

Interior Alaska

Moose News

Summer/Fall 2011



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Welcome to ADF&G's Interior Moose News!

Managing for abundant moose populations is a rewarding challenge, but management decisions are not always easy to understand. Hunters and other members of the public sometimes find it difficult to understand how moose hunting regulations fulfill management strategies, especially when regulations seem contradictory to management goals. For example, why harvest antlerless moose if our goal is moose abundance?



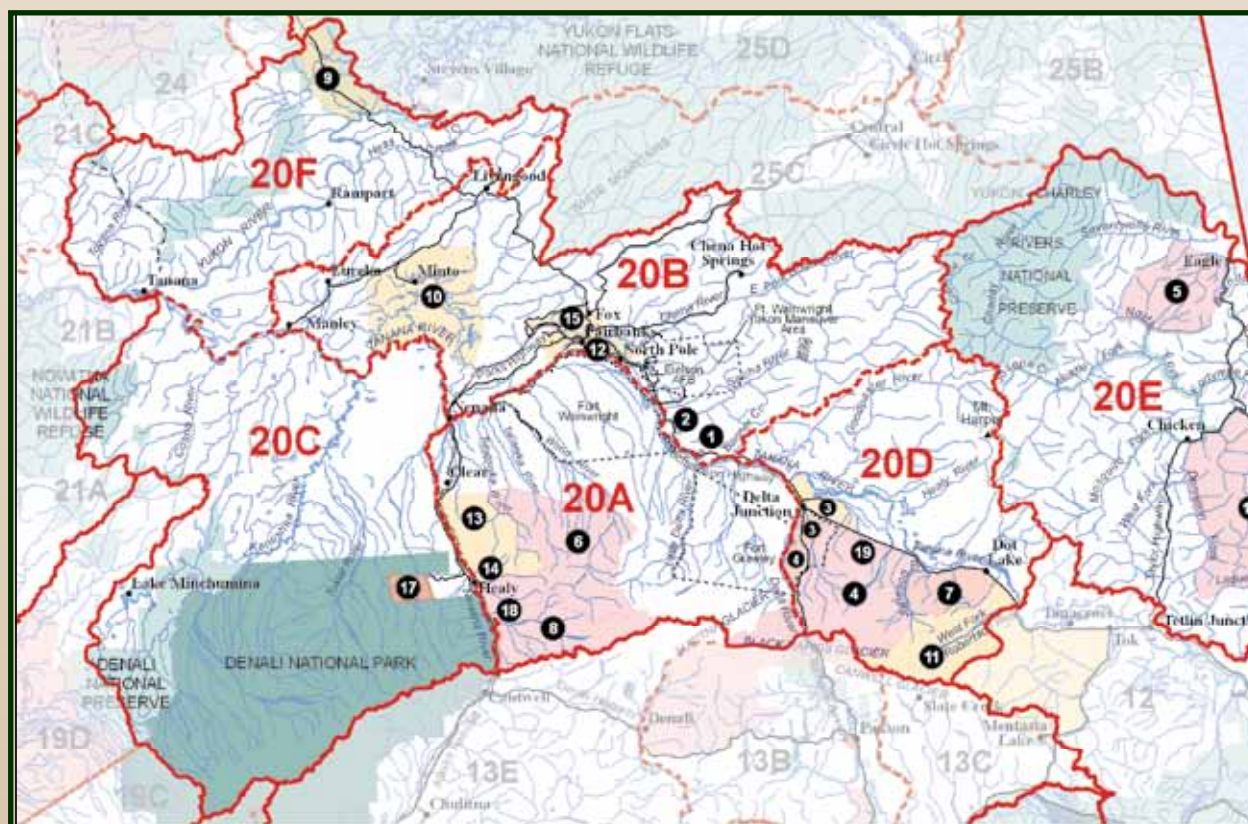
This newsletter aims to better explain moose management in the Interior. These 12 pages can't convey all the data collected or all of the information published in scientific papers on the topic, but we have tried to include enough information on antlerless moose hunts, antler restrictions, population dynamics, habitat, and nutrition to answer many of the most commonly asked questions. I hope you find it helpful.

I'm fortunate to be able to work with so many dedicated and top notch wildlife research and management biologists in Interior Alaska. We are learning more about moose biology, behavior, and many other subjects every day.

This newsletter focuses on Game Management Units 20A, 20B, and 20D because these areas are where the most moose are harvested in Interior Alaska. If you have more questions after reading through this newsletter, please contact our office and our staff would be glad to provide additional information and answers.

— David D. James, Region III Regional Supervisor

Unit 20



Game management unit 20 is divided into six subunits (A,B,C,D,E,F). This area makes up a large part of the Interior — over 50,000 square miles! It is a boreal forest ecosystem with a variety of spruce, birch, and aspen stands as well as alpine tundra in the higher country and wetlands in the low country. Moose habitat throughout Unit 20 is highly variable. Poor moose habitat consists of extensive black spruce stands that offer few shrubs or leafy trees for food. Good habitat consists of young hardwood forests, wetlands, river floodplains, and lots of new shrub growth. Our forests are dynamic and are always changing over time. Fire, which promotes new forest growth, is essential in maintaining quality moose habitat throughout the Interior.

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Basics of Moose Biology

Understanding Moose Food

During the summertime moose have an abundant supply of food. They eat the new green growth of herbs such as fireweed and the leaves of shrubs like willow and aspen as well as aquatic vegetation. Summer is a time of plenty and a time to get fat. When winter comes, moose have a harder time getting the same amount of nutrition.

During the late fall and winter moose shift their diet from lush green vegetation to woody plants, which contain fewer nutrients. A moose normally loses 25% of its body weight during the winter.

In order of preference, moose browse willow, aspen and balsam poplar, birch, and alder.

The quality of a moose's winter diet is determined by the bite size of the twigs available, the species of plant, how long they take between bites, how far apart the available plants are, and how much fiber they are getting in each bite. Small twigs provide the most nutrition but take longer to fill the stomach. Larger twigs provide less nutrition but fill the stomach faster. A happy medium of both small and larger twigs is generally best for moose.



Plant defense

Many plants produce chemical compounds as a defense mechanism against getting eaten. When plants are heavily browsed they may produce more of these compounds making them toxic or at least less digestible. This has an impact on the nutritional value that animals gain from eating the plant. Heavily browsed plants also become more branched and bushy, making it more difficult for moose to reach the twigs they want to eat.

Fire and Moose

Fire is a natural and critical event in Alaska's Interior. It is vital to maintaining habitat for moose and many other creatures. Wildlife diversity is directly related to habitat diversity. Fire creates and maintains habitat diversity.

When left undisturbed over time, Alaska's boreal forest ultimately turns into spruce forest. Spruce forest, especially black spruce forest, grows slowly and supports a low diversity of wildlife.

Despite the dramatic way fire is portrayed in the news, fires don't burn everything in their path. They burn unevenly across the land leaving a patchwork pattern dictated by factors such as vegetation and weather. Not all plants burn and die. Fires can actually rejuvenate the soil, burn off dense and unproductive stands of black spruce, and allow new types of vegetation to flourish.

A good, hot fire can set the stage for new growth of herbs, willow, birch, and aspen, all of which are valuable to moose and many other wildlife species.

Fires do not cause an immediate increase in moose numbers but over time, can create valuable food sources that maintain healthy populations many years into the future.



Measures of Health in Moose Populations

Twinning rates

The twinning rate is the ratio of cow moose that have twins versus single calves. Twinning rates depend on habitat quality and moose nutrition. It is an indicator of productivity and the moose population's overall condition. In general, research indicates that moose populations with twinning rates less than 10% are nutritionally stressed. Populations with twinning rates greater than 20% indicate good quality habitat that can support more moose. Based on surveys, Unit 20A twinning rates have averaged less than 10% since the 1990s. This indicates relatively poor nutrition for Unit 20A moose.

Calf weights

Calf weights are a good indicator of forage quality. Biologists capture and weigh moose calves in the spring. Interior moose calf weights average from 339 to 450 pounds. Moose calves in southwest Unit 20D averaged 340 pounds. This is on the low end of the scale and is indicative of poor nutrition.



Biologist, Kalin Kellie, weighing a moose calf in Alaska Range foothills.

What's wrong with too many moose?

A moose population that is too large for its habitat and showing signs of nutritional stress is more susceptible to disease, parasites, predation, and other mortality. Winter compounds this situation because nutritious summer plants die and snow reduces the availability of what food sources remain. As snow depth increases, moose expend more energy finding food. If good browse is not readily available, a severe winter, or a series of harsh winters, can help send a moose population in poor nutritional condition into a sharp decline. A population with access to abundant browse is better able to withstand severe winters because they are in better physical condition and don't have to expend as much energy finding food.



How do we know when a moose population is too large for its range?

There are several factors that indicate when a moose population is getting too large for its range and showing signs of nutritional stress. Here are some of the most obvious indicators:

- ❖ A decrease in the proportion of cows having twins. This number, when it is below 15–20% of cows in an area, is perhaps the best indicator of poor nutrition.
- ❖ An increase in the age that a cow first gives birth.
- ❖ A decrease in calf weights.
- ❖ Overbrowsing of winter food sources (willows, birch, aspen).



Severe overbrowsing of willow in Unit 20A.

Tracking Moose Numbers and Trends

Population estimate vs. census

Conducting a census by counting every animal in a population is possible for caribou because they group together in alpine areas at certain times of the year.

Because moose live in the forest, it is too expensive and logistically impossible to count all moose in a certain area. Instead, we must estimate the number of moose using a complex and rigorous scientific method of estimating numbers based on samples. Similar sampling estimates are used by large corporations, including insurance and mining companies, to make multi-million dollar decisions.

In a typical survey, a game management area is broken up into survey units measuring 2.5×2.5 miles square. These units are flown over briefly prior to the survey to determine if each unit is a high or low density moose area (see yellow/red map below).

A certain number of sample units (the more the better) are randomly chosen from the high density and low density areas for intensive observation. When conditions are just right, the surveys begin. These conditions include



Moose surveys are conducted from the air, over large areas, after a sufficient amount of snow is on the ground, and when moose are most visible. Conducting surveys, using the same technique year after year, provides good data about population trends in an area.

- ❖ **Adequate snow** – enough frost or snow so moose are visible
- ❖ **Adequate light** – days get shorter and shorter in the winter
- ❖ **Antlered bulls** – no surveys after December 5 so most bulls have antlers
- ❖ **Wind** – less than 30 mph and not turbulent
- ❖ **Temperature** – higher than -30° F

Pilots with observers fly back and forth in the selected units looking for any moose. When they see moose they circle them to determine the age and sex class of the animals and record the data.

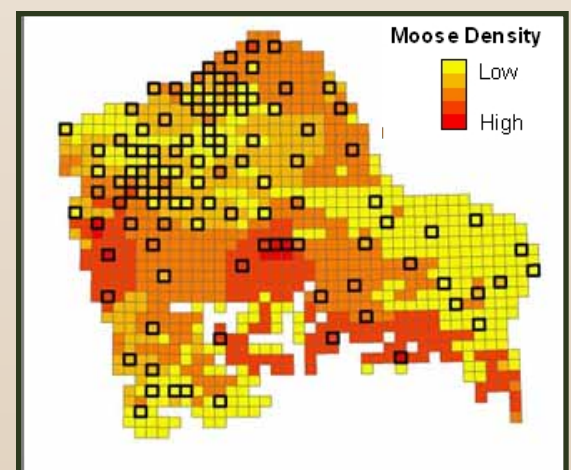


In this survey unit example from Unit 20A:

- ❖ 44 minutes were spent surveying the unit.
- ❖ 64 linear miles were flown.
- ❖ 3 cow:calf pairs and 1 medium bull were counted.
- ❖ 7 moose were found in 6 square miles for a density of 1.2 moose per square mile.

To the left is a track from a GPS in a plane conducting a survey of a sample unit.

2.5 × 2.5 miles



Biologists try to survey as many sample units as possible. In Unit 20A for example, an average of 120 units are usually flown. The sampled units (bold black) are used to estimate moose density in unsampled units using statistical modeling. The more sample units counted, the smaller the estimated survey error.

This is a simplification of a complex process. If you would like to understand even more about aerial moose surveys, look up the publication *GeoSpatial Survey Operations Manual*.

<http://winfonet.alaska.gov/sandi/moose/surveys/documents/GSPEOperationsManual.pdf>

We don't see all the moose

To determine how many moose we miss during an average survey, we double check how well moose were spotted using radiocollared moose.

In addition to survey planes, we send out a radiotracking plane to locate radiocollared moose. After surveying a unit, the survey plane and the radiotracking plane compare data and see if all radiocollared moose in a unit were spotted.

We repeat these trials in different areas with different habitat types to get an idea of how often we miss moose in a survey unit and to determine a sightability correction factor for the different areas. In Unit 20A the sightability correction factor is 1.2, which means we estimate 1.2 moose are actually on the ground for every moose seen by the survey crew.



Radio collars only came into widespread use in the past 30 years. They have revolutionized wildlife management and led to much greater precision in data collection.

Radio collars allow biologists to track and find individual moose at any time for a variety

of reasons. Much more expensive GPS collars record movements using GPS technology that can be downloaded from memory chips in the collar or from satellites so moose movements can be tracked without flying.

Information we get from moose surveys

- ❖ An estimate of a moose population over a large area.
- ❖ Moose distribution data.
- ❖ Ratio of bulls to cows (indicator of hunting pressure).
- ❖ Ratio of calves to cows (estimate of productivity and survival).
- ❖ Number of cows having twins (spring surveys).
- ❖ Age structure of bull moose in the population (based on antler size).

Managing Moose

Intensive Management Means More than Killing Wolves and Hunting Bulls

In 1994 the Alaska State Legislature adopted a statute which mandated the Board of Game to designate intensive management areas containing certain populations of moose, caribou, and deer in the state.

Intensive management is not simply predator control. Intensive management is 'the active management of a wildlife population, consistent with sustained yield, that will enhance, extend, and develop the population to maintain high levels or provide for higher levels of human harvest.' (AS 16.05.255 (k)(4))

When moose populations are at low density in intensive management areas, predator control may be necessary to help moose numbers increase. But in urban or near-urban areas such as Units 20A, 20B, and 20D this is not usually the case. These areas have some of the highest moose populations. With high populations comes the responsibility to harvest those moose. This cannot come from harvesting only bulls. In high density areas, managers are especially concerned with maintaining a healthy population and ensuring habitat quality remains high. Harvesting across age and sex class (bulls, cows, and calves) allows managers to maintain healthy populations and protect the habitat from overbrowsing, while at the same time increasing hunting and harvest opportunity.



Dense Moose Populations Are Less Productive

A high population and high productivity are not the same. In fact, dense moose populations are less productive than sparse ones. We see this in all dense moose populations in the state. In dense populations cows are nutritionally stressed, which is reflected in lower twinning rates and older age of first reproduction. Compare that to low density areas where twinning rates can be very high, cows give birth at an early age because there is plenty of food, and moose are in excellent condition.

If the goal is to optimize harvest, a productive population is needed. The most productive moose populations occur at levels below the maximum densities that habitats can support. Managers need to manipulate harvest of different sex and age classes to maintain a balance between populations and their habitats.

Antlerless Moose Hunts

What is antlerless?

Antlerless and cow are often used interchangeably, but they are actually not the same thing. Antlerless means just what it says – a moose without antlers. So, in an antlerless hunt, a bull without antlers is a legal animal, as is a calf moose, or a cow, unless the permit carries further restrictions or conditions. For example, a permit might specify that only cows without calves are legal in an area. Check permits for specific conditions of antlerless hunts.

When does ADF&G recommend antlerless hunts?

In areas of the state with high moose populations, an antlerless harvest is sustainable and often necessary to protect habitat and population productivity. In general, the antlerless moose harvest is used to increase harvest opportunity in a population showing signs of nutritional stress and/or to keep a population from getting too large. In areas of the state with low or declining moose populations, cow moose harvests are not recommended because they can prevent a population from growing or cause further decline.

Antlerless moose hunts

- ❖ Stabilize a growing population and keep it within the capacity of the habitat.
- ❖ Help reduce the hunting pressure on adult bulls and maintain bull:cow ratio within management objectives.
- ❖ Increase sustainable yield of a population and help to meet intensive management harvest objectives.
- ❖ Increase public safety by reducing the risk of moose-vehicle collisions.
- ❖ Increase hunting opportunity.

How long will it take for the moose health to improve?

Moose forage may rebound quickly after populations are reduced through antlerless hunts. It may take longer for overall moose health to improve. Moose born during years with poor forage availability are smaller and in poorer condition, and not able to produce twins as well as those that are born with better food availability. There will be a lag time for twinning rates to increase. Eventually, calves raised with quality food will be larger and twinning rates will increase.



Heavy moose browse (brooming) on willows in Unit 20B

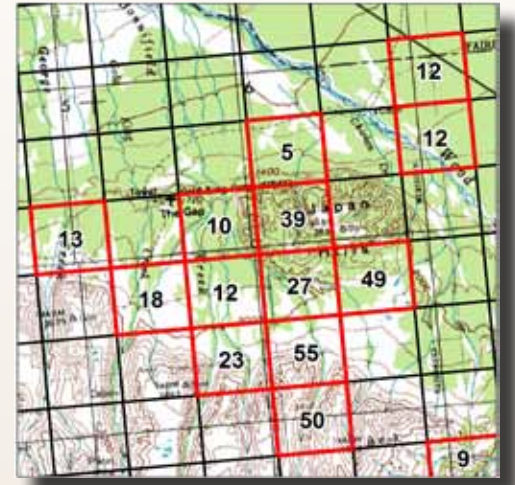
Where Did Our Moose Go?

Some hunters report that they are observing fewer moose in their hunting area while out in the field. These observations may be completely accurate, but there are also some important points to consider regarding moose observations.

- ❖ If the goal was to reduce moose numbers, there may be fewer moose in an area.
- ❖ Moose that are hunted may change their behavior – they may avoid trails or may flee after hearing a boat, 4-wheeler, or snowmachine.
- ❖ Moose may be reduced by hunting along access corridors such as roads, trails, or rivers.
- ❖ Habitat changes over time; old burned areas grow back to forest and lose the quality feed that attract moose. At the same time, more recent fires may provide moose with a new food source in an area that was scarcely used prior to the burn.

In 2009 a concerned hunter who lives in an antlerless hunt area told ADF&G managers he was not seeing any moose while traveling through the area where he once saw a lot of moose.

In response, ADF&G conducted a small-area, complete moose census in that exact area (counting every moose) and counted more than 300 moose. The actual numbers from the survey units are on the map to the right. The moose were there but were not seen from the ground. Several of the reasons moose were not seen are listed above.



Opposition to Antlerless Hunts

Antlerless hunts can be controversial. ADF&G can recommend antlerless hunts, but cannot decide to implement them. Only the Board of Game, with input from local advisory committees, can approve antlerless hunts. Once approved, antlerless hunts must be reappraised every year. Approval of the hunts has been tenuous in many years, for several reasons:

- ❖ Local opposition to an influx of nonlocal competitors.
- ❖ Moral or ethical objections to the harvest of cows and calves.
- ❖ Lack of trust in ADF&G data regarding moose numbers and nutrition.

Support for Antlerless Hunts

Despite the sometimes vocal opposition to the antlerless hunts in Unit 20, many hunters take advantage of the opportunity to put food in their freezers. While some of the same hunters apply for these permits each year, the overall number of hunters applying for antlerless hunts indicates a general willingness of hunters to take advantage of the moose abundance and aid sound game management by harvesting antlerless moose.



Hunters line up and camp out, sometimes days in advance for an opportunity to register for antlerless hunts on Minto Flats.

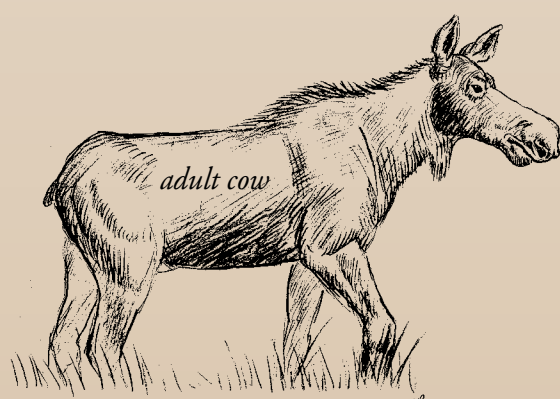
How valuable is this resource to Alaskans?

Since 2004, more than 32,600 antlerless permits have been issued (unsuccessful applicants not included) in Unit 20, which has resulted in the harvest of 6,000 additional moose.

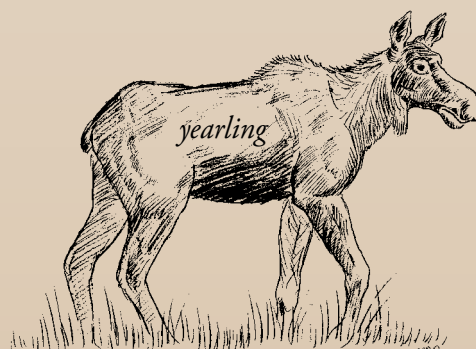
At an estimated 300 pounds of meat per animal × \$10 per pound of lean, organic meat, the antlerless harvest placed about **\$18 million** worth of additional meat into residents' freezers.

It's not just moose

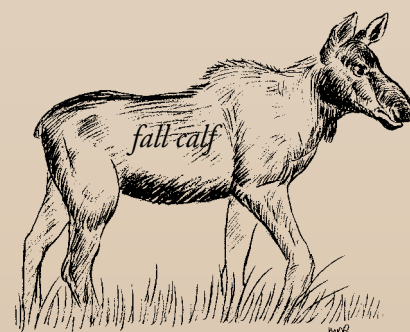
Females of other wildlife species have been harvested regularly in Alaska for many years. When appropriate, wildlife managers can allow the harvest of females of many species, including bison, caribou, sheep, mountain goat, deer, and bear.



Adult moose - Large size and long nose relative to the overall head size.



Yearling moose - Not quite adult size. Nose elongated but not fully grown. Still relatively short compared to overall head.



Moose calf - Up to 400 pounds by fall. Short nose relative to overall head.

Antler Restrictions – Why?

The main purpose of antler restrictions is to maintain hunting opportunity and longer seasons, while limiting the number of bulls that are harvested to sustainable levels. Antler restrictions are put in place on moose populations that are under a lot of hunting pressure. Antler restrictions are not intended to create trophy animals, but actually place more pressure on larger animals.

The most common restrictions that managers use locally are spike fork/50 inch, meaning you can only shoot animals with a spike or a fork on either side, or with a 50-inch or larger antler spread. If a moose has four (three in some areas) brow tines on either side it is also legal.

Without antler restrictions, a hunt might only last for a few days before a large number of bulls are taken. With antler restrictions in place that same area might remain open longer and allow opportunity for more people to get out and hunt.



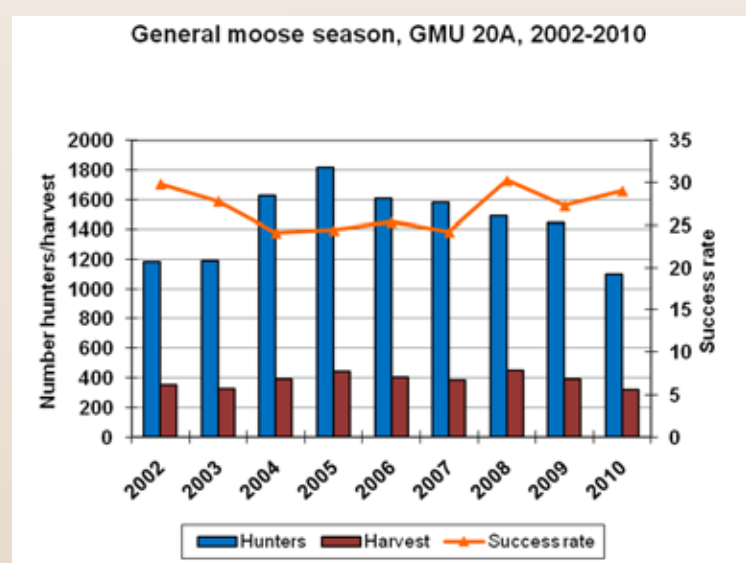
Ernie Finch with a 70-inch Unit 20A moose.

You can watch a video about judging antler size on the ADF&G website:

Home > Hunting > Hunting info by Game Species > Moose > More Resources > "Field Care of Big Game Meat" and "Is This Moose Legal" videos

Antler restriction and bull to cow ratios

In order to maximize hunter satisfaction and the breeding potential of fertile cow moose, managers in the Interior strive to maintain a bull:cow ratio at a minimum of 30 bulls:100 cows. An any-bull hunt in an area with high hunting pressure can significantly impact the moose population, even if the population is large. Between 1996 and 1999, high hunter success in unrestricted bull hunts in Unit 20A resulted in a decline of bull:cow ratios to 24:100. Antler restrictions were implemented and the bull:cow ratio recovered in a couple of years. Now, rather than have the ups and downs in the ratio, managers can maintain antler restrictions and provide a drawing for any bull permits based on population survey results.



Since antler restrictions were implemented in Unit 20A in 2002, the success of hunters hunting bull moose during the SF/50 general season hunt has been relatively high and stable at approximately 25–30%.

This trend along with bull:cow ratios exceeding 30:100, indicate bull moose are being harvested at sustainable rates.

How Do Scandinavia and Alaska Compare?

During fall 2009, about 300,000 hunters in Norway and Sweden harvested about 124,000 moose on a total land area of approximately 283,000 square miles. In Alaska, about 25,000 hunters harvested roughly 8,000 moose on 571,000 square miles. The estimated moose population in Scandinavia is about 350,000 moose, as compared to roughly 200,000 here in Alaska. However, we shoot 11 moose per thousand residents in Alaska, compared to 9 per thousand in Scandinavia. There are many differences between Scandinavia and Alaska that make it difficult to copy their success on a large scale. However, moose densities in Units 20A, 20B and 20D are similar to average densities in Scandinavia.



Hunters proudly exhibit two moose they harvested in Norway. Photo courtesy of Erling Solberg, a Norwegian moose researcher and hunter.

Predation is very low in Scandinavia since bears and wolves are relatively uncommon and not widely distributed. The annual harvested surplus consists of 40% calves and 20% yearlings. About 15–20% of the total harvest consists of adult cows, with adult bulls comprising the remaining 20–25%. Here in Alaska, bears and wolves take more of the surplus, even in high density areas. Thus our annual surpluses are lower than in Scandinavia, even at similar densities.

In addition, nutritional condition of Interior Alaska moose appears to be lower due to poorer quality habitat. Areas with the highest moose densities in Scandinavia experience milder winters and longer growing seasons than Interior Alaska. Scandinavian forests are intensively managed mainly through clear-cutting and regenerating plantations, and are often interspersed with farmland. This creates abundant, high-quality forage which makes Scandinavian moose more productive than ours, even at the same densities.

Scandinavian hunters lease land from landowners, and pay them the meat value of moose they shoot (about \$4,000 for an adult bull). However, they can sell meat they do not use at a profit on the open market. Trophies are rare, with few bulls living past 4.5 years of age. Hunters use dogs and radios to increase efficiency. Quotas are assigned to hunting teams, rather than individual hunters, and hunting success is very high (80–90% in most areas). Access is easy in Scandinavia, where virtually all moose are within a half mile of a maintained road.

The Alaska Department of Fish and Game strives to manage moose populations for long-term productivity and sustainability. This requires monitoring the nutritional condition of the moose and status of their primary food plants. The goal is to understand when corrective actions such as increased harvest or habitat improvements are warranted to reduce potential for population die-off in severe winters or range damage by prolonged heavy use.

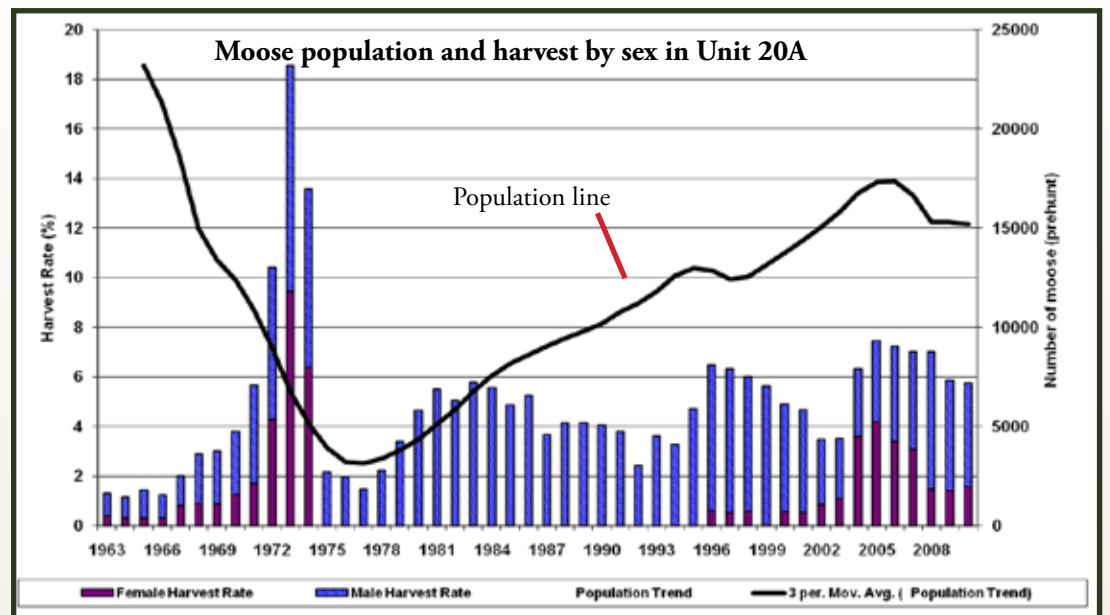
Game Management Unit Updates

Unit 20A – Area Status and Trends

Unit 20A includes the Tanana Flats and adjacent Alaska Range foothills – just south of Fairbanks. It produces more moose than any equivalent size area in the state and provides about 15% of all the moose harvested in Alaska.

A combination of factors contribute to Unit 20A's high moose population, including low bear predation on calves, historic predator control, quantity of habitat, decades of relatively mild winters, and a high number of trappers harvesting wolves.

Recent population estimates place the population at between 14,000 and 15,000 moose. Long-term research looking at indicators of nutrition (i.e., twinning rates, age of first reproduction, age of first twinning, weight of 10-month-old calves, and browse utilization) indicates the current habitat in Unit 20A can more appropriately support approximately 10,000–12,000 moose. The moose population must therefore be reduced since it is nutritionally stressed at its current levels.



The population of moose in Unit 20A went from about 23,000 moose in the 1960s down to 2,800 in the mid-1970s to about 15,000 today. Harvest rates of moose went from 1% to 2% of the population in the 1960s to 19% in the early 1970s and has hovered around 5% since the late 1970s.

Learning from the 1970s

In the early 1970s biologists did not have the tools to monitor wildlife and gather data used by staff today. Back then biologists believed that the moose population was declining primarily because of limited food supply, so they recommended a cow harvest to reduce the population.

In fact predation at the time was increasing due to a recovering wolf population that had been strongly reduced prior to statehood. Predation, a series of hard winters, and antlerless hunts drove the moose population to low levels. Predator control in the 1970s and early 1980s helped moose numbers increase and antlerless hunts were reestablished in 1996, after 21 years of closures.

The strategy today

Significant antlerless hunts were initiated in 2004 after a long period of population growth. The management goal was to slowly reduce the moose population from 17,000–18,000 moose to around 12,000 moose to protect the moose population's health and habitat quality and to meet harvest objectives.

We learned during 1996–2007 that cow harvest rates of 1–2% will not prevent growth, harvest rates of 2% will result in population stability, harvest rates between 2% and 4% will result in a slow population decline, and harvest rates of 4–9% will cause a much more rapid decline. From this, we feel confident that cow harvest rates of around 2% along with a harvest rate of 4% of bulls will maintain a stable population and sustainable harvest.

Moose in the winter

Winter weather can have a significant impact on moose populations. Mild winters allow populations to grow, but multiple severe winters can send a high population into a sharp decline. It is interesting to note that a series of harsh winters from 1989–1990 through 1992–1993 did not result in a moose population crash like that of the late 1960s–early 1970s, probably in part because moose densities were much lower (about half as many moose) and moose were likely in better condition.



Marc Lester, ADN

Moose have long legs and can get around in the snow pretty well. Wet, heavy snow makes moose movements more difficult than light fluffy snow. In general, research shows that calves start to feel the effects when snow reaches a depth of 32 inches, while the critical depth for adult moose is about 36 inches.

Fire on the flats

Prescribed fires are an integral component of intensive management to maintain and enhance moose habitat. But, many members of the public are opposed to prescribed fires because of the potential for smoke in Fairbanks and the risk of the fire escaping and burning uncontrolled.

The Alaska Department of Natural Resources conducts prescribed fires in Alaska. An approved burn plan has been in place for the western Tanana Flats since 1994. Conditions have been suitable on several occasions but the fire was not ignited either because equipment/crews were not available or there were rapid changes in weather.



"I am dedicated to managing moose in our area to provide as much hunting opportunity as possible, within sustainable limits, while protecting the moose population's health and habitat over the long term."

— Don Young, Units 20A, 20B, 20C, 20F, and 25C Area Management Biologist. Don began his career with ADF&G in 1997 and has been the Fairbanks Area Biologist since 1999.

Twinning rates in Unit 20A



Twinning rates averaged 37% (1977–1982), when moose densities were about 10 times lower than today, indicating that the Unit 20A moose population is capable of high twinning rates under favorable nutritional conditions.



Unit 20B – Area Status and Trends

Unit 20B consists of much of the road system outside of Fairbanks – north of the Tanana River. It also encompasses Minto Flats. Because the Unit 20B moose population has been steadily increasing, several antlerless hunts have been implemented over the past years.

Why so many moose?

The population in Unit 20B is growing more rapidly than Unit 20A. Between 2001 and 2009 it increased from 12,000 to 20,000 moose!

The rapid increase in the moose population occurred due to several factors:

- ❖ Moose survival is high, especially because trappers and hunters are reducing predators in the area. Hunters have harvested about 150 black bears per year for the past 15 years, and have also typically taken a significant number of wolves and grizzlies.
- ❖ Many areas that burned in the large fires of 2004 and 2005 are now 6–7 years old and provide great summer and winter browse for moose with lush new growth of herbs, willows, and aspen.
- ❖ Winters have been mild for several years with low snow and without extended periods of extreme cold, which has increased moose survival.

What now for Unit 20B?

Research on nutritional indicators has shown that the current moose population in Unit 20B is nutritionally stressed, similar to the population in neighboring Unit 20A. Moose numbers are too high for available habitat, and are still growing. The first objective is to stop the moose population growth. If action is not taken now it will be more difficult to manage later. This can only be done by allowing hunters to harvest antlerless moose.

Managers strive to reduce large fluctuations in the population by allowing hunters to take more moose. There are a lot of good data for Unit 20B and with hunter participation, the herd can be managed to meet objectives.

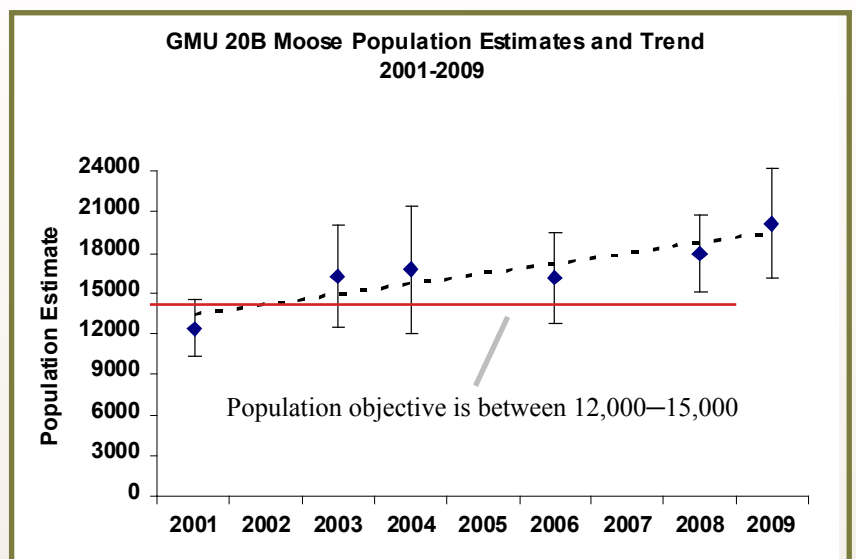
Drawing hunts reduce crowding

Hunters often complain that antlerless hunt areas in Unit 20A are too crowded, with too many hunters in one place at one time. Managers recognized this and have changed the management strategy. Because Unit 20B has a lot of people and a lot of populated areas, 40 separate drawing hunts were implemented to spread hunters out in time and place in 15 different areas and at 3 different time slots.

These drawing hunts have been very successful and as a result there have been very few complaints from hunters or other members of the public. Most people don't even see another hunter while in the field. The target right now is to stabilize the population with a harvest of 6% bulls and 2–3% cows from the prehunt population.

The Fairbanks Management Area

The Fairbanks Management Area (FMA) encompasses the city and suburbs of Fairbanks and is only open to bowhunting for moose. The FMA is the one area in the state that most closely resembles the Scandinavia moose management situation. Unlike most of Alaska which can sustain an annual harvest of about 5% of the moose population, the FMA's sustainable harvest is more like 30% (obtained through archery harvest and vehicle kills). This is due to very low numbers of predators, road access to almost all areas, a lot of human disturbance which creates good moose food, and harvest of cows and calves.



Biologist/Pilot Tom Seaton studied winter moose browse for his Master's thesis and developed a moose browse survey technique used across North America. Tom began his career with ADF&G in 1996 and is the Assistant Fairbanks Area Management Biologist and manages Unit 20B moose.

Browse surveys are conducted to assess the extent to which moose use their habitat. The amount of browse removal allows biologists to determine whether the area can support more moose or if the population is too high. High browse use in an area coincides with nutritional stress indicators such as lower twinning rates and lower calf weights.



Moose like disturbed areas because they provide lush growth of herbs and shrubs. That is why they often feed along the edge of our roads.



Every year nearly 100 moose get hit by cars just in the Fairbanks Management Area. Moose find good food along the road system and escape deep snow by getting on the roads.

Unit 20D – Area Status and Trends

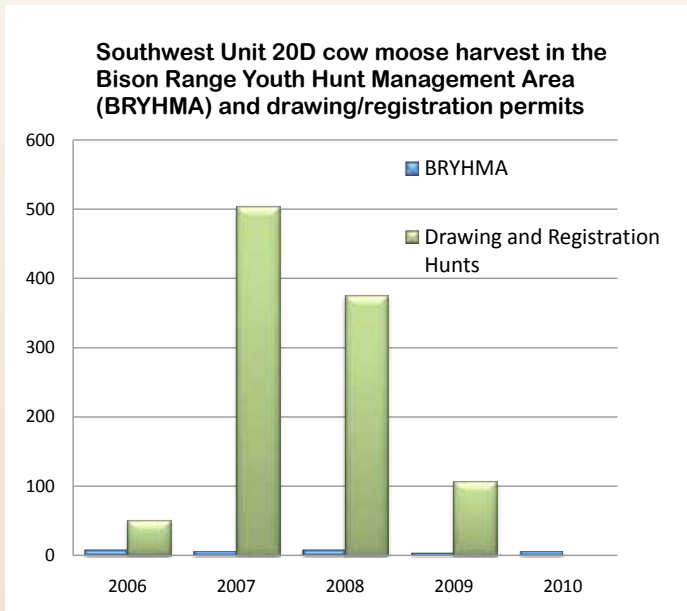
Unit 20D is located around Delta Junction. Antlerless hunts have been implemented in Unit 20D to bring the population into balance with its food resources.

Intensive moose management was adopted by the Alaska Board of Game for Unit 20D in 1995 with a population objective of 8,000–10,000 moose. That objective is currently being met.

Unit 20D moose north and south of the Tanana River are managed separately. The southern population is at a very high level while the northern population is at a moderate level but is likely increasing as a result of large wildfires in the area in 2003 and 2004.



Steve DuBois, in the field placing a radio collar on a bull moose.



The southern Unit 20D moose population increased from 1995 and reached its highest density in 2006. Research indicated that the population was nutritionally stressed. As a result, from 2006 to 2009, antlerless moose hunts were conducted in southwest Unit 20D to reduce and stabilize the population. Since 2006, 1,056 cow moose have been harvested and the population was successfully reduced to about 2003 levels. Antlerless moose hunting was suspended in 2010 to evaluate the trend of the moose population.

“In 2010 we suspended the antlerless hunt after conducting it for 4 years, and are evaluating whether the moose population density needs further reducing or to be held stable at the current level (i.e., resume antlerless hunting). Most likely the population is going to start increasing again without antlerless hunts.

We have the largest amount of information ever put together for Unit 20D including population estimates, twinning surveys, browse survey data, calf weights, and movement data.”

— Steve DuBois, Delta Area Management Biologist from 1987 until retirement in 2011.

Southern Unit 20D moose management efforts

- ❖ Population estimate survey in November 2010.
- ❖ Ongoing calf twinning surveys in spring 2010 and spring 2011.
- ❖ Extensive survey of browse removal by moose during winter 2009–2010.
- ❖ Calf weights collected in fall 2009.
- ❖ Moose movement study.
- ❖ Public meetings to review the data and develop recommendations for future management options for the Unit 20D moose population held in spring 2010.



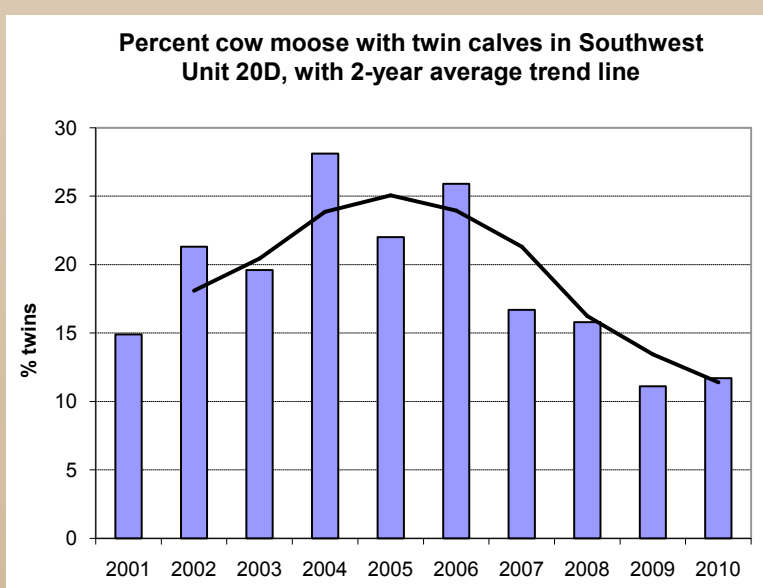
Two bull moose spar, Unit 20D. Southwest Unit 20D's radiocollared bull moose first reach a 50-inch antler spread at 6 years of age.

Important notes about Unit 20D

- ❖ Southwest Unit 20D calf moose have some of the lowest weights in Interior Alaska, averaging only 340 pounds, which indicates that cows are in poor nutritional condition.
- ❖ Moose browse shows evidence of prolonged heavy browsing, particularly in the mountains. This may result in death of the plants.
- ❖ Overwinter moose browse removal was reduced substantially after cow harvest.
- ❖ Southwest Unit 20D's radiocollared adult moose have good survival, which indicates that hunting is necessary to remove cows if population reduction is the goal.



Many public meetings were held in Delta to discuss the antlerless hunts proposed by ADF&G.



Twinning rates in Unit 20D

Currently in Unit 20D biologists are closely monitoring twinning rates to see if they start to increase.

After the cow moose hunts in Unit 20D, the amount of browse removed by foraging moose was reduced from 25% to 15%. This significant decline will allow better quality browse to develop and become available to moose.

How long it takes for more available food to translate into better health and increased twinning rates is yet to be seen.

Moose Research in the Interior



Scott Brainerd

Scott Brainerd is the Region III Research Supervisor for Wildlife Conservation. Scott worked in wildlife research and management in Scandinavia for 20 years before returning to Alaska in 2008.



Rod Boertje

Biologist/Pilot Rod Boertje has been researching moose and caribou for most of his 30 years with ADF&G. Rod has worked on over 30 peer-reviewed publications and is considered a leader on predator-prey issues.



Kalin Kellie

Since being hired with ADF&G in 1999, Kalin has worked on several moose research projects in Interior Alaska related to nutritional status and moose survey techniques. She also flies fixed-wing aircraft for the department.



Mark Keech

Biologist/Pilot Mark Keech has worked on various research projects involving moose and their predators since 1994.

Research Supports Management

Research is a necessary component of our game management programs in Region III. Research efforts on moose, their predators, and habitat have a long and storied history here in Interior Alaska. It all began with Dr. Bill Gasaway's groundbreaking research that helped managers understand the population crash of the 1970s and design management strategies to increase moose numbers. Research staff have produced dozens of scientific articles and reports on moose and related topics for international science journals, and our senior researchers are recognized as experts by their peers.

Over the years, our moose research staff has worked closely with managers to improve our knowledge and management of moose populations in Interior Alaska. Work has focused on understanding relationships between moose and their habitats and predators, and how factors such as fire and hunting influence these relationships. Research has also been an essential component in developing sophisticated tools for reliably counting moose and has been essential for the success of our management programs in Unit 20 and elsewhere in Region III.

Natural mortality rates of male vs. female moose

Rod Boertje is nearing completion of a 5-year research project that will answer several questions about moose mortality. Do bull moose have similar survival rates as cows? Are hunters the main cause of death of bull moose over 1 year of age? At what age do moose first have average antler spreads of 50 inches?

Boertje's study area is Unit 20A which has a high population but low birth rates. The competition for food and its availability keeps this population at the lowest nutritional status found among moose populations in North America.

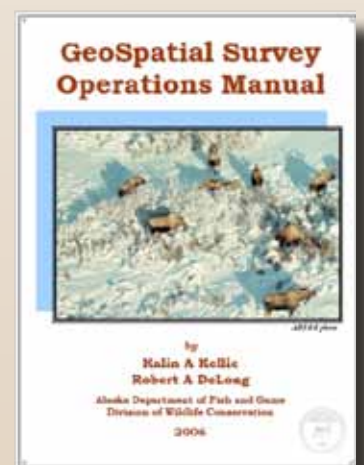
In 2010, Boertje monitored dozens of radiocollared moose at least monthly. He gathered data on mortality and birth rates to assist managers in the decision-making process for hunting opportunities. Boertje intends to monitor these 105 collars until his sample size of males and females diminishes to less than 10 moose. Several publications based on the data are available, and more publications are forthcoming. This work has been an essential basis for proper management of the Unit 20A moose population.



Improving survey methods

Kalin Kellie is investigating options for improving our geospatial population estimator (GSPE) during a 5-year research project. The GSPE method was first used in 1997 to assist biologists in estimating how many moose were in an area when conducting an aerial survey.

Kellie intends to use data gathered from 10 years of trial surveys on existing radiocollared moose. During a trial survey, an area is searched multiple times. Now that several years of GSPE survey data are available, Kellie will use these to test the GSPE's reliability for detecting long-term population trends. The results from the applicable model are intended for use throughout Interior Alaska and may be applicable to other species.



Determining the nutritional status of moose in high density populations

Kalin Kellie is researching the nutritional impact wildfires have on Interior moose populations. The study areas are intensive management areas with high density moose populations. A measurement of population nutrition is vital to determine management strategies.

Previous research studies show that calf weights are the most sensitive indicator of nutritional status in moose populations. Using that information, Kellie gathered weights from 260 moose calves in areas of Units 20A, 20B, and 20D during March 2009 and 2010. Kellie's survey study areas were affected by additional wildfires during the course of her research project. Fieldwork has concluded and analysis and writing of the data will be her focus in 2011.

Response of moose to a reduction of predators

Mark Keech is wrapping up a 6-year study of the moose population in Unit 19D East near McGrath. Biologists tranquilized, collared, and translocated grizzly and black bears out of the study area during 2003 and 2004. Since 2004, private citizens can obtain permits from ADF&G to take wolves within the study area using aircraft during the winter. These efforts have reduced predator numbers within the study area, providing a unique opportunity for Keech to investigate the effects of predator reduction on the moose population. Moose survival has increased significantly leading to more moose available for harvest.

In order to learn moose survival rates and movements related to predator removals, Keech placed radio collars on calf, yearling, and adult moose and tracked them throughout the study. He helped conduct population estimates and gathered data on calving and twinning rates of moose. Keech also took into consideration such factors as physical condition, weather, population density, and age when developing models to help identify the most important factors influencing moose survival.

Preliminary results indicate calf survival is most affected by bear predation and winter severity, while yearling and adult moose survival is influenced by wolf predation but not by winter weather. Other factors such as age and physical condition also affect moose survival.



Tom Paragi

Tom has worked on habitat enhancement and management, moose, and game bird research in Interior Alaska since 1999.



Biologists count the willow, aspen, and birch twigs within plots and record the diameter of the twigs. With this information, they can evaluate production and removal rates of moose food.



Craig Gardner

Since 1979, Biologist/Pilot Craig Gardner has worked on bears, bison, caribou, lynx, moose, wolf, and wolverine.



Kimberlee Beckmen

ADF&G Veterinarian Kimberlee Beckmen works on wildlife throughout the state. She cooperates on several ongoing research projects and has written numerous scientific reports and journal articles about diseases and parasites in moose, caribou, and marine mammals.

Habitat evaluation techniques for moose management in Alaska

To meet intensive management goals we need to better understand the quality of habitat, impacts of snow depth, and availability moose food. Biologists Tom Paragi and Kalin Kellie are in the fourth year of a 5-year research project to obtain information that will help managers plan effective moose management strategies.

Paragi, Kellie, and Tom Seaton are conducting browse surveys to measure how much browse is produced and what proportion of the annual growth the moose are eating. Higher browse removal corresponds to lower twinning rates for cows.

Deep snow conditions cover food and force moose to move about in winter and expend more energy reserves. To learn more about the effects of snow depth, Paragi and Kellie are currently gathering data from snow gauges throughout the Interior. This will allow staff to record snow depth and infer its effects in various game management units.

Movements and sightability of moose

Surveys show that moose are relatively abundant on the Yukon-Innoko floodplains in late winter but it is not known if the same moose are present during the hunting season in September.

Understanding moose movements in the Yukon-Innoko area is just one of several questions researched in a joint project by ADF&G, the Bureau of Land Management, and the U.S. Fish and Wildlife Service. In March 2010, ADF&G research biologists Tom Paragi and Kalin Kellie fit 30 cows and 24 bulls with GPS collars to monitor year-round movements of moose in this area. A GPS collar, although more expensive to buy, monitors the detailed movements of moose without the need for expensive telemetry flights. This project is slated to run for 3 years.

With the data gathered from the GPS collars, biologists are also trying to estimate the number of moose not seen during late winter surveys. It may seem easier to count moose on a sunny day from an airplane, but in reality the sun creates shadows and glare making it more difficult to spot them than on a flat-light day.

Estimating twinning rates is another component of this research project. Biologists typically fly surveys to estimate moose twinning rates. Using the 30 GPS-collared cows in addition to transect surveys provides a larger sample size for biologists to more accurately determine twinning rates in areas where moose are at low to moderate abundance in early summer.

Breakaway wolf snares

Since 1993, ADF&G and private trappers have developed and tested wolf snares designed to release moose and caribou but restrain wolves. Current testing and development by ADF&G biologist Craig Gardner shows promising results.

By studying how moose encounter a wolf snare, Gardner found that incorporating two modifications to the snare resulted in fewer moose catches and fewer injuries to moose while reliably holding wolves. Both modifications can easily be made by trappers or a commercial snare company.

You can view the brochure at the Alaska Trappers Association's website alaskatrappers.org or pick one up at the ADF&G office in Fairbanks.



What's in my meat?

Veterinarian Kimberlee Beckmen monitors disease and parasites in moose populations throughout Alaska. One of the most common questions from hunters relates to tapeworm cysts, a common occurrence in the muscle and liver of moose. People cannot be infected by these tapeworms, but dogs can. It is not advisable to feed raw moose scraps to dogs.

Recent research revealed that 80% of moose muscle cysts are bear tapeworms, the other 20% are wolf tapeworms.

Moose get tapeworm by eating vegetation that has been infected by bear or wolf droppings.

For more information go to the ADF&G website and look under Species>Parasites and Diseases.

www.adfg.alaska.gov/index.cfm?adfg=disease.specieslist

To find ADF&G research publications go to

www.adfg.alaska.gov/index.cfm?adfg=librarycollections.publicationsreports



Tapeworm cyst

Public Involvement and the Regulations

ADF&G does not create the rules within the hunting regulations book. The Board of Game actually makes the decisions about wildlife management based on proposals submitted by the public, local advisory committees, and/or ADF&G. ADF&G also provides management and research data to the board to help them make their decisions.



Advisory Committees – Get Involved

Fish and Game advisory committees represent local areas – they are the local “grass roots” groups that meet to discuss fish and wildlife issues and to provide recommendations to the Board of Fisheries and the Board of Game. The advisory committees in Units 20A, 20B, and 20D are the **Minto/Nenana, Middle Nenana River, Fairbanks, and Delta**.

Meetings are always open to the public and are generally attended by department staff and members of the public who can offer background information on agenda topics.

Learn more about the Interior advisory committees?

Go to our website and look under Regulations - Advisory Committees - or contact the Interior Region Boards Support staff.

Interior Region - Nissa Pilcher
1300 College Road
Fairbanks, AK 99701-1551
Phone: (907) 459-7263
Fax: (907) 459-7258
nissa.pilcher@alaska.gov



Nissa Pilcher with a Dolly Varden on the Unk River.

“As moose hunters you should know that there are over 80 local Fish and Game advisory committees (AC) spread throughout Alaska. Their job is to make sure our communities are really involved in the process of making good, workable regulations for Alaskan hunters – like you.



Mike Tinker has been on the Fairbanks advisory committee for more than 20 years.

Advisory committees have meetings before the Board of Game meets to discuss and vote on proposals to change regulations, or to add new ones. In road-accessible communities like Delta Junction, Healy, or Fairbanks, the ACs meet frequently. Large areas, like Fairbanks, have ACs with up to 15 members and some of the smaller villages have a lesser number.

These groups gather ideas for new proposals, discuss problems with the public and representatives from the department and decide what information to pass on to the board. Advisory committees send in proposals for regulation changes, comments on other proposals and send representatives to the board meetings for testimony to the board and discussions with board members.

Advisory committee members are elected from the communities they serve. Advisory committees have some authority passed down directly from the Alaska statutes. They are designated areas of responsibility by the boards of fisheries and game, usually by specific game management units.

Most ACs focus their efforts on the local area but keep an eye open for proposals that might set a precedent that could come to their local area. Remember, all hunters and nonhunters alike are welcome at the local advisory committees. Almost every one of us got started because we had a question or an idea to make things better, more clear, more fair, etc.” — *Mike Tinker*

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- U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington, VA 22203
- Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street NW MS 5230, Washington DC 20240.

The department's ADA Coordinator can be reached via phone at the following numbers:

- (VOICE) 907-465-6077
- (Statewide Telecommunication Device for the Deaf) 1-800-478-3648
- (Juneau TDD) 907-465-3646
- (FAX) 907-465-6078

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