game's main role is to conserve and develop Alaska's wildlife resources by setting policy and direction for the management of the state's wildlife resources. The board is charged with making allocative decisions, and the Department of Fish and Game is responsible for management based on those decisions.

**Aerial relocation surveys-** A small fixed-wing aircraft is used to fly over the study area to relocate radio collared birds using a VHF receiver and antennas affixed to each wing strut. The pilot listens to the beeps for each individual radio collar frequency from the receiver to determine the birds' location. Those locations are catalogued using an onboard GPS.

**Breeding-site fidelity-**An individual returning to the same breeding territory or nesting location from the previous spring.

**Brood-** The number of chicks from an individual hen. Periodically chicks from multiple broods will be maintained by 2-3 females.

**Game Management Unit (GMU)-** geographical areas defined by natural landscape boundaries and designated for the management of wildlife resources.

**Mortality-** Death. This is a key factor in understanding any natural population from humans to ptarmigan. For a population to be stable mortality rates must equal productivity (reproductive) rates.

**Movement-** The geographic and elevation scale that an individual ptarmigan utilizes over the landscape. This study measured this in square kilometers (geographic) and vertical meters (elevation).

**Population index-**A measure of population size in a small area as it relates to a larger, broader geographic area.

**Productivity-** For a given population, this is the average number of chicks per brood that recruit into the population. This can be compared between years and between study sites to determine a relative scale of productivity.

**Recruitment-** To become a member of the population. In this case, chicks are recruited into the population if they survive to the hunting season.

**VHF radio collar-**A small device that emits a VHF radio signal tuned to a specific frequency much like a radio station. A location can be determined of the collared individual based on the listener's proximity and orientation to the device. For ptarmigan, this device is packaged in a necklace with a 10 inch antenna that helps broadcast the signal. The radio signal is silent to the passive observer but emits a distinct signal if listened through a VHF radio receiver.