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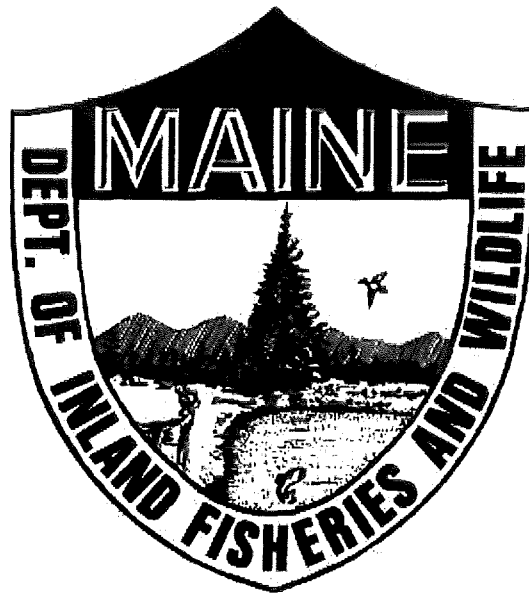


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Report to the Joint Standing Committee on Inland Fisheries and Wildlife

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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Inland Fisheries & Wildlife

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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 2015 Moose Report

- Overview of management actions taken
 - Conducted helicopter composition surveys in 3 Wildlife Management Districts (WMDs)
 - Conducted helicopter abundance counts in 5 WMDs
- Review of 2014 moose hunt
 - Harvest of 2,022
- 2015 Moose season information
 - Recommendation of 2,815 permits
- Controlled moose hunt summary
 - Successful 6th year of operation, 24 moose harvested
- Review and report on adult female and calf survival study
 - Study initiated in WMD 8 in January with 60 moose (30 adult females and 30 calves) radio collared with GPS collars
 - 2014: 22 calves and 12 adults died. Completed necropsies on 33 of 34 recovered moose
 - Additional Capture for 2014-2015 added 35 calves and 9 adults for a total of 35 calves and 35 adult moose (32 f, 3 m) currently active and equipped with GPS collars

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 5 winters, Department staff has 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 double count aerial surveys for estimating moose abundance across 83% of this area (Wildlife Management Districts 1-6, 8, 9, 11 and 19). This technique provides the Department with a statistically reliable method for estimating moose populations. 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. We anticipate having the ability to conduct aerial surveys in WMD 10 at a later date. In the fall of 2012, the Department released a statewide moose estimate based on this work. In conjunction with the helicopter double count estimates staff have also completed aerial surveys (composition counts) that allow determination of the percent of bull, cows and calves in these units. To date, surveys have been completed in WMDs 1-9, 14, and 19. These surveys provide us with reliable data on bull to cow ratios which is one of the essential and required measurements in the moose management system. Through our harvest regulations, IFW strives to maintain a certain percentage of mature or prime bulls in each WMD's moose population. 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.

In addition, we have obtained reliable data on the number of calves per adult cow in these areas. This is one of the most critical pieces of information for managing our moose population. Calf/cow ratios give us 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 has 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 7 years, permit *increases* in the most northern districts have varied from 10% in WMD 3 (which already had high permit allocations) to 742% in WMD 2. 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 will occur when the Department moves into the next planning phase for moose management.

The Department has moved into a very positive position where we can reliably and effectively assess moose population dynamics 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 we will continue to move Maine to the forefront of moose management.

2014 Moose Season Summary

Maine moose hunters could hunt moose for 6 days by permit within the structure of a split season framework (September/October/November) during 2014. The September season, which occurred in WMDs 1-6, 11, and 19, ran from the 22nd to the 27th; the October season, which occurred in WMDs 1-14, 17-19, 27, and 28, ran from the 13th through the 18th; , and the November season in WMDs 1-4 and 19 ran from the 3rd to the 8th. In addition, 2014 marked the eighth 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 November 3rd to November 29th and opened for Maine residents on November 1st. 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 abundance, 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, 22, 23, 25 and 26, provided an additional 130 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 2014 was 3,095.

Overall, hunters registered 2,022 moose in 2014 (780 in September, 873 in October, and 369 in November). Hunting conditions in September started out unfavorably with temperatures on opening day reaching the low 80's! Similarly temperatures in October reached into the high 60's on the second day and by Wednesday maxed out in the low 70's. Under these conditions not only do moose spend more time in cover and travel less, but hunter effort is reduced. Thus hunter success rates averaged 74%, 62%, and 68% for

the September, October, and November North seasons, respectively. For the southern Maine moose hunt, the overall success rate was 23% as would be expected under low moose densities. We provided additional materials on IFW's website to ensure that prospective hunters are fully aware of the conditions, land access and lower success rates for the southern Maine moose hunt.

2015 Moose Season Framework

In 2015, there will be 4 separate moose hunting periods in Maine – a September hunt, October hunt, and 2 hunts in November. The September season will run from September 28th to October 3rd in WMDs 1-6, 11 and 19; the October season from October 12th through the 17th and include WMDs 1-14, 17-19, 27, and 28. The November season in WMDs 1-4, 9 and 19 will run from November 2nd through November 7th. In WMDs 15, 16, 22, 23, 25 and 26, the season will coincide with November's deer season running from November 2nd through November 28th. Opening day for Mainers will be Saturday October 31st.

The northern November hunt started in 2010 as a result of LD 929: An Act to Expand the Moose Hunting Season while also requiring a management strategy change for WMD 2 from a Recreational to Compromise Moose Hunting Zone. For 2015, WMDs 1-4, 9 and 19 will offer an additional moose hunt in November. This hunt will occur from the 2nd through 7th of the month. The additional hunt was promulgated in response to a change in management strategy in WMD 2 that required an increase in permit allocations to reduce moose abundance (a result of LD 929 An Act to Expand the Moose Hunting Season). For the eighth year the Department will allocate a total of 105 permits for any moose (bull, cow, or calf) in southern sections of the state (WMDs 15, 16, 22, 23, 25 and 26). In total, the Department recommended 2,815 permits for the 2015 moose hunt.

Prospects for the 2015 Recreational Moose Hunt

Given the Department's aerial survey work, we have statistically reliable estimates of moose abundance across northern Maine, our best moose habitat. Better estimates of moose abundance has allowed the Department to provide additional hunting opportunities in some areas while reducing permits in other areas to best meet our management population goals and objectives. As additional data are collected on moose populations across the state the Department will be able to continue to fine tune permit allocations to meet the needs of the public and respond to population changes over time.

Controlled Moose Hunt in Eastern Aroostook County

Prior to implementing the controlled hunt in Eastern Aroostook County, the Department used depredation permits and increased recreational moose hunting permits to reduce crop depredation and moose / vehicle collisions. These efforts had limited success. It was anticipated that a controlled hunt would provide a focused, site-specific, management effort to reduce crop depredation and increase road safety.

With public input, the Department conducted a controlled moose hunt in nine towns in eastern Aroostook County from 2009 to 2014; additional towns have been added or subtracted over time due to crop field rotations and where crops are being grown in the current year. The purpose of the controlled hunt was 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 was not a recreational hunt.**

The controlled hunts occurred between mid-August and the start of the September recreational moose hunt. Controlled hunts were not open to all hunters. A person who received a controlled moose hunting permit was exempt from the two-year eligibility requirement of the recreational moose hunt. All other fees, laws and rules relating to moose hunting applied to the controlled hunt.

Hunters harvested a total of 81, 72, 60, 32, 31 and 24 moose in the 2009, 2010, 2011, 2012, 2013, and 2014 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 and critical discussion it was recommended that the controlled hunt for 2014 utilize only 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 2015 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 2015

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 collared 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 granulosis 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 we are working with New Hampshire to understand the dynamics of tick populations, evaluate causes of moose mortality, and to compare regional differences in moose disease and mortality rates. Initially, we will 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 (Wildlife Management District 8). However, the intent of the original project proposal was to expand this work to a second study area in either northern or eastern Maine, to determine the variability of moose mortality rates in different areas in Maine.

Project Initiation: Capture and Mortality

In January 2014, Wildlife Division, worked with the Aerotech moose capture team to plan and review capture protocols, logistical support and project mission. IFW wildlife biologists conducted aerial reconnaissance for adult female and calf moose. GPS coordinates were given to Aerotech with locations of moose dispersed throughout the WMD 8 study area. Over the next week, Aerotech captured and collared 30 adult cows and 30 calves (14 M; 16 F). All moose were captured via net-gunning with three moose needing additional chemical immobilization to finish processing. Biological samples including blood, feces, and hair were collected from the majority of animals (56/60, 93%). In addition, a winter tick count was performed on most moose and they were photographed (57/60, 95%).

We receive daily GPS locations on all moose until time of death. As of November 1st, 22 calves (10 F, 12 M) and 12 adult cows had died. One adult cow (summer augment capture) “slipped” a collar. Department staff recovered and necropsied 33 of 34 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. A preliminary analysis of the results of this assay should be available by summer 2015.

Cow/calf Walk-Ins

Part of IFW's moose survival project includes examining productivity and survival of calves. Beginning in May IFW biologists began monitoring the status and fate of 20 GPS collared adult female moose and their potential calves. Biologists monitored these cows using traditional VHF telemetry to determine whether the cow had a calf at heel or not. Biologists "walked-in" several times a week until a calf was documented with the cow or it was determined that no calf was born. After a calf was documented, walk-ins were reduced to 1 per week until the calf died or probability of mortality was 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.

Tests on blood serum collected at capture (January – February) determined that 18 of 20 cows were pregnant (90%). However, only 11 of these 18 cows (61%) had calves that survived long enough for biologists to walk in and find them. If we assume that the 18 cows that were pregnant only had one calf each, we estimate that 7 calves either died in-utero or near the time of birth. Only one calf was found dead (within the 1st week of life).

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 (2006-2014), 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, 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.

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.

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.

2nd Year Moose Capture

In January 2015, IFW's Wildlife Division again worked with the Aerotech moose capture team to plan and review capture protocols, logistical support, and project mission. IFW wildlife biologists conducted aerial reconnaissance for adult female and calf moose to assist Aerotech with their capture efforts. GPS coordinates were given to Aerotech with locations of moose dispersed throughout the WMD 8 study area. Aerotech captured and collared 3 adult cows and 35 calves (12 M; 23 F). With the capture and collaring of these new animals we now have 35 calves and 35 adult moose on the air. All moose were captured via net-gunning with one adult cow needing additional chemical immobilization to finish processing. Biological samples including blood, feces, and hair were collected from the majority of animals (37/38, 97%). In addition, a winter tick count was performed on most moose and they were photographed.

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