A Healthy Moose

**Typical diet:** Twigs of aspen, willow, birch, alder, maple, and aquatic plants.

**Forage:** Consume 30-45 pounds of browse a day.

**Life span:** 15-20 years.

**Size:** Up to 1800 lbs.

**Habitat:** Boreal forest. Cold climate, brushy, abundant wetlands.

**Range:** Some northern U.S States, Canada, China, Czech Republic, Estonia, Finland, Lithuania, Norway, Manchuria, Poland, Russia, Siberia, Slovakia and Sweden.

**Activity:** Browse, sleep, reproduce, avoid predators.
Could not move for days—partial paralysis
Reduced sensory perception
Mild liver fluke infestation
Minimal fat reserves
Coat in good condition with minimal hair loss
Moose had to be euthanized

What do you notice? What do you wonder about?
Health Issues/Cause of Death:

- Brainworm tracts were found inside the brain. This resulted in the animal losing the ability to move and was partially paralyzed. This would have resulted in death.
- Brainworm lesions likely caused mobility or sight issues long before its death. Moose would have poor foraging ability leading to decreased nutrition and overall health evident at time of necropsy.
- Liver flukes posed another health stressor, damaging liver tissue and function. However, the quantity of the flukes were mild and were not the cause of death.

Based on these findings, researchers propose the following management actions to reduce such moose deaths in the future:

Management Action #1: Reduce whitetail deer that carry brainworm. Harvesting more deer through hunting will reduce the potential for parasite transmission between deer and moose.

Management Action #2: Reduce intermediate hosts (e.g., snails, slugs) of brainworm. Fire and forest management practices reduces parasites and gastropod (e.g. snails, slugs) populations.

Management Action #3: Promote habitat modifications that benefit moose and deter deer, such as promoting the growth of plants that moose feed on and deer avoid. Creating moose habitat that deer avoid will further reduce parasite transmission risk.

NEXT STEPS:

1. With your group, make at least two connections between your observations and questions and the cause of death.
2. What other questions will the team need to answer before, during and after the management actions (below) are implemented?
3. List three topics that you may need expert advice on during the management phase of this project? Who might have this expertise? Is there someone in your community that you could ask?

Data courtesy of work done 2010 – 2017 by the Grand Portage Band of Lake Superior Chippewa and Natural Resource Manager EJ Isaac.
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Activity: Browse, sleep, reproduce, avoid predators.
• Missing large patches of hair.
• Highest tick density was > than 5 ticks per square inch.
• Area trampled from moose trying to get up.
• Minimal fat reserves were found upon necropsy.

• Cow (female) moose was lactating indicating she had calves (babies)
• Lack of snow cover in the previous spring resulted in significant increases in tick populations.

**WHAT DO YOU NOTICE? WHAT DO YOU WONDER ABOUT?**
Health Issues/Cause of Death:

- High winter tick loadings reduce body condition due to energetic costs of replenishing blood. This led to decreased fitness.
- Significant hair loss due to ticks results in increased stress associated with hypothermia during winter. This also results in the animal spending more time grooming the ticks off than foraging for nutritional browse.
- Reduced body condition resulted in inability to care for newly born calves as a result of her mortality. Newly born calves will not survive without maternal support.

Based on these findings, researchers propose the following management actions to reduce such moose deaths in the future:

- Management Action #1: Increase fire regime to control tick populations. Controlled fires through active forest management create moose browse and reduce parasites.
- Management Action #2: Give collared moose anti-tick treatments (Permethrin) to eliminate ticks at time of capture.
- Management Action #3: Assess feasibility of large scale anti-tick program for moose. Investigate if products are available that could be mixed into a supplemental feed to treat ticks on moose.

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FIELD NOTES

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Activity: Browse, sleep, reproduce, avoid predators.
• Puncture wounds on back legs.
• Calf had limited fat reserves around organs and under hide.
• Bone marrow had been metabolized.
• Limited snow depth during the winter.

WHAT DO YOU NOTICE? WHAT DO YOU WONDER ABOUT?
Health Issues/Cause of Death:

- Wolf attack caused puncture wounds on calf’s hind legs resulting in decreased mobility. The injured calf could not forage properly and had low body weight.
- Puncture wounds became infected and caused chronic stress.
- A combination of stressors stemming from the wolf attack resulted in this calf dying.

Based on these findings, researchers propose the following management actions to reduce such moose deaths in the future:

- Management Action #1: Consider management of wolf populations.
- Management Action #2: Reducing deer populations may reduce wolf population growth.

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FIELD NOTES

- Calf largely eaten and skinned out.
- Calf was estimated at 5 days old based on calving pattern of collared cow.
- No obvious signs of a struggle.

WHAT DO YOU NOTICE? WHAT DO YOU WONDER ABOUT?
Health Issues/Cause of Death:

- High calf mortality due to black bear predation. Black bear predation is likely higher in years when spring is snowy, cold, and bears are hungry. Predation potential may increase if hibernation patterns are altered and bear body condition in spring is reduced.
- Collared cow protected her other calf by fleeing the area and may indicate reduced health or parental strategy to save one calf.
- Calf could have been weak or health compromised due to poor health of the cow.

Based on these findings, researchers propose the following management actions to reduce such moose deaths in the future:

- Management Action #1: Manage black bear populations through increased hunting to reduce calf mortality.
- Management Action #2: Investigate if baiting bears can mitigate calf predation.
- Management Action #3: Increase cow fitness through moose restoration activities. Examples include: reducing predators like bears and wolves, increasing preferred browse of good nutrition, creating habitats to meet moose needs (food, shelter, water), reducing stressors like parasites (ticks, brainworm, liver flukes) and reducing competition (deer).

Next Steps:

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