

MAINLAND MOOSE

Lesson Plan grades 7-9+



Learning Outcomes

Components of an Ecosystem
Ecological Succession
Action

Themes

Scientific Reasoning
Environmental Action
Climate Change

Concepts

Cause and Effect
Stewardship and
Sustainability

CONTENTS

- Self-guided reading
- Definition/term search
- Trend graphing and mapping
- Q & A
- Ways to take action



This lesson plan was written by: Becky Parker, NatureNS Executive Director, with input from: Bob Bancroft, retired government biologist and President, Nature Nova Scotia

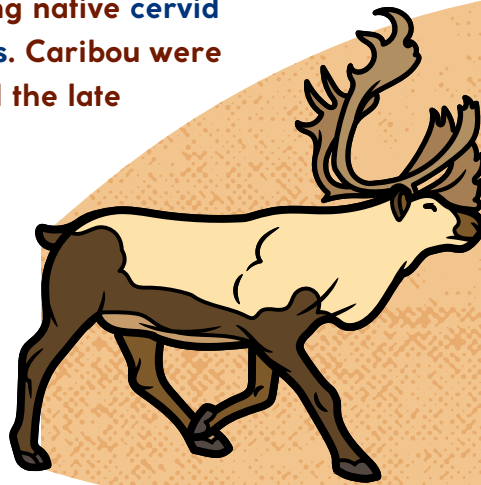
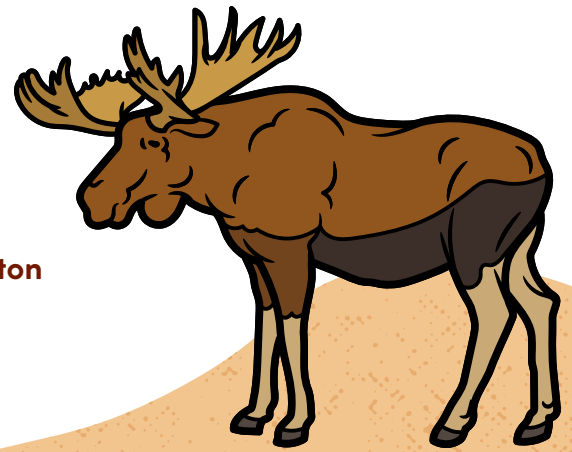
For more on moose and other species at risk/forest topics:
www.naturens.ca info@naturens.ca

MAINLAND MOOSE

AKA Tiam,
L'Élan, Maoth

The Mainland Moose is **Endangered** in Nova Scotia. It is a distinct population from the much more abundant Cape Breton Moose (*Alces alces andersoni*), which were intentionally introduced to the Island from Western Canada after all the original Moose (*Alces alces americana*) were **extirpated**.

Moose are the only remaining native **cervid** (deer) found in the **Maritimes**. Caribou were found in Nova Scotia up until the late 1800s, but were extirpated due to overhunting and a disease called Brainworm introduced by White-tailed Deer, which had been slowly moving in from other parts of Canada to take advantage of newly opened forests cleared by European settlers.



<1%

1000

The percentage of forests in Nova Scotia that are still "old growth."

The total number of Moose thought to live in Mainland Nova Scotia, at the time of the 2003 Status Report

Brainworm (AKA *Parelaphostrongylus tenuis*)

Deer rarely show any symptoms of *P. tenuis* infection but Moose may display slower movements, stumbling, an unusually tilted head, weight loss, and walking in circles. For Moose, infection is often fatal.

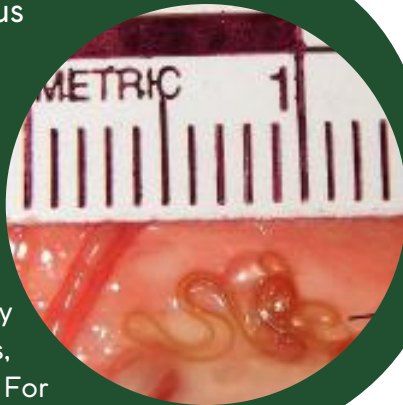


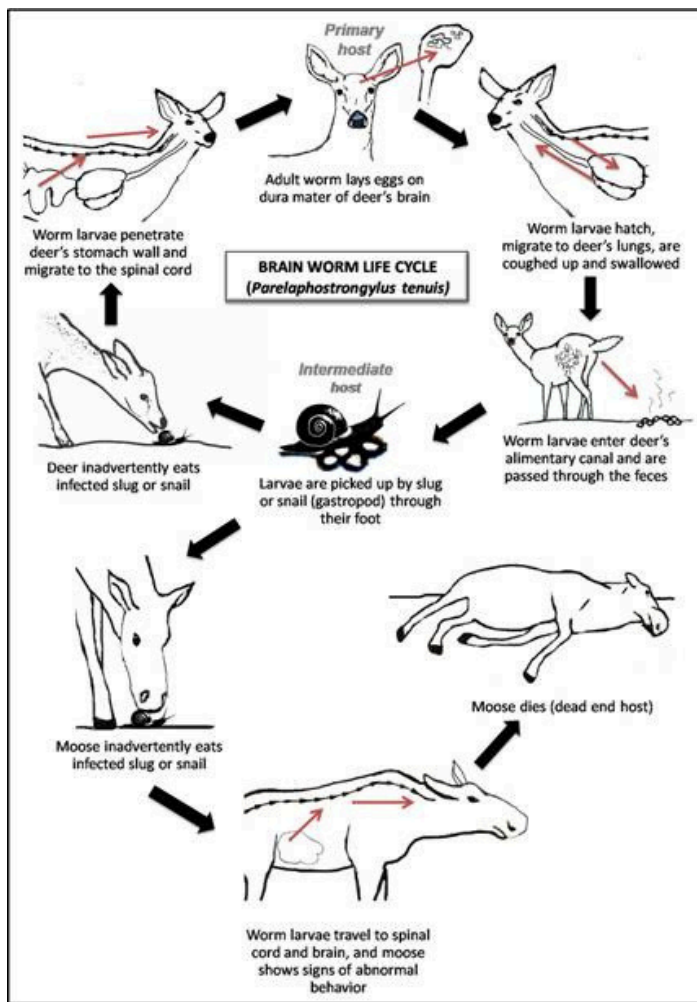
Photo by the New York
State Dept of Environmental Conservation

THREATS TO MOOSE

Brainworm doesn't seem to hurt the White-tailed Deer, but it is deadly for the Caribou and Moose. Moose are also threatened by habitat loss in much of Nova Scotia, needing large areas of both mature and young forests dotted with healthy open-water wetlands to get enough food and safely raise their young, whereas Deer are happy to live in the open fields and younger forest types that have become so common after decades of forest clearing.

Some domesticated ungulates are also susceptible to brainworm infection, including sheep, goats, alpacas, rarely cattle, and rarely horses. Brainworm is not only an issue for wildlife but also a serious risk for farm animals and our economy as well.

Look up the definitions of these "**highlighted words**" in your dictionary or do a Google search to learn more



Brainworm lifecycle, by the New York State Dept of Environmental Conservation

Forest Clearing

The area **clearcut** in Nova Scotia has doubled since the 1970s, so much that 99% of forest harvests today use clearcut methods, including "**shelterwood**"

Forests with trees older than 80 yrs make up just 1% of all forests



Before European settlement, when Mi'kma'ki's forests were managed for a diverse, multi-age structure, cool Hemlock stands provided habitat for animals like Salmon, Trout, and Moose. Small clearings provided young regrowth and browsing habitat for our large **ruminants**. Temperatures in the forest were cool, change happened slowly, and diversity was high.

European settlers cleared large areas of forested land for farms, changed the local hydrology, and, as their populations grew, hunted increasingly threatened food resources like the Caribou and Moose out of their previous ranges. Fires, either set in order to clear land for farming or by accident, dramatically changed the forests of Mi'kma'ki even before the expansion of the modern forestry industry.

13% The percentage by which total forest cover in NS has declined since just 2003!

Two of Nova Scotia's biggest fires on record happened in 2007 and 2008, in Porters Lake and Spryfield, respectively. Both were caused by a combination of hot weather, dead debris from Hurricane Juan, poor land planning, and human error. Under continued climate change, we can expect fires to become more frequent.



Large fires are not normal in the **Wabanaki-Acadian forest**. In many areas, fire and drought had such a serious impact on the soil that regrowth was stunted for centuries.

Then the Deer arrived...

The shift to younger forest types combined with a warming climate allowed Deer from the South and West to move into Atlantic Canada, bringing Brainworm with them.



And Nova Scotia saw the rise of the Industrial Forestry Age...

Whole logs and, eventually, milled lumber dominated the settler-managed forestry industry up until the early 1900s. As large old trees became harder to find, technology advanced, competition from other jurisdictions grew, and two World Wars demanded more and new forest products, the industry witnessed a shift from milled lumber to pulp and paper. Forestry companies and the communities they employed successfully lobbied governments across Atlantic Canada for access to public or "crown" lands, which had previously been dominated by the so-called "lumber lords" of the saw mill era. **Pulp and paper** took off and public lands were increasingly leased long-term to growing forestry empires.

This meant faster cutting cycles, more replanting and plantation-style forestry, and more herbicide spraying to keep less-valuable deciduous tree species from regenerating.



up to 20 years
with the option to
renew!

By the end of the 1900s, entire forest ecosystems had changed and 99% of forests across Nova Scotia were less than 80 years old. Most forests being managed through clearcut methods also meant that dwindling old growth areas were increasingly cut off from each other, creating disconnected islands that species like Moose would have to hop between in order to find shelter. Open regenerating forests provide food for browsing Moose, but they also expose them to predators, harsh weather, poachers, and White-Tailed Deer.

Deer continue to pose a threat to Moose today, especially in lower elevations where their habitat is more likely to overlap, and in areas where forestry and housing development continue to open up older forests.



Reporting Moose sightings is important, but reports have declined in recent years...

Hunting Moose was restricted in Southwest Nova Scotia in 1936 and eventually halted entirely across the province by 1981, but poaching continues to be a problem.

The province asks that citizens report Moose sightings (including tracks and scat), but people aren't making reports as often as they used to. Nova Scotians are also asked to report poaching, but poaching usually happens in remote places that are out of sight from most citizens, like along logging roads.



Moose are affected directly and indirectly by human activity in the Wabanaki-Acadian forest...

Moose benefit from young regenerating forests for browsing but don't have enough large mature forests to take shelter in.

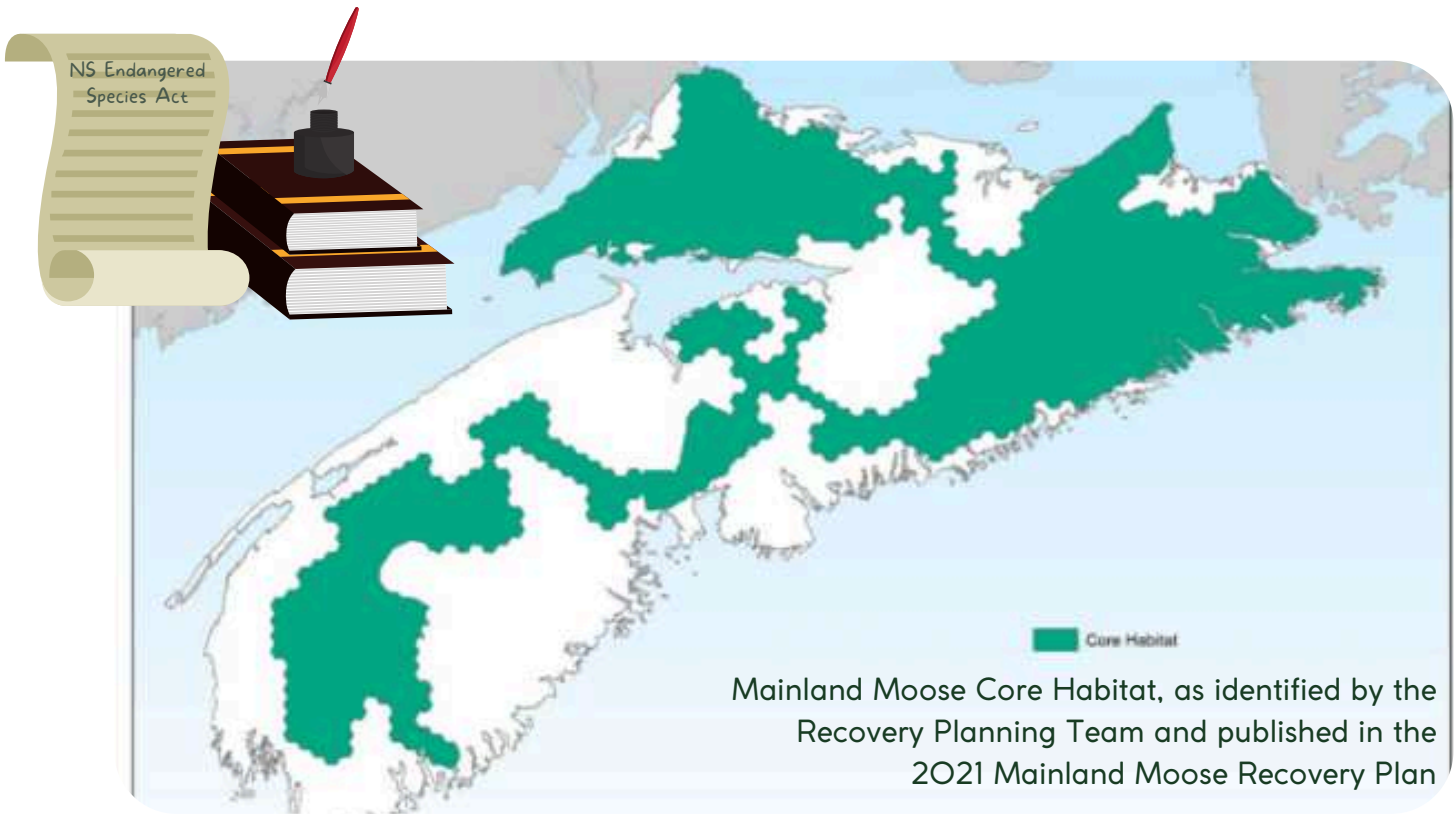
Logging roads and large cleared areas allow poachers and Brainworm-carrying Deer to move into Moose habitat.

Patchwork habitat created by unsustainable forestry practices forces Moose into narrow corridors of suitable habitat and prevents individuals from finding mates.



RECOVERY PLANNING

Recovery Plans are scientific planning documents the province is required to produce for Threatened or Endangered **Species At Risk**



In 2020, scientists and hobby naturalists took the province to court because the Dept of Natural Resources and Renewables never completed a Moose Recovery Plan, as required by the NS Endangered Species Act. The province was found to be in violation of its own legislation and released the Recovery Plan, 9 years late, in 2021. It aims to recover the population to a size of [at least] 5000 total Moose. It also identified, for the first time, the legally-required Core Habitat area that experts consider to be key battle grounds in the fight to save the species.



Core Habitat includes specific areas of habitat essential for a species' long-term survival and recovery. In the case of the Moose, this includes large, intact, mixed forests and linkage corridors between them that ensure adequate population mixing.

The future of the Mainland Moose is far from certain. Core Habitat doesn't do anything to protect the Moose unless the province officially designates it and creates rules around its management. Can you help
#savethemainlandmoose?

MAPPING MOOSE

Use the data below to plot a population trend chart for the Mainland Moose. Plot the total and local #s

*These numbers are estimates simplified from provincial records, generated by aerial counts, ground surveys, or models, with some made using different study methods. Some years and areas do not have available moose count/estimate data.

YEAR	# OF MOOSE FOUND ACROSS MAINLAND NOVA SCOTIA				
	TOTAL (ALL AREAS)	SOUTH WEST	COLCHESTER/CUMBERLAND	CHEBUCTO	NORTH EAST
1920	7000	500	4000	unknown	500
1965	3000	350	2000	unknown	357
1975	1650	unknown	1200	30	200
2003	1000	250	580	20	150
2050 (Recovery Plan Goal)	5000	500	2000	No Goal	1500

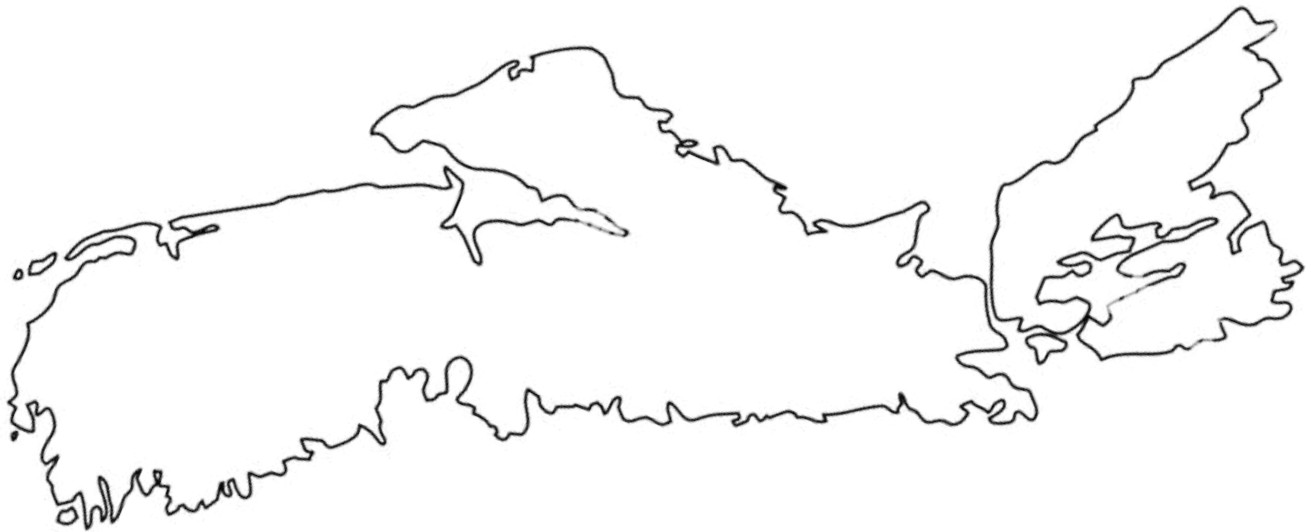
*The province also has a goal of 500 Moose located in the linkage areas/ corridors between these concentration areas



Key:

<input type="checkbox"/> Total	<input type="checkbox"/> Colchester/Cumberland	<input type="checkbox"/> Year
<input type="checkbox"/> South West	<input type="checkbox"/> Chebucto	
<input type="checkbox"/> North East		

Copy freehand or trace the outline of the Core Habitat Area on pg 5 onto this map of Nova Scotia. Then, write the number of total Moose found in each concentration area (place the numbers in the correct location on the map). Consult an atlas or other map if you are unsure of where those places are located. Finally, dot and label your home/school community.



What is the overall population trend for Moose in Nova Scotia?

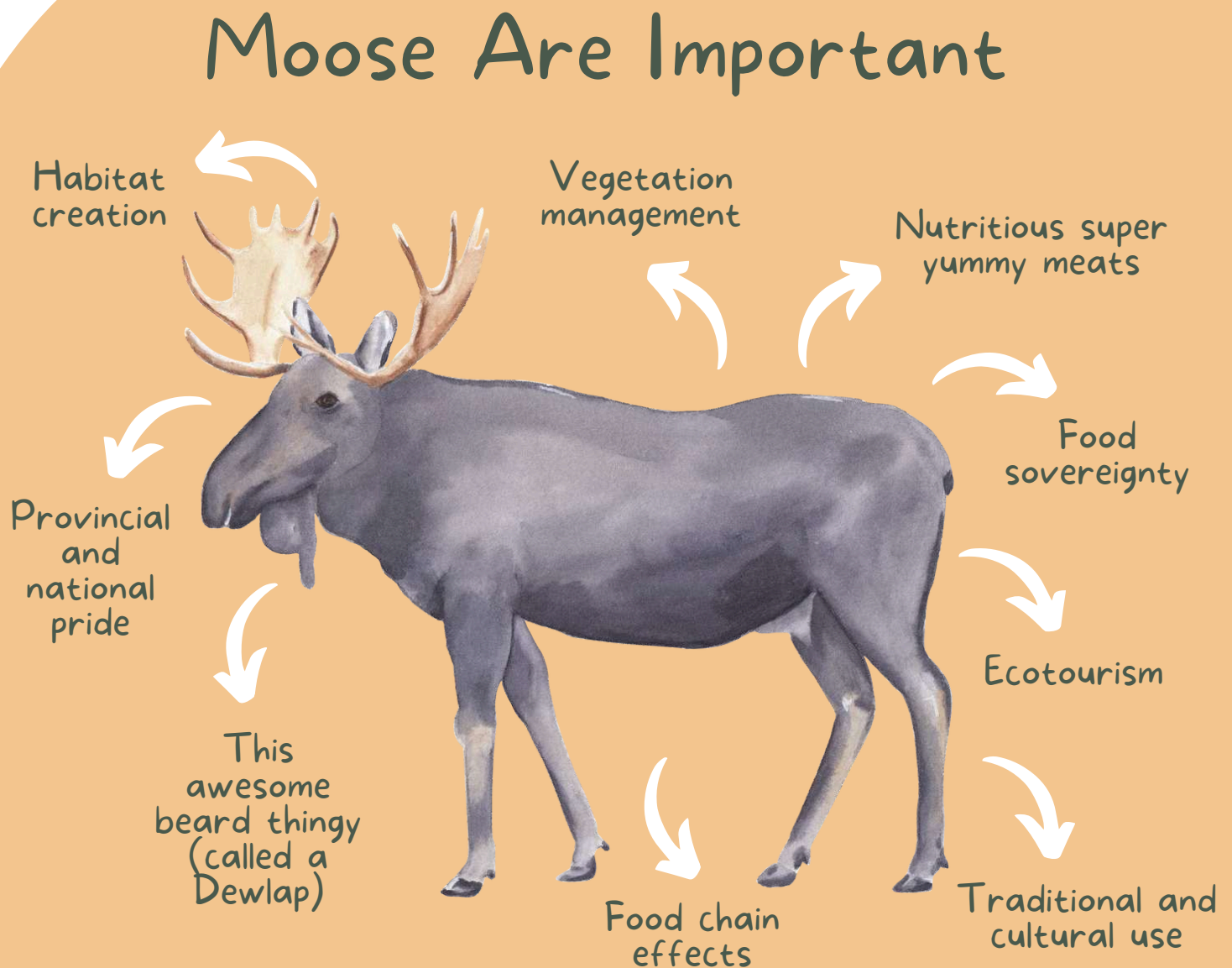
What are some reasons that might explain this change?

Which areas are experiencing the greatest change?

What factors might affect how likely a Moose in Nova Scotia is to encounter a White-Tailed Deer, and therefore be exposed to Brainworm? Where can Moose go to escape the Deer?

BECOME A MOOSE GUARDIAN

Take a look at the diagram below and think about the ways Moose and their habitats are important to you. Write a few sentences about why you think it's important to save the Mainland Moose from extirpation in Nova Scotia.



Now take the numbers from your chart and your reasons for saving the Mainland Moose and write to the Nova Scotia government asking them to designate Core Habitat. Here are some suggestions to get you started. There is space on the last page to write your letter. Feel free to add a drawing or other extras to support your case!

How could Core Habitat protections help save the Mainland Moose?

The Core Habitat identified in the Recovery Plan includes a LOT of public land. Government could immediately amend forest management plans in these areas to only include uneven-age treatments (no more clearcutting on public lands).

Some areas of Core Habitat are already in Nova Scotia's Parks and Protected Areas Plan. Government could immediately designate all pending protected areas within Mainland Moose habitat, permanently protecting them from development.

There is already a Special Management Practice for Moose in Nova Scotia, that guides what kinds of precautions land managers should take when working in suspected Moose habitat. This SMP could be updated to regulate new road construction in confirmed Core Habitat.

Nova Scotia has a fund meant specifically for further research and protection of wildlife habitat, called the Habitat Conservation Fund. Government could prioritize a percentage of this fund's grant allowances over the next 20 years specifically for Moose research and stewardship action in Core Habitat

Private landowners managing woodlots in Core Habitat could be incentivized to protect moose through funding or other opportunities to improve their forestry practices. Like supports for hardwood and specialty markets, easier access to or greater benefits for working land trusts, supports for sustainable tourism, and more!

OTHER ACTIONS YOU CAN TAKE TO #SAVETHEMAINLANDMOOSE

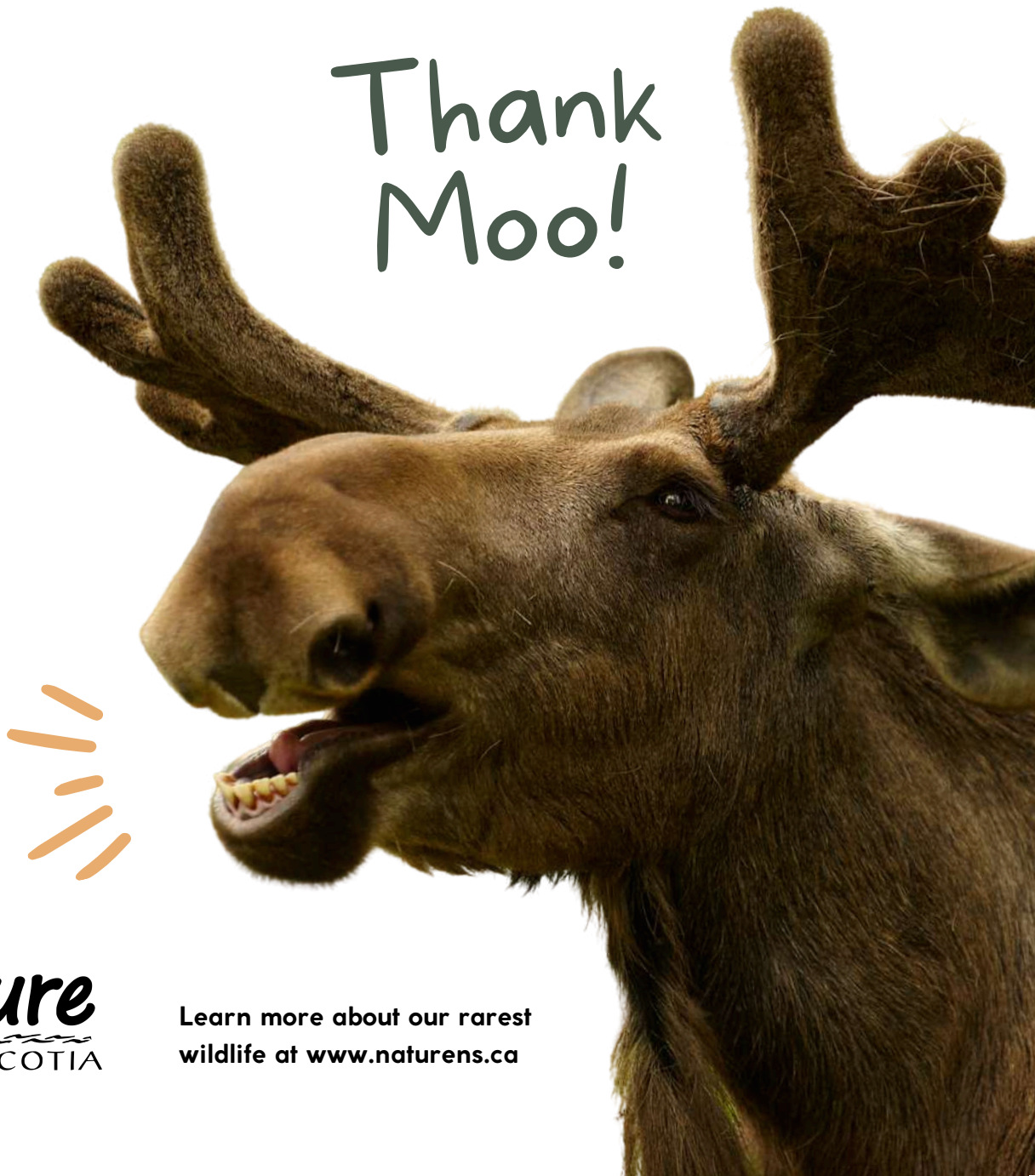
Report Moose sightings to government and their research partners at:

www.novascotia.ca/natr/wildlife/sustainable/msform.asp

Put up a display at school so others can learn about the Mainland Moose and take action to save the species

Talk to your family and friends about the threats facing the Mainland Moose and how you can work together to mitigate them

Thank
Moo!



Learn more about our rarest
wildlife at www.naturens.ca

To:
Premier Tim Houston and
Minister of Natural Resources and Renewables Tory Rushton

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Minister of Natural Resources and Renewables
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Dear Minister Rushton,

My name is _____ and I am concerned about the
future of the Mainland Moose.

I live in _____. Did you know that
there are only an estimated _____ Mainland Moose left in my
community?

I care about the future of the Mainland Moose because

In 2021, your government identified a large area of Nova Scotia as Core
Habitat for the Mainland Moose, 66% of which falls within public lands.

I'm asking you to officially designate Core Habitat for the Mainland
Moose and create new protections in these areas that save the species
from extirpation in Nova Scotia.

These protections could include

The 2021 Recovery Plan for the Mainland Moose says we are at a
critical junction for deciding the fate of this species. Please follow the
recommendations of the Recovery Team and save the Mainland Moose.

Sincerely,

Mainland Moose Trivia!

Moose are the only remaining native member of the deer family in Nova Scotia

Moose are Endangered in Mainland NS

Less than 1% of Nova Scotia's forest are in an "old growth" state

Moose may weigh 700-900lbs

Moose were re-introduced to Cape Breton after the native population died out and are a different subspecies from the Mainland population

Bull moose antlers may be 5ft across at maturity

Some tree species of the Wabanaki-Acadian forest can live to be 500 or more years old

A white "leucistic" moose made the news in NS a few years ago when it was shot by hunters who didn't understand the animal's cultural significance to the Mi'kmaq

Moose need a large area of diverse forest and access to lakes and wetlands

Moose are threatened by habitat destruction, climate change, and brainworm spread by introduced White-tailed deer

Young moose can already outrun a human by just 5 days old

The main [natural] disturbance in the Wabanaki-Acadian forest is wind-throw, where small patches of old forest are opened up by storm activity

Moose have a four-chambered stomach, like cows

Young moose typically stay with their mothers for only 1 year

Moose are Nova Scotia's largest land animal

Male moose have a "dewlap"

99% of forest harvests in Nova Scotia today use clearcut methods

Moose are mainly solitary animals, until breeding season

Core Habitat is the area essential for a species survival and long term recovery and must be identified for all species at risk, according to the NS Endangered Species Act

Twins are a sign of a healthy moose population

Bull moose shed their antlers each year, usually over the fall-winter

Moose have four toes on each foot

Moose are found across the Northern Hemisphere. Four out of the total nine subspecies are found in Canada