MAINE STATE LEGISLATURE

Report to the Joint Standing Committee on Inland Fisheries and Wildlife

As Required by 12 MSRA Section 11552

Proposed Actions for Moose Management in Regards to the Number of Permits Issued, the Length and Timing of the Annual Moose Hunting Season

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In response to the requirements set forth in Title 12 MSRA, 11552, subsection 2, the Department of Inland Fisheries and Wildlife submits the following report on the actions taken and proposals for the management of moose relative to the number of permits, season timing, and the areas open to hunting.

Highlights of 2017 Moose Report

- Overview of management actions taken
  - Conducted composition surveys in 6 Wildlife Management Districts (WMDs) by helicopter
  - Conducted abundance counts in 2 WMDs by helicopter
- Review of 2016 moose hunt
  - Preliminary Harvest: 1,533 moose
- 2017 Moose season information
- Controlled moose hunt summary
  - Successful 8th year of operation, 24 moose harvested
- Review and report on adult female and calf survival study
  - Study initiated in WMD 8 in January 2014 with 60 moose (30 adult females and 30 calves) fitted with GPS collars
  - Study expanded to WMD 2 in January 2016
  - January 2017 fitted 36 GPS collars on calves in WMD 8 and 37 in WMD 2
  - Currently have 165 GPS collared moose combined in WMD 8 and 2

Moose Management Actions

MDIFW has publicly derived management goals and objectives for many of the species it manages, including moose. Current moose management goals and objectives are to manage moose in northern, western, and Downeast Maine (the Recreation Management Area) at a level that would maximize both hunting and viewing opportunities. Whereas, in northeastern Maine and in several WMDs in central Maine (the Compromise Management Area) the goal is to balance the public's concern about moose/vehicle collisions with the public's desire to hunt and view moose. The moose management goal in southern coastal Maine (the Road Safety Management Area) is to reduce the moose population to the extent necessary to minimize the danger to motorists.

After 7 winters, Department staff have completed aerial surveys (flights to estimate moose numbers and flights to determine composition of bulls, cows and calves) of the majority of our state's prime moose range. In collaboration with the Maine Forest Service Ranger Pilots, the Department conducted aerial surveys for estimating moose abundance across 83% of this area (WMDs 1-6, 8, 9, 11 and 19). This technique provides the Department with a reliable method for tracking changes in moose abundance. The moose population in the WMDs that were surveyed is representative of the core of Maine's moose population. Although WMDs 7 and 10 were not surveyed because of mountainous terrain and logistical difficulties, IFW biologists can estimate moose densities in these WMDs based on moose harvest rates, habitat characteristics, and moose sighting rates. The Department anticipates having the ability to conduct aerial surveys in

WMD 10 at a later date. In conjunction with the density estimates staff have also completed aerial surveys (composition counts) that allow determination of the percentage of bull, cows and calves in these units. To date, surveys have been completed in WMDs 1-9, 14, and 19. These surveys provide staff with reliable data on bull to cow ratios which is one of the required measurements in the moose management system. IFW strives to maintain a certain percentage of mature or prime bulls in each WMD's moose population through harvest regulations. This includes ensuring minimum ratios of mature bulls to cows and a minimum ratio of mature bulls among all bulls in the population. If the percentage of bulls falls below the threshold set for a given WMD, the number of bull permits allocated must be reduced. This is important for maintaining reproductive success and a healthy moose population.

In addition, the Department has obtained reliable data on the number of calves per adult cow in these areas. Calf /cow ratios give Department biologists insight on changes in moose population growth, whether the moose population is approaching the carrying capacity of the habitat, and on changes in moose calf mortality rates.

Department staff have been evaluating the role of winter ticks and lungworm as a source of mortality in moose. Heavy winter tick loads on moose, especially on calves, can be debilitating and is likely a significant factor in spring moose mortalities. In a heavy tick year, not only will there be higher than normal overwinter losses of calves but adults can succumb to heavy tick loads as well. The Department has been working to better understand the frequency of "bad" winter tick years, the geographical distribution of winter ticks across the state, and the effects of ticks on various sex and age classes of moose.

With the collection of reproductive data (ovaries) on moose and the aforementioned survey data, IFW has the ability to reliably assess moose abundance, population composition, and reproduction. However, there is still much to be learned and quantified regarding moose mortality rates. Population modeling of moose has demonstrated that population growth can be very slow. The Department is investigating ways to quantify mortality rates by embarking on a 5-year study of adult female and calf survival (see below). *Thus it is imperative that hunting mortality continues to be carefully controlled and managed based on the best available science*. Current permit allocations reflect both the best available science and uncertainties surrounding moose mortality rates. Given the precipitous decline of moose in Minnesota and concerns in New Hampshire the Department must act prudently in permit recommendations.

Over the last 3 years, permit numbers have stabilized or decreased in most northern WMDs. Downeast, central, and eastern WMDs permit levels have declined and antlerless permits have been reduced either because population objectives have been met or populations are likely below objective. In our most northern WMDs (1, 2, and 4), the Department recognizes the cooperation and responsibilities of landowners within the North Maine Woods where current infrastructure can be stressed during a 6-day moose hunt. The Department is working with these stakeholders to better understand issues between moose hunters and the operations within the working forest. Opportunities to

improve the season structure and framework to better address the needs and issues with the North Maine Woods is currently taking place as part of the Departments' big game planning process for moose management.

The Department has moved into a very positive position where it can reliably and effectively assess moose population trends in Maine and provide the highest level of management for the people of the state. With financial support and our continued partnership with the Maine Forest Service and University of Maine Animal Health Lab IFW staff will continue to move Maine to the forefront of moose management.

2016 Moose Season Summary

Maine moose hunters could hunt moose for 6 days by permit within the structure of a split season framework (September/October/October) during 2016. The September season, which occurred in WMDs 1-6, 11, and 19, ran from the 26th to October 1st; the October season, which occurred in WMDs 1-14, 17-19, 27, and 28, ran from the October 10th through the 15th; , and the late October season in WMDs 1-4 and 19 ran from the 24th to the 29th. In addition, 2016 marked the tenth southern Maine moose hunt in Department history and covered southern WMDs 15, 16, 23 and 26. WMDs 22 and 25 were added as well for 2011. The southern hunt ran concurrent with the November deer season from October 31st to November 26th and opened for Maine residents on October 29th. The Department timed this hunt to provide additional opportunity for hunters who wanted to hunt moose, which occur in low densities in these WMDs, along with deer. By combining moose and deer hunting in the same season the Department was able to alleviate landowner concerns about creating another separate hunt in southern Maine.

The annual allocation of moose permits is related to the publicly-derived management goals for each WMD. Permit levels may change from one year to the next if significant changes occur in moose population trends, population composition, or if management objectives have been reached. The Department's implementation of aerial surveys and collection of reproductive data is enabling biologists to make permit recommendations based on more reliable data than has historically been available for moose management.

The southern Maine moose hunt in WMDs 15, 16, 23, 25 and 26, provided an additional 105 Any-moose Permits. An Any-moose Permit allows the permittee to harvest either a bull or cow. The total number of moose permits issued in 2016 was 2,140.

Preliminary registration data indicate that 1,533 moose were harvested in 2016 (577 in September, 762 in October, 193 in the 2nd October season and 18 in southern Maine). Thus hunter success rates averaged 80%, 70%, 88% and 17% for the September, October, 2nd October season and Southern Maine hunt respectively. For the southern Maine moose hunt, the overall success rate was 17% as would be expected given the low moose densities in this region. To insure hunters understand why the success rate for moose hunters in southern Maine is low, the Department provides information on its website on hunting conditions, land access issues, and moose hunting success rates.

2017 Moose Season Framework

In 2017, there will be 4 separate moose hunting periods in Maine – a September hunt, 2 October hunts, and a November hunt. The September season will run from September 25th to September 30th in WMDs 1-6, 11 and 19; the October season from October 9th through the 14th and include WMDs 1-14, 17-19, 27, and 28. The second October season in WMDs 1-4 and 19 will run from October 23rd through October 28th. In WMDs 15, 16, 23, 25 and 26, the season will coincide with November's deer season running from October 30th through November 25th. Opening day for Mainers will be Saturday October 28th.

The third hunting week in northern Maine started in 2010 as a result of LD 929: An Act to Expand the Moose Hunting Season, which also required a management strategy change for WMD 2 from a Recreational to Compromise Moose Hunting Zone. For 2017, WMDs 1-4 and 19 will offer the additional moose hunt in late October.

Controlled Moose Hunt in Eastern Aroostook County

The purpose of the controlled hunt is to 1) reduce the incidence of crop depredation in selected towns (commercial broccoli fields), and to 2) reduce the incidence of moose / vehicle collisions along the Route 1 and Route 161 corridor. **The controlled hunt is not a recreational hunt.**

With public input, the Department conducted a controlled moose hunt in nine towns in eastern Aroostook County from 2009 to 2016; additional towns have been added or subtracted over time due to crop field rotations and where crops are being grown in the current year. Hunters harvested a total of 81, 72, 60, 32, 31, 24, 25, and 23 moose in from 2009-2016 controlled hunts, respectively.

Each year, following the controlled moose hunt, IFW biologists and wardens have discussed the hunt results and associated issues with representatives of the Smith and Ayer Farms, with the focus on possible improvements for future controlled hunts in eastern Aroostook County. In 2013 after considerable discussion it was recommended that the controlled hunt for 2014 only be open to Disabled Veterans. This recommendation was based, in part, on the low hunting success rates of landowners and violations associated with guides. The Disabled Veteran portion of the hunt has proved to be the most effective and successful way to fulfill controlled hunt objectives and thus the recommendation stands for the coming 2017 hunt as well. The Department recommended reducing permit levels to 25 for Disabled Veterans. The Department has met population objectives for WMD 3 and 6; and thus has reduced permit allocations in WMD 6 (maintain permit levels in WMD 3) to ensure current moose numbers are maintained.

ADULT COW AND CALF MOOSE SURVIVAL STUDY
PROJECT UPDATE JANUARY 2017

Background:

In January 2014, New Hampshire Fish and Game (NHFG) and the Maine Department of Inland Fisheries and Wildlife (IFW) initiated parallel studies of adult and calf moose survival. NHFG captured and fitted 43 moose (21 adults, 22 calves) with GPS collars and IFW captured and collared 60 moose (30 adults, 30 calves). Moose in both states are monitored daily for mortalities. Upon death, moose are recovered in the field and necropsied to determine cause of death. In Maine, this work follows close to a decade of winter tick surveys on moose and necropsy work. This work has provided insights on winter tick abundance, the occurrence of lungworm (*Dictyocaulus sp.*), and the prevalence of tapeworm cysts (*Echinococcus granulosus canadensis*) in moose.
In the 1990s, winter tick infestations were recognized as having potential impacts on the population dynamics of moose. A moose may experience anemia and increased energy expenditures as the result of numerous ticks feeding on its blood and from the loss of its hair, as a result of its attempt to rub ticks off. Young moose in particular are susceptible to high tick loads (Bontaites et al. 1993). Normally, calves entering their first winter have no fat reserves and may be in negative energy balance over winter (Schwartz 2007). In winters that have deep snow and extreme cold temperatures, calf energetic demands increase. Thus, the combination of these elements when combined with both external and internal parasite loads may lead to increased winter mortality.

The influence of winter ticks on moose may be governed by a variety of factors including annual winter tick abundance, moose densities, habitat, and environmental conditions (fall/spring temperatures, winds, and snow depth; Samuel 2007). Currently, IFW is working with New Hampshire and Vermont to understand the dynamics of tick populations, evaluate causes of moose mortality and t compare regional differences in moose disease and mortality rates. This study will all be able to compare relative moose densities and environmental conditions between moose in Coos County, New Hampshire and the Jackman-Moose River area in Maine (WMD 8) and in northern Maine (WMD 2).

Methods

Health Assessment: At capture and mortality, blood is drawn from moose and collected as both whole blood and serum. Blood is used to assess pregnancy status establish and assess a wide variety of chemical and physiological parameters. This collection of blood, when examined over the course of the project and alongside New Hampshire's moose, will help establish baseline values for moose condition and identify pathogens or abnormal values that may affect Maine's moose. We are currently cataloguing and summarizing blood work values from moose captured in the first year.

Internal Parasite Loads (Fecals and organ/tissue necropsy): At the time of capture and mortality, moose fecal and organ/tissue samples are collected. Examination of these samples determine parasite type, parasite load, and whether the parasite load impacted the health of the moose. To date, both the lungworm *Dictyocaulus spp*. and tapeworm *Echinococcus granulosus canadensis* have been identified as common and potentially significant stressors to moose health.

Mortality Surveillance:

We receive daily GPS locations on all moose until time of death. Department staff have recovered and necropsied 99% of all deceased moose using a protocol adapted from the Minnesota Department of Natural Resources and further refined by our partners at the University of Maine-Animal Health Laboratory (UMAHL), NHFG, and the University of New Hampshire Diagnostic Laboratory. This protocol includes assessment of death at mortality site, winter tick counts, blood collection, field necropsy, aging, and collection of tissue samples for diagnostics and analysis.

All blood and fecal samples collected at capture and at death have been sent to UMAHL. UMAHL has catalogued and processed all tissue samples. Blood samples are being analyzed for internal parasites, hormones indicative of pregnancy, general blood chemistry, and heavy metals. The UMAHL continues to process these blood samples.

Cow/calf Walk-Ins

Part of IFW's moose survival project includes examining productivity and survival of calves. Beginning in May IFW biologists monitor the status and fate of GPS collared adult female moose and their potential calves. Biologists monitor these cows using traditional VHF telemetry to determine whether the cow had a calf at heel or not. Biologists walk-in several times a week until a calf is documented with the cow or until the biologist is certain a calf wasn't born. After a calf is documented, walk-ins are reduced to 1 per week until the calf dies or probability of mortality is greatly reduced. In other words, calf vulnerability is highest during the 1st month of life; therefore, at ~12 weeks of age calves chances of survival greatly increase until their 1st winter.

In December/January 2015-16 IFW expanded the moose survival project into WMD 2 in northern Maine. The addition of this northernmost study area is critical to understanding the dynamics of environmental conditions (e.g., snow, temperatures, and 1st snowfall), moose population parameters and winter tick ecology.

In December/January 2016-17 Native Range captured and collared 37 calves in the northern WMD 2 study area and 36 calves in the western WMD 8 study area to maintain annual calf sample size. With the addition of calves captured this winter, IFW now has a total of 162 moose collared in WMDs 2 and 8.

Status of Analyses

Winter tick: To date staff have summarized data on winter tick counts comparing information between tick loads of moose from recreational hunts (2006-2016), tick loads of GPS collared moose at capture, tick loads of GPS collared moose at necropsy and tick loads of harvested moose in both New Hampshire and Vermont. Ultimately, this project, in collaboration with NHFG and VDFW, will identify critical thresholds of winter tick loads on moose to predict risk of mortality. For example, total counts of winter ticks on moose (>50 ticks within the shoulder/rump counts) may signify increased risk of overwinter mortality for that individual (P. Pekins, University of New Hampshire, personal communication). In addition we are working with diagnostic labs to further understand additional disease vectors that winter ticks may or may not harbor that could impact moose health.

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