

# Protocol Development Summary

**Protocol:** Moose

**Parks Where Protocol will be Implemented:** BELA, GAAR, KOVA, NOAT

## **Justification/Issues being addressed:**

Moose (*Alces alces*) are an integral component of the boreal ecosystem in the ARCN. Moose have the potential to alter the structure and function of vegetation communities through browsing and biogeochemical cycling. Abundance of this species in the boreal forest is tightly linked to disturbance regimes, in particular fire. Moose are considered good indicators of long term habitat change within park ecosystems because they require large quantities of resources from their habitat year round, and populations have the potential to respond dramatically to long term changes in resource conditions. Moose are crucial to many subsistence communities as a primary source of food throughout most NPS lands in Alaska in addition to being harvested by the general public on NPS Preserve and Monument lands.

## **Specific Monitoring Questions and Objectives to be Addressed by the Protocol:**

Some of the specific monitoring questions that will be addressed by this protocol include:

- What are the long-term trends in moose population numbers in the ARCN?
  - Are abundance, sex and age composition, and distribution changing in the ARCN?
  - What is the variation in time and space of the seasonal movements for moose in ARCN
  - Is there a correlation between key environmental/weather factors and the distribution, productivity and sex and age composition in moose in ARCN?
1. Determine changes in abundance, distribution and composition of moose in ARCN. **Justification.** *Abundance and distribution are basic measurement of population health and status of moose. Sex and age composition are important variables to any evaluation of population change and will be collected during the abundance/distribution surveys.*
  2. Estimate calf survival and recruitment success for moose in ARCN. **Justification.** *Reproductive success is a primary demographic parameter that provides critical information for understanding patterns of population change. Hence, these data can be used to understand trends, focus management action and money, and identify hypotheses for further evaluation.*
  3. Estimate human harvest of moose in ARCN. **Justification.** *Monitoring annual human harvest is an important demographic parameter in understanding population change; population trends can thus be better understood from monitoring the interaction of these demographic parameters.*

**Basic Approach:**

Monitoring moose populations in ARCEN will employ the use of an aerial survey method developed by Gasaway et al. (1986) and modified by Ver Hoef (2001, 2002). These survey methods are in wide use across the state and allow for comparison across survey areas. The survey areas are delineated using a geographical information system (GIS) and survey area have been identified for the ARCEN parks. Survey areas are divided into grids of rectangular sample units of 2 degrees latitude and 5 degrees of longitude. Sample units will be stratified into high or low density based on habitat characteristics or stratification flights conducted before the surveys. High and low units will be randomized for order of sampling at the start of the survey. Fall surveys will provide information on population levels as well as sex and age composition of the moose population. Survey areas will be sampled on a rotational basis.

**Principal Investigators and NPS Lead:**

NPS principal investigators will be Brad Shults, Jim Lawler and John Burch. Cooperators will include Jim Dau (ADF&G), Glen Stout (ADF&G), Tony Gorn (ADF&G), Nate Olson (USFWS), Lisa Saperstein (USFWS), Kyle Joly (BLM), and Tim Craig (BLM).

**Development Schedule, Budget, and Expected Interim Products:**

Regional protocols already exist for conducting moose surveys. Therefore, protocol development will not require field research. ARCEN will employ the same protocol as developed by the Central Alaska Network (CAKN). Therefore, protocol development for this vital sign will consist of writing a new sections in the protocol narrative and SOPs to make the existing protocols specific to ARCEN parks, such as describing survey area locations and documenting how data will be entered into NPS computers, analyzed, and reported.

The P.I.'s will produce a draft moose survey protocol ready for external peer review by FY 2009. After peer review, revision and approval, we hope to implement the protocol in November 2010. No funds are budgeted for development or testing of this protocol.