



**The Future of Moose in  
Northwestern Ontario:  
Implications of Climate Change**

# ++ Risk

## ❄ Predation

- ❄ higher wolf predation due to increased deer densities.

## ❄ Parasites

- ❄ *P. tenuis* in CEMZ D1 and C1
- ❄ ticks in CEMZ B
- ❄ liver fluke in CEMZ D1

## ❄ Human Interactions

- ❄ risk of mismanagement from lack of information in CEMZ D1 & C1

## ❄ Summer Habitat

- ❄ increased *P. tenuis*/liver fluke from increased use of wetter areas (more deer/more time in snail habitat/higher encounter rates).

# + Risk

## ■ Predation

- 📖 higher wolf predation due to extreme weather.

## ■ Winter Habitat

- 📖 lower abundance of thermal cover (heat stress)

- 📖 lower quality of thermal cover (heat stress)

- 📖 increased energy cost of increased snow crusting/density on moose movement

- 📖 increased mortality due to increased wolf mobility on crusted/denser snow

## ■ Summer Habitat

- 📖 increased extreme weather events resulting in more blowdown (poor moose habitat)

- 📖 increased forest disease (Pj budworm, S budworm) resulting in poorer summer habitat.

- 📖 Calving/nursery areas with increased predation

# + Risk (cont'd)

- \* Parasites

- \* P. tenuis in CEMZ B
- \* ticks in CEMZ A
- \* liver fluke in CEMZ C1

- \* Human Interactions

- \* risk of mismanagement from lack of information in CEMZ B & A

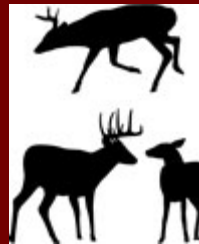
# Moose-Climate Interactions

- 2 potential interactions models

## Model 1 – deer mediated changes



Climate changes



## Model 2 - independent climate impacts



Climate changes



# "-" Risk

- \* Winter Habitat
  - \* reduced energy cost of decreased snow depth.
- \* Summer Habitat
  - \* spatial patterns of summer food patches
- \* Human Interactions
  - \* decreased success of licensed hunters from warmer weather
  - \* decreased mortality from railways from reduced "snow trapping"

# "--" Risk

## ★ Winter Habitat

- ★ increased winter forage from increased disturbance.

## ★ Summer Habitat

- ★ predator (human and natural) escape cover relative to food
- ★ increased fire size/frequency (more food)

# Management Actions ++ Risk

- \* Predation

- \* reduce deer densities (particularly post severe winters) to keep wolf numbers low.

- \* Summer Habitat

- \* monitor/document P. tenuis/liver fluke cases
- \* decrease deer #'s
- \* deer pellet sampling for parasites
- \* gastropod survey

- \* Parasite/Disease

- \* reduce deer density
- \* snow data collection
- \* monitoring/documenting sick moose
- \* population management of moose in parks (related to tick)
- \* hair loss surveys to monitoring winter tick

# Management Actions ++ Risk

- ★ Human Interactions

- ★ (relating to lack of information for management)

- ★ decrease licensed harvest

- ★ regular monitoring of populations

- ★ increase funding/staffing

- ★ adjust hunting regulations in response to pop'n change

- ★ review MAI protocols (changes in snow depth and quality)

- ★ improved calf harvest estimate

- ★ consider calf harvest controls

# Management Actions +Risk

## \* Winter Habitat

- \* identify characteristics of winter thermal cover
- \* establish targets for amount, location and patch size of winter thermal cover
- \* ensure silviculture provides adequate future winter thermal cover
- \* spatial assessment of winter thermal cover prior to allocation in FMP.
- \* Ensure fire cycles in SFMM consider climate changes in managed fire cycles and species specific fire cycles.

## \* Summer Habitat

- \* Monitor predator populations

# Management Actions "---"Risk

- ★ Winter Habitat

- ★ limiting silviculture options in natural fires that would reduce moose forage
- ★ ensure adequate thermal cover remains during salvage operations of natural disturbances

# Information Needs

- Predation
  - ★ rates of predation by wolves and bears on moose
  - ★ bear and wolf densities
  
- ★ Winter Habitat
  - ★ identify characteristics of winter thermal cover (FRI stand characteristics, locations, patch size)
  - ★ identify upper critical temperature
  
- ★ Summer Habitat
  - ★ identify characteristics of summer thermal cover (FRI stand characteristics, locations, patch size)
  - ★ identify upper critical temperature (behavioral change threshold)
  - ★ Na requirements from heat stress
  
- Understanding inter-relationship of multiple stressors and benefits from climate change on moose.