

## **DIF&W 2015 Moose Assessment Report**

The following narrative summarizes permit allocation recommendations for the 2015 moose season. Recommendations are given by Wildlife Management District (WMD) and Management Zone (i.e., Recreation, Compromise, and Road Safety). Table 1 (page 8) summarizes 2015 permit allocation recommendations. Table 2 (page 9) provides numerical permit increases or decreases by WMD and season from 2014.

Regional Biologists and I met on January 15<sup>th</sup> to review biological and harvest data, hunter sighting data, reproductive indices, aerial density estimates, and composition counts. This information was applied to the moose management system and used to calculate moose permit allocations based on current WMD goals and objectives. The department continues to make significant improvements in the amount and types of data collected to inform the decision process for allocating moose permits.

To date, we have completed aerial estimates of moose densities in WMDs 1-6, 8, 9, 11, and 19. We have also completed aerial composition counts to determine adult/calf age and sex ratios in WMDs 1-9, 14 and 19. 2014 marked the 5<sup>th</sup> consecutive year in which the department collected reproductive data. These reproductive data provide critical information on moose reproduction and population trends. In 2014, the department initiated a study to evaluate adult female and calf survival using GPS collared moose.

### **Permit Allocations**

Department biologists reviewed data for each WMD and approached decision making for permit levels based on the best available data and management system criteria. Moose populations in each WMD may vary in their demographics (birth and death rates, age composition), and each WMD varies in the quality of habitat for moose. Therefore, WMDs are assessed in respect to these differences and current goals and objectives.

To provide the public with the highest level of service and address moose management goals and objectives the following general recommendations were made:

#### **Recreational and Compromise Zone Hunts**

1. September moose hunts in Maine are world class. We recommend the department consider increasing the allocation of bull permits to the September moose season and structuring the September season as bull only hunts. Since this would be a major change in Maine's moose management, this recommendation should first be vetted through public hearing process and incorporated into future planning efforts for setting moose management goals.
2. We recommend various levels of antlerless harvest (see below) where antlerless (primarily adult cow) harvest is warranted when populations are above objective and/or in situations where sex ratios skewed to bulls needs to be adjusted. Cow-calf bonding is critical to calves. Placing antlerless permits in November allows the cow-calf bond to remain longer in time.

### **Season Framework Recommendations:**

1. Given the limitations of moose habitat in southern Maine (i.e., WMD 22, 23, 25, and 26) and low moose densities, some flexibility is warranted to meet management goals and objectives. We recommend:
  1. hunters in these districts not be penalized by losing points, or having to remain out of the lottery for the next 3 years, if they do not shoot a moose in Southern Maine; and
  2. road safety management goals and objectives need to be reviewed during the next planning process to rectify the divergent goals and objectives of reducing moose but not removing all moose from these WMDs. Given the low moose densities in southern Maine, removing even a few moose may have implications for the public's desire to view moose in this region.

These changes would have to be made in statute. We will work through the legislative process in the next year to accomplish these recommendations.

Collection of reproductive data: To date we have had low compliance with hunters submitting reproductive data. We will work with the Maine Professional Guides Association and look at ways to provide incentives for hunters to provide this very important data.

## **Overview**

The department's moose management objectives fall into three categories: Recreational, Compromise, and Road-safety. The three approaches address the public's desire to balance the positive and negative aspects of moose in Maine. Since 2011, the department has used aerial surveys to estimate moose abundance, population composition, and reproduction. These data enable staff to assess annual population changes for moose and calculate allowable removal rates. What follows is a brief summary by Wildlife Management District aggregated by management area type.

### WMD 1 –Recreational Management Area

Recommendation: ***Maintain BOP/AOP Permits.***

Rationale: We determined that the current moose population in the Recreational WMDs is at objective. This assessment was based on 2014 aerial estimates of abundance (double-count survey), aerial composition counts, reproductive data, and management system inputs. The percentage of mature bulls in the population was slightly above threshold, as determined by hunter sighting rates, aerial surveys, and the percentage of mature bulls in the harvest. At this time the bull composition is adequate. Reproduction (ovulation rates) in prime cows appears to be above K (carrying capacity) suggesting that reduction of moose densities is recommended. After a decrease in antlerless permits in 2014 due primarily to a winter tick epizootic both BOP and AOP are recommended to remain at current levels to maintain moose at objective.

### WMD 2-Compromise Management Area

Recommendation: ***Decrease BOP and AOP permits.***

Rationale: In 2010 WMD 2 was changed to a compromise management area and therefore a new population objective was assigned to this WMD. We determined that the moose population in WMD 2 is at objective based on management system inputs. However, sightings by moose hunters continue to decline. In addition, we have conducted aerial double count surveys for three consecutive years, as well as consecutive composition counts. The bull : cow sex ratio and the percentage of mature bulls in this WMD appear to be low based on management system criteria. We recommend a decrease in bull and antlerless only permits to maintain population size and adequate bull: cow composition.

#### WMD 3- Compromise Management Area

Recommendation: ***Maintain permits.***

Rationale: We determined that the moose population in WMD 3 is below objective based on management system inputs. Sightings by moose hunters do not show a trend in moose abundance. Mature bulls continue to be below criteria objective. However adult cow mortality from last winter is likely to increase the bull portion of the adult sex ratio. Thus, we recommend maintaining bull permits at current level.

#### WMD 4 – Recreational Management Area

Recommendation: ***Maintain BOP and AOP Permits.***

Rationale: We determined that the moose population in WMD 4 is at objective based on estimates of abundance (double-count survey), composition counts, and management system inputs. Sighting rates by moose hunters remained stable. *Ovulation rates appear to be depressed suggesting a population above K.* Sex ratios and the percentage of mature bulls in this WMD appear to be adequate based on management system criteria. To maintain this population near objective, we recommend maintaining the current number of AOP permits.

#### WMD 5- Recreational Management Area

Recommendation: ***Maintain current permit levels.***

Rationale: We determined that the moose population in WMD 5 is below objective based on aerial estimates of abundance (double count survey), aerial composition counts, reproductive data and management system inputs. Sex ratios and the percentage of mature bulls in this WMD appear to be adequate based on management system criteria. *WMD 5 contains prime moose habitat and the current level of permits based on these data are warranted.* We recommended no change in permits levels.

#### WMD 6- Compromise Management Area

Recommendation: ***Decrease BOP.***

Rationale: We determined that the moose population in WMD 6 is below objective based on aerial double count surveys, aerial composition survey data, and management system inputs. After three years of the controlled moose hunt and relatively high harvest rates, the number of permits was scaled back. Sightings by moose hunters do not show a trend. Adult sex ratios are adequate as well as bull composition. However the WMD is below target and we recommend a slight decrease in bull permits.

\* To address negative impacts of moose the department will likely continue a “maintenance” phase with the controlled hunt

WMD 7 – Recreational Management Area

Recommendation: **Maintain current permit levels**

Rationale: We determined that the moose population in WMD 7 is likely below target based on the aerial composition survey and management system inputs. Aerial surveys indicate that adult sex ratios are currently skewed towards bulls. The age distribution, as calculated from a small sample size of harvested bulls, indicates that the percentage of mature bulls in the population is low. However, aerial composition counts indicate that there are adequate numbers of bulls on the ground.

WMD 8 – Recreational Management Area

Recommendation: **Maintain BOP and AOP Permits**

Rationale: We determined that the moose population in WMD 8 is at objective based on current aerial surveys and management system inputs. The percentage of mature bulls in this WMD appears to be slightly below objective based on management system criteria. However aerial surveys show an increase in the adult bull to cow ratio.

\*In January 2014 we initiated an adult cow and calf survival study to assess and quantify survival rates and causes of mortality. This information will be critical to managing moose and allocation of moose permits.

WMD 9- Recreational Management Area

Recommendation: **Increase BOP and AOP Permits**

Rationale: We determined that the moose population in WMD 9 is above objective based on aerial composition surveys and current aerial population estimates. The percentage of mature bulls and sex ratio in this WMD appear to be on target based on management system criteria. In addition, aerial flights show a bull to cow ratio that is close to par. The combination of these factors should allow for an additional bull harvest. There has been no cow harvest in this district since 2002. We understand the importance of moose viewing in this district. Therefore, we recommend an initial cow harvest of 50 permits.

WMD 10- Recreational Management Area

Recommendation: **No change in permit numbers;**

Rationale: We determined that the moose population in WMD 10 is likely below objective based on management system inputs. Sightings by moose hunters are stable. The percentage of mature bulls in this WMD appears to be low based on management system criteria. However, a small sample size of harvested bulls may lead to a biased estimate of the proportion of old to young bulls in the population. We recommend that the prohibition on harvesting antlerless moose be continued for WMD 10.

WMD 11- Compromise Management Area

Recommendation: **No change.**

Rationale: We determined that the moose population in WMD 11 is below objective based on aerial double count surveys and management system inputs. Sightings by moose hunters do not show a statistically significant trend. The sex ratio in this WMD appears to be adequate based on management system criteria. WMD 11 has had relatively high harvest rates for nearly a decade. With the population below objective, and future growth likely to be slow, it is recommended that the harvest recommendation for WMD 11 continue be bulls only.

WMD 12- Recreational Management Area

Recommendation: **No change in permit numbers**

Rationale: We determined that the moose population in WMD 12 is below objective based on management system inputs. Sightings by moose hunters are stable. The percentage of mature bulls and sex ratio in this WMD appear to be on target based on management system criteria.

WMD 13- Recreational Management Area

Recommendation: **No change in permit numbers**

Rationale: We determined that the moose population in WMD 13 is likely near objective based on management system inputs. Sightings by moose hunters do not indicate any significant trend in the moose population. Sex ratios and the percentage of mature bulls in this WMD appear to be adequate based on management system criteria. We note that the sample size was low for this estimate.

WMD 14- Recreational Management Area

Recommendation: **No change in permit numbers.**

Rationale: We determined that the moose population in WMD 14 is likely near objective based on management system inputs. Sightings rates by moose hunters do not indicate a change in moose abundance. The percentage of mature bulls and the bull : cow sex ratio in this WMD appear to be low based on management system criteria. However aerial composition survey conducted last winter showed a bull to cow ratio at threshold. Given low permit numbers and low sample size the data is insufficient to determine if decreasing bull permits is justified.

WMD 15 and 16- Compromise Management Area

Recommendation: **No change.**

Rationale: Given the low harvest numbers we cannot make determinations on bull composition. Given the objective to reduce the population (effectively to maintain very low densities), wildlife division biologists will need to incorporate future rules of thumb for determining permit increases in this area based on other metrics and public demands for additional hunting/viewing opportunity.

WMD 17- Compromise Management Area

Recommendation: **No change.**

Rationale: At this time management systems inputs are inadequate to detect a trend in population growth. Low sample size and high annual variability precludes our ability to determine bull composition. Recommend September opening.

WMD 18- Recreational Management Area

Recommendation: **No change in permit numbers.**

Rationale: We determined that the moose population in WMD 18 is likely below objective based on management system inputs. Sightings by moose hunters did not indicate a significant trend in moose abundance. The bull: cow sex ratio and the percentage of mature bulls in this WMD appear to be low based on management system criteria.

WMD 19- Recreational Management Area

Recommendation: **Maintain BOP and AOP permits.**

Rationale: We determined that the moose population in WMD 19 is likely above objective based on estimates of abundance (double-count survey), composition counts, and management system inputs. However, moose hunter sightings are decreasing. Bull composition data suggests that prime bulls are adequate. Since population is above objective maintaining both bull and antlerless permits are recommended for the current year. Calf to cow ratio were among the highest of all WMDs surveyed.

WMD 22-Road Safety Management Area

Recommendation: **No permits.**

Rationale: Past aerial double count surveys would suggest relatively low moose numbers that are unevenly distributed over a large area (<.5 moose per square mile). Over the last 6 years moose collisions have been highly variable but have averaged at 10 per year within the district. Multiple counties intersect WMD 22; therefore, it is difficult to make inferences regarding our metric of road-kills using collisions per million miles (vehicle) traveled. Given low moose numbers, the relatively small size of the management area (433 mi<sup>2</sup>), and specifically two consecutive years with no harvest, we recommend no permits be allocated. See additional recommendations for southern Maine moose hunt above.

WMD 23 and 25- Road Safety Management Area

Recommendation: **No change.**

Rationale: Sightings by deer hunters would suggest relatively low moose numbers that are unevenly distributed over a large area (<.5 moose per square mile). Over the last 6 years moose collisions have been highly variable but have averaged 10 per year within the district. WMD 25 is contained within most of Lincoln and Knox counties.

WMD 26- Road Safety Management Area

Recommendation: **Reduce AMP.**

Rationale: WMD 26 remains a WMD with chronically low success rates with harvest of 1 moose each of the last 2 years. The WMD has very few places that hold moose with limited access. We recommend a decrease in permits.

WMD 27- Recreational Management Area

Recommendation: ***Decrease BOP.***

Rationale: We determined that the moose population in WMD 27 is likely below objective and has been below objective in consecutive years based on management system inputs. Sighting rates by moose hunters demonstrate a stable trend. The bull : cow sex ratio and the percentage of mature bulls in this WMD appear to be low based on management system criteria. However sample sizes are small and may be an unreliable indicator of bull composition. Recommend decreasing BOP permits. See other WMD alternatives above.

WMD 28- Recreational Management Area

Recommendation: ***No change in permit numbers***

Rationale: We determined that the moose population in WMD 28 is likely below objective and has been below objective in consecutive years based on management system inputs. Moose hunter sighting rates demonstrate an increasing trend. Sample sizes are small for assessing mature bulls and may be an unreliable indicator of bull composition. Recommend allowing WMD 27 hunters to also hunt WMD 28.

**Table 1: Moose Permit Recommendations by Wildlife Management District for 2015**

WMD	Bull-Only			Antlerless-Only			Any-Moose	Total
	2015	Sept	Oct	Nov	Sept	Oct	Nov	
<a href="#">1</a>	150	125	0	0	0	100	0	375
<a href="#">2</a>	100	100	0	0	0	100	0	300
<a href="#">3</a>	100	80	0	0	0	100	0	280
<a href="#">4</a>	250	150	0	0	0	200	0	600
<a href="#">5</a>	100	25	0	0	0	0	0	125
<a href="#">6</a>	100	25	0	0	0	0	0	125
<a href="#">7</a>	0	125	0	0	0	0	0	125
<a href="#">8</a>	0	175	0	0	0	0	0	175
<a href="#">9</a>	0	100	0	0	0	50	0	150
<a href="#">10</a>	0	60	0	0	0	0	0	60
<a href="#">11</a>	25	25	0	0	0	0	0	50
<a href="#">12</a>	0	35	0	0	0	0	0	35
<a href="#">13</a>	0	35	0	0	0	0	0	35
<a href="#">14</a>	0	35	0	0	0	0	0	35
<a href="#">15</a>	0	0	0	0	0	0	25	25
<a href="#">16</a>	0	0	0	0	0	0	20	20
<a href="#">17</a>	0	20	0	0	0	0	0	20
<a href="#">18</a>	0	40	0	0	0	0	0	40
<a href="#">19</a>	50	50	0	0	0	50	0	150
<a href="#">22</a>	0	0	0	0	0	0	0	0
<a href="#">23</a>	0	0	0	0	0	0	25	25
<a href="#">25</a>	0	0	0	0	0	0	25	25
<a href="#">26</a>	0	0	0	0	0	0	10	10
<a href="#">27</a>	0	10	0	0	0	0	0	10
<a href="#">28</a>	0	20	0	0	0	0	0	20
<b>Total</b>	<b>875</b>	<b>1,235</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>600</b>	<b>105</b>	<b>2,815</b>

**Table 2. Numerical changes in permit allocation by WMD and season for 2015.**

NUMERICAL CHANGES								
WMD	Sept	Oct	Nov	Sept	Oct	Nov	Nov(Month)	Total
			Week			Week		
	BOP			AOP			AMP	
<a href="#">1</a>	0	0	0	0	0	0	0	0
<a href="#">2</a>	-125	-100	0	0	-50	-25	0	-300
<a href="#">3</a>	0	0	0	0	-25	25	0	0
<a href="#">4</a>	-50	50	0	0	-50	50	0	0
<a href="#">5</a>	0	0	0	0	0	0	0	0
<a href="#">6</a>	0	-25	0	0	0	0	0	-25
<a href="#">7</a>	0	0	0	0	0	0	0	0
<a href="#">8</a>	0	0	0	0	0	0	0	0
<a href="#">9</a>	0	25	0	0	0	50	0	75
<a href="#">10</a>	0	0	0	0	0	0	0	0
<a href="#">11</a>	0	0	0	0	0	0	0	0
<a href="#">12</a>	0	0	0	0	0	0	0	0
<a href="#">13</a>	0	0	0	0	0	0	0	0
<a href="#">14</a>	0	0	0	0	0	0	0	0
<a href="#">15</a>	0	0	0	0	0	0	0	0
<a href="#">16</a>	0	0	0	0	0	0	0	0
<a href="#">17</a>	0	0	0	0	0	0	0	0
<a href="#">18</a>	0	0	0	0	0	0	0	0
<a href="#">19</a>	0	0	0	0	0	0	0	0
<a href="#">22</a>	0	0	0	0	0	0	-10	-10
<a href="#">23</a>	0	0	0	0	0	0	0	0
<a href="#">25</a>	0	0	0	0	0	0	0	0
<a href="#">26</a>	0	0	0	0	0	0	-15	-15
<a href="#">27</a>	0	-5	0	0	0	0	0	-5
<a href="#">28</a>	0	0	0	0	0	0	0	0
<b>Total</b>	-175	-55	0	0	-125	100	-25	-280