Fire Mediated Effects on Moose and Subsistence Activities

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BONANZA CREEK LTER
Boreal Forest Ecology

Institute of Arctic Biology
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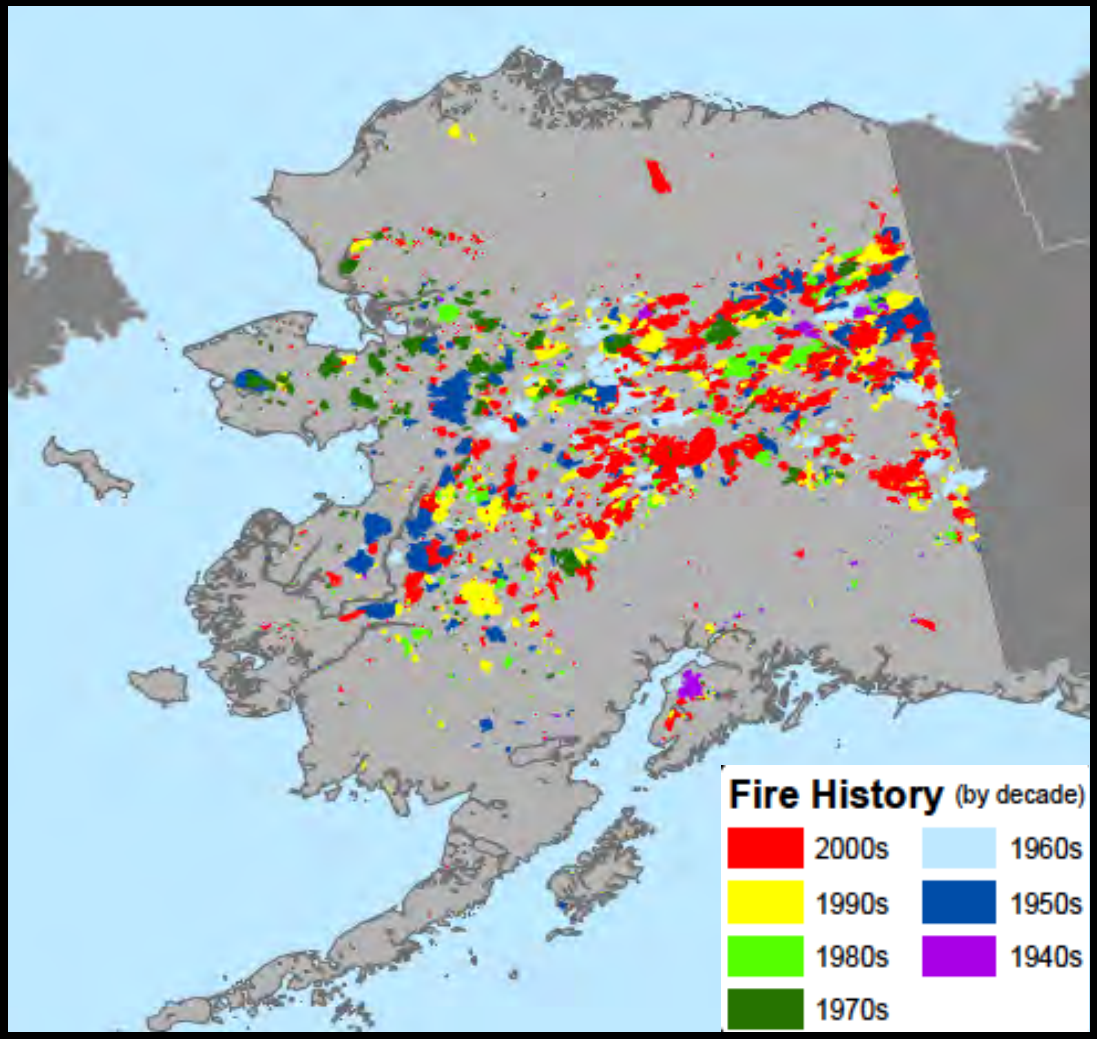
ALASKA DEPARTMENT OF FISH AND GAME

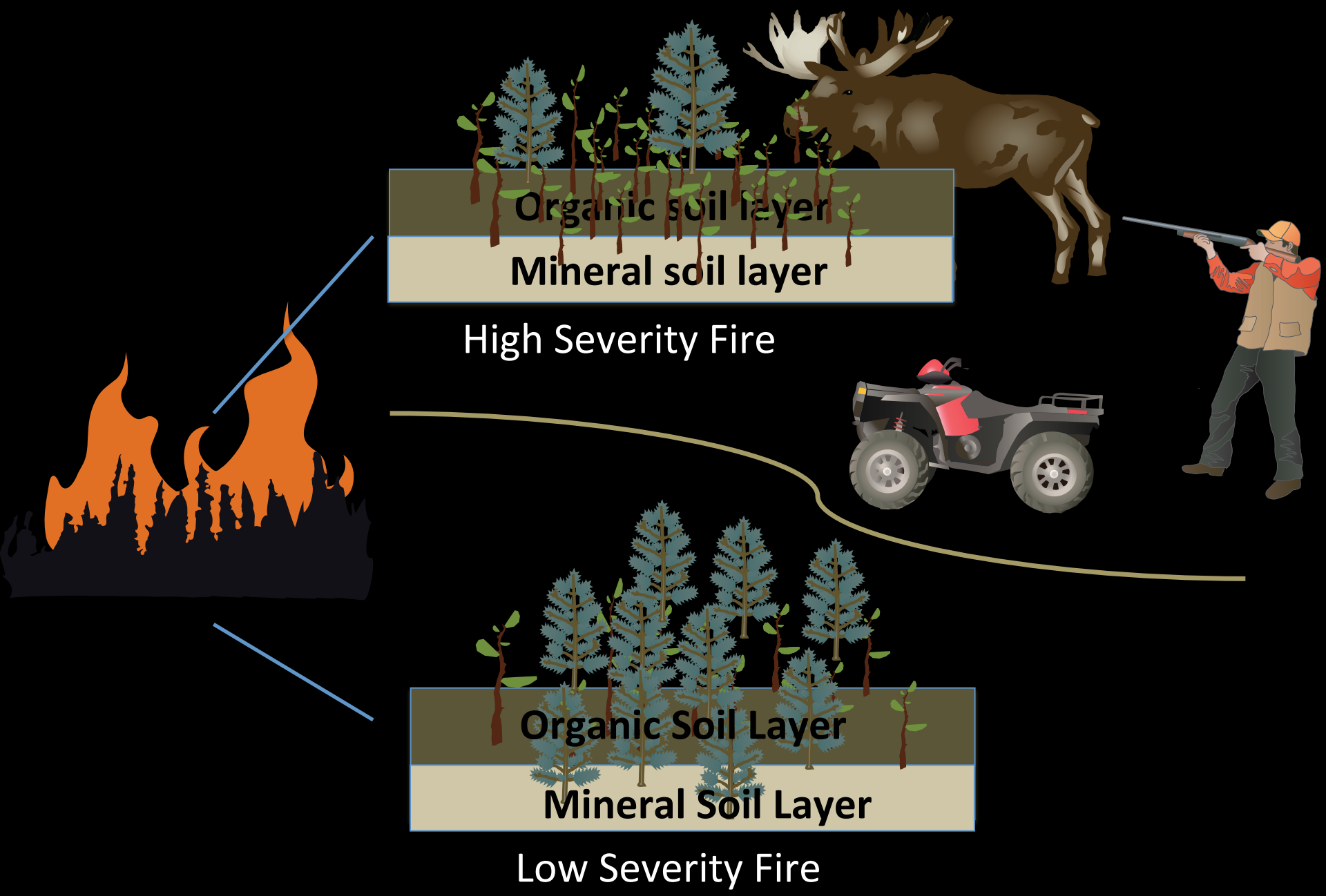
Outline:

- Introduction to moose, fire and hunter interactions.
- Research in interior Alaska:
  - Moose habitat use
  - Browse production surveys
  - Hunter harvest rates
- Management Scenarios
- Opportunities for Collaboration

Alaska's Changing Fire Regime



(www.fire.ak.blm.gov)


Organic soil layer
Mineral soil layer
High Severity Fire
Organic Soil Layer
Mineral Soil Layer
Low Severity Fire

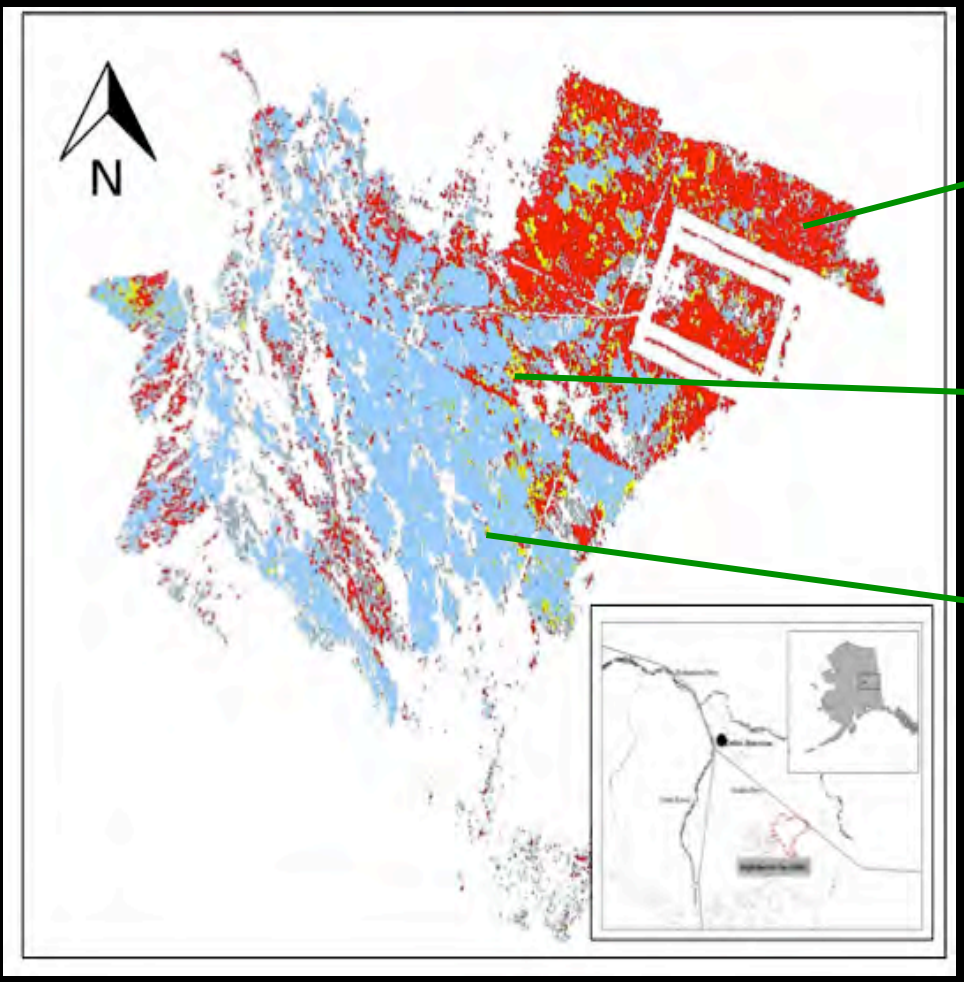
Research Questions:

1) What is the relative importance of regenerating burns on winter moose habitat use?

2) How does fire severity affect the duration of production of browse species in a regenerating burn?

3) How does a regenerating burn affect hunter success rates? Does accessibility play a role?

Study Area: Hajdukovich Cr



(Mikalek et al. 2002)

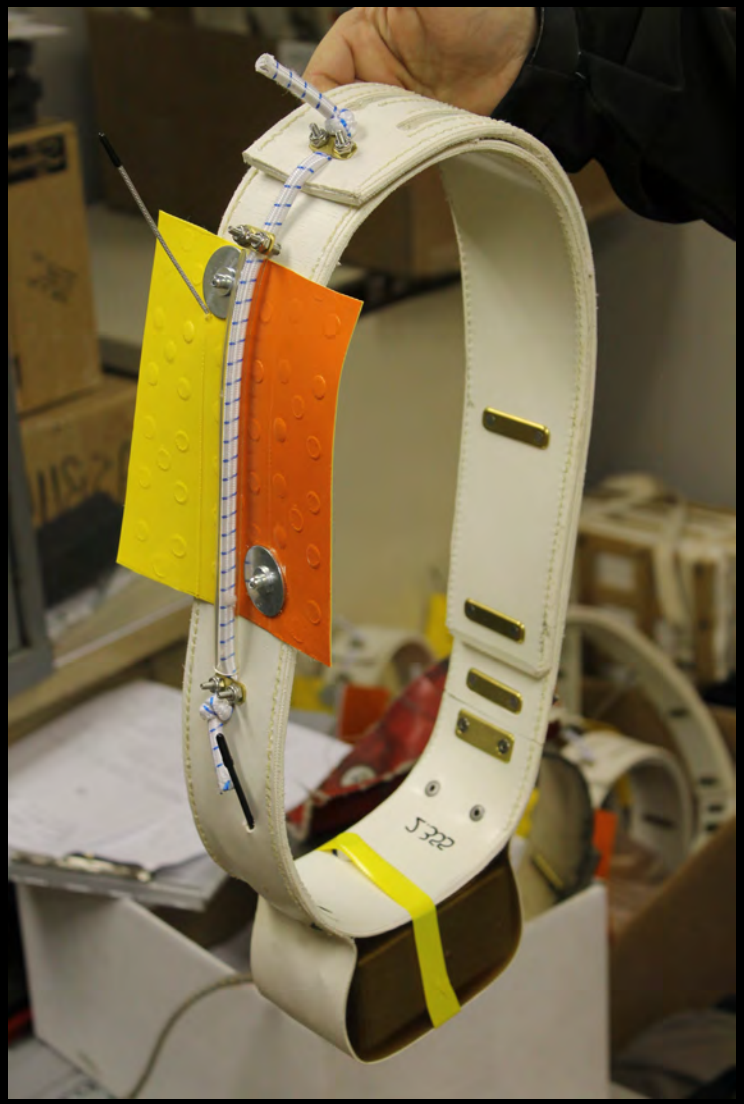
- Fire sever
  - 60% low
  - 10%
  - 30%
- Pre-fire v
  - black
  - few mixed stands of aspen
- Post-fire
  - diver paths

High

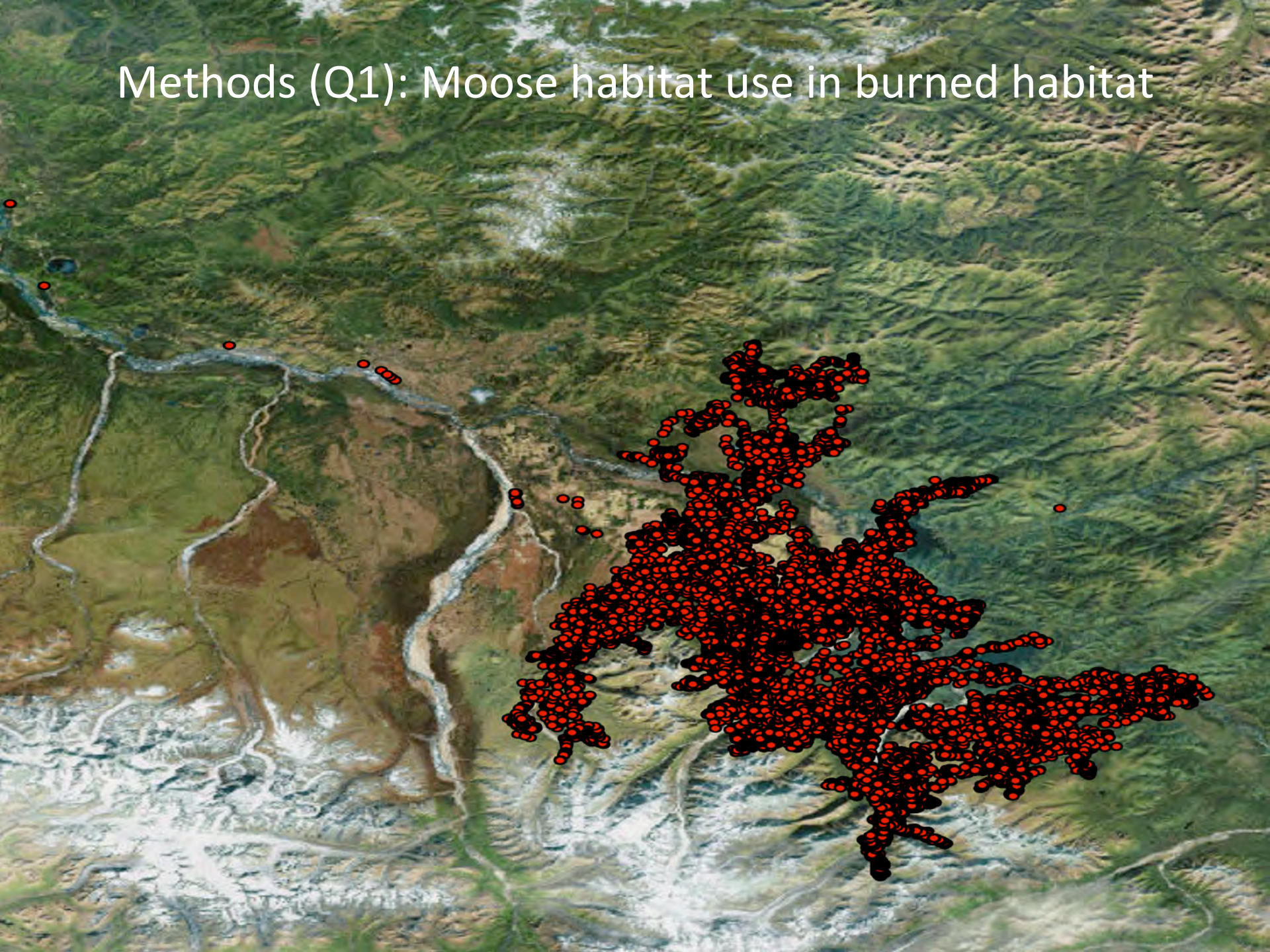
Med

Low

Methods (Q1): Moose habitat use

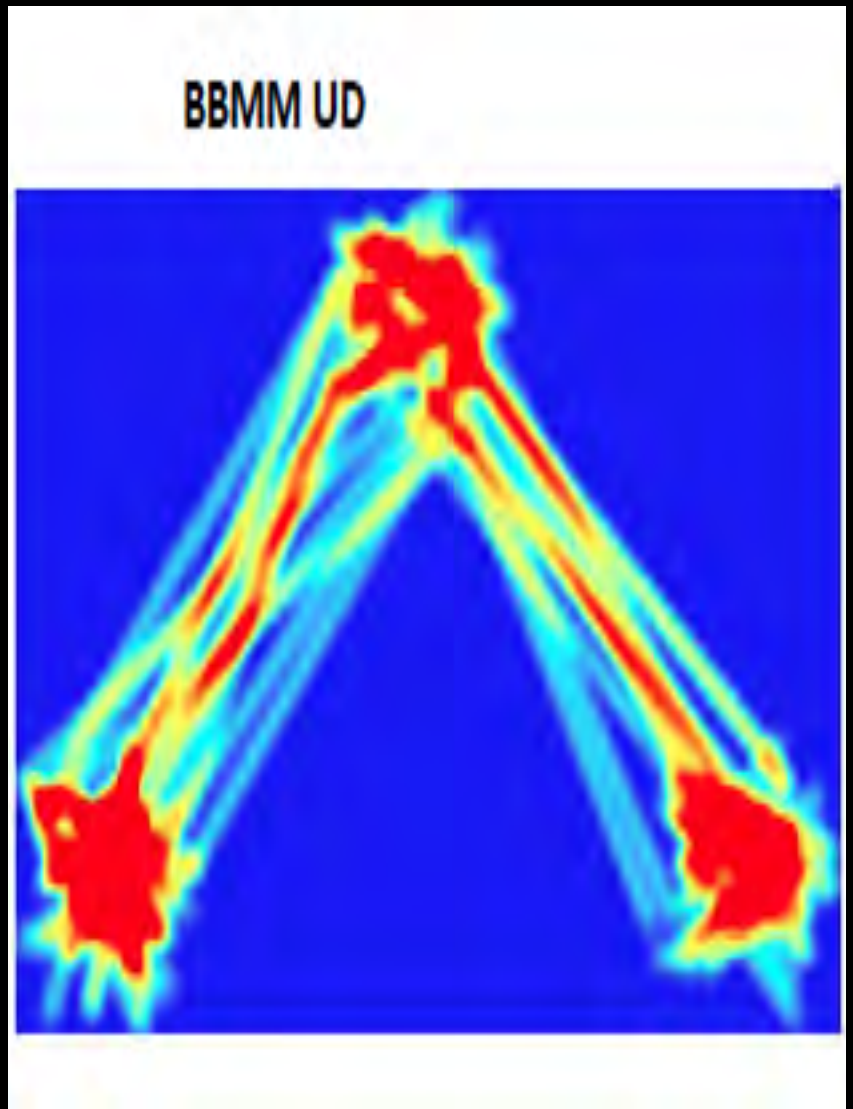


Methods (Q1): Moose habitat use in burned habitat



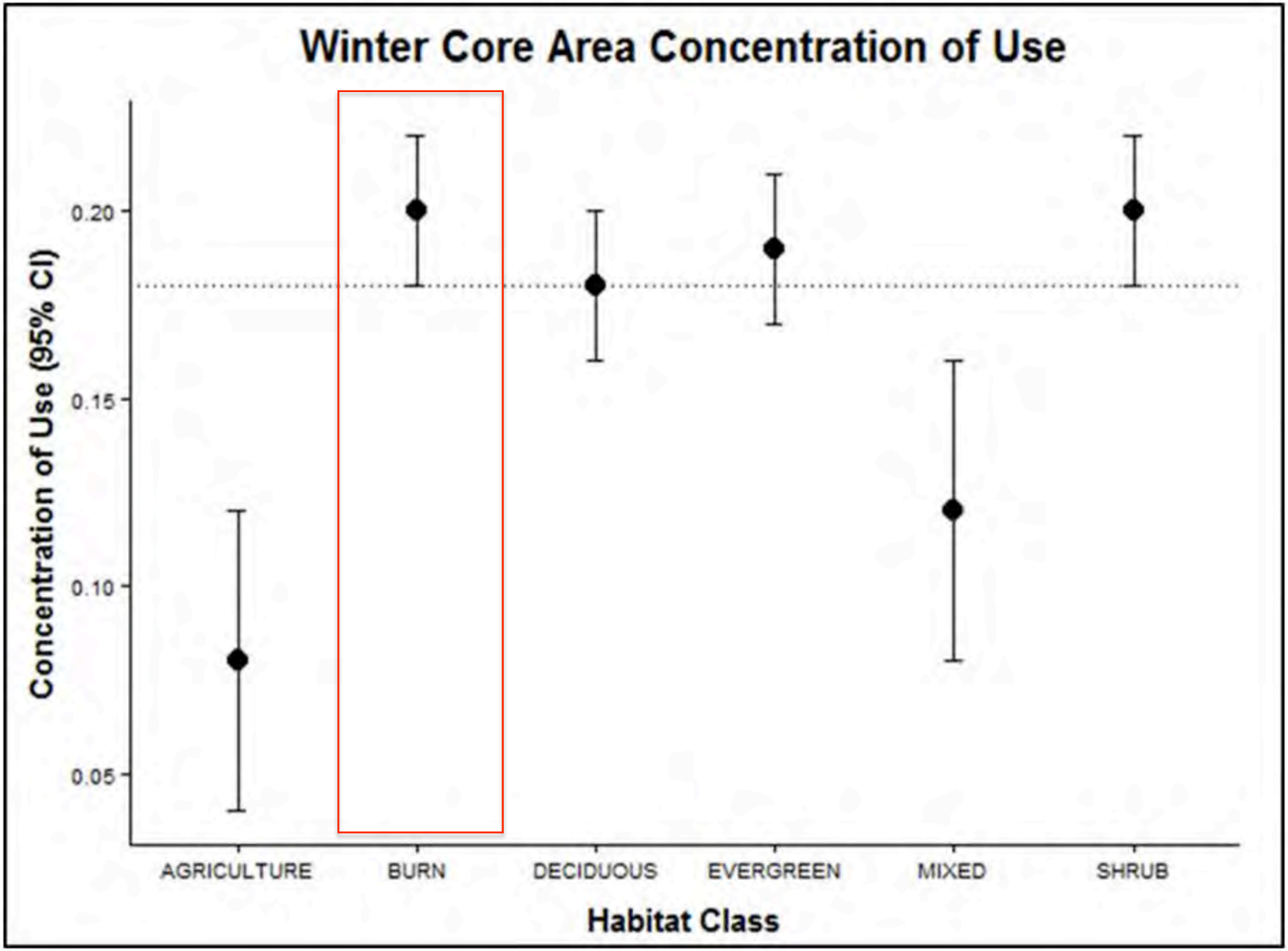
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

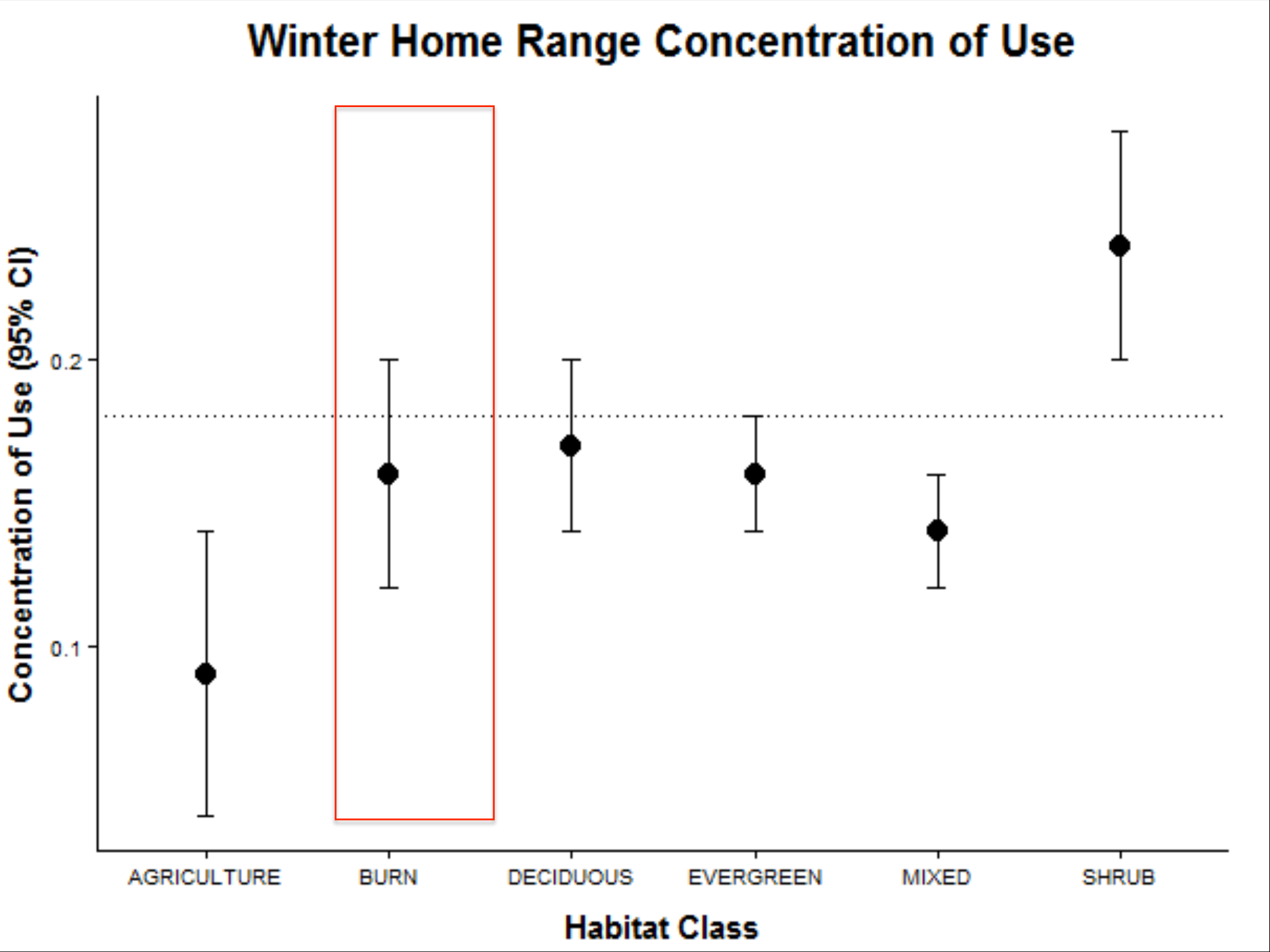
Methods (Q1): Moose habitat use

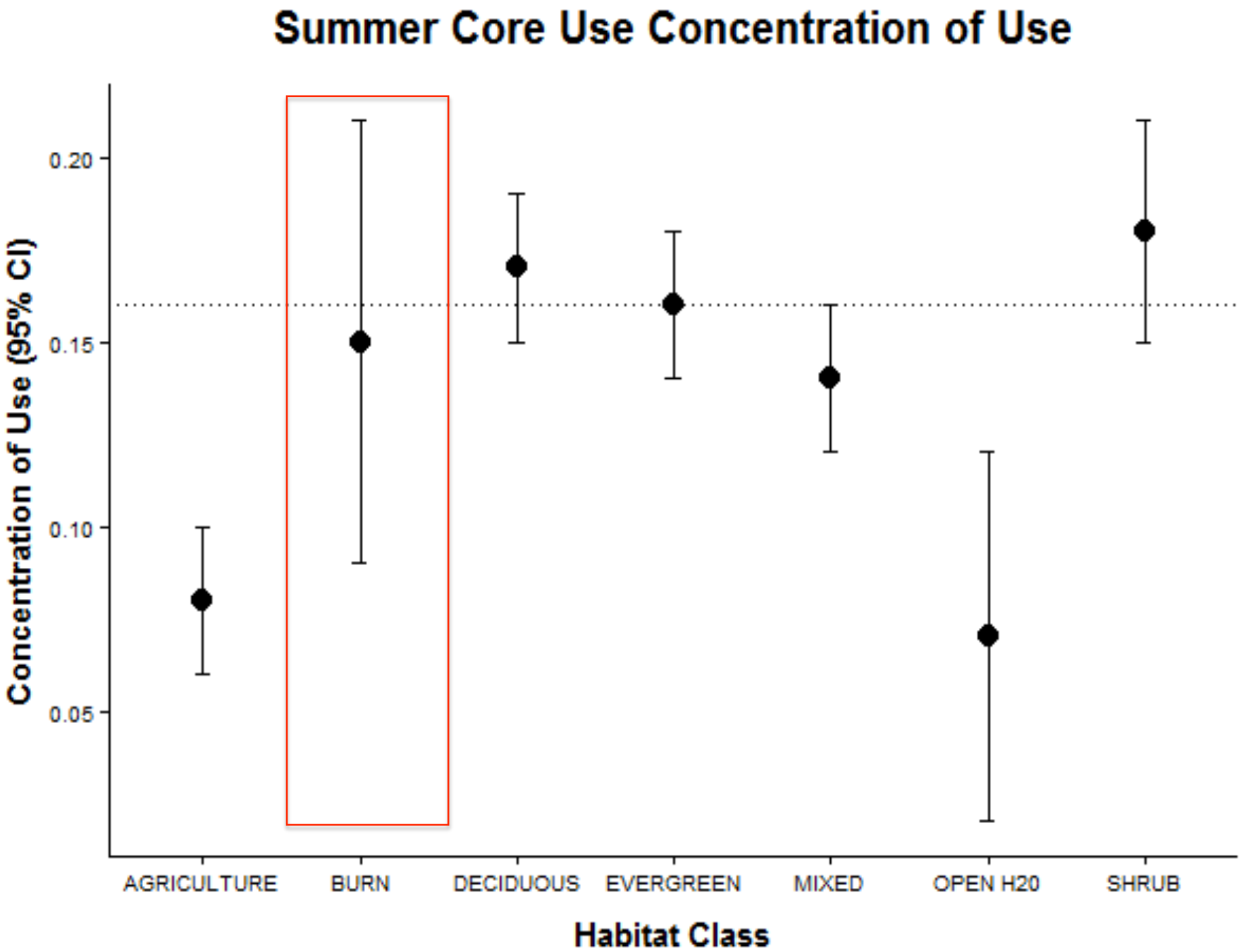


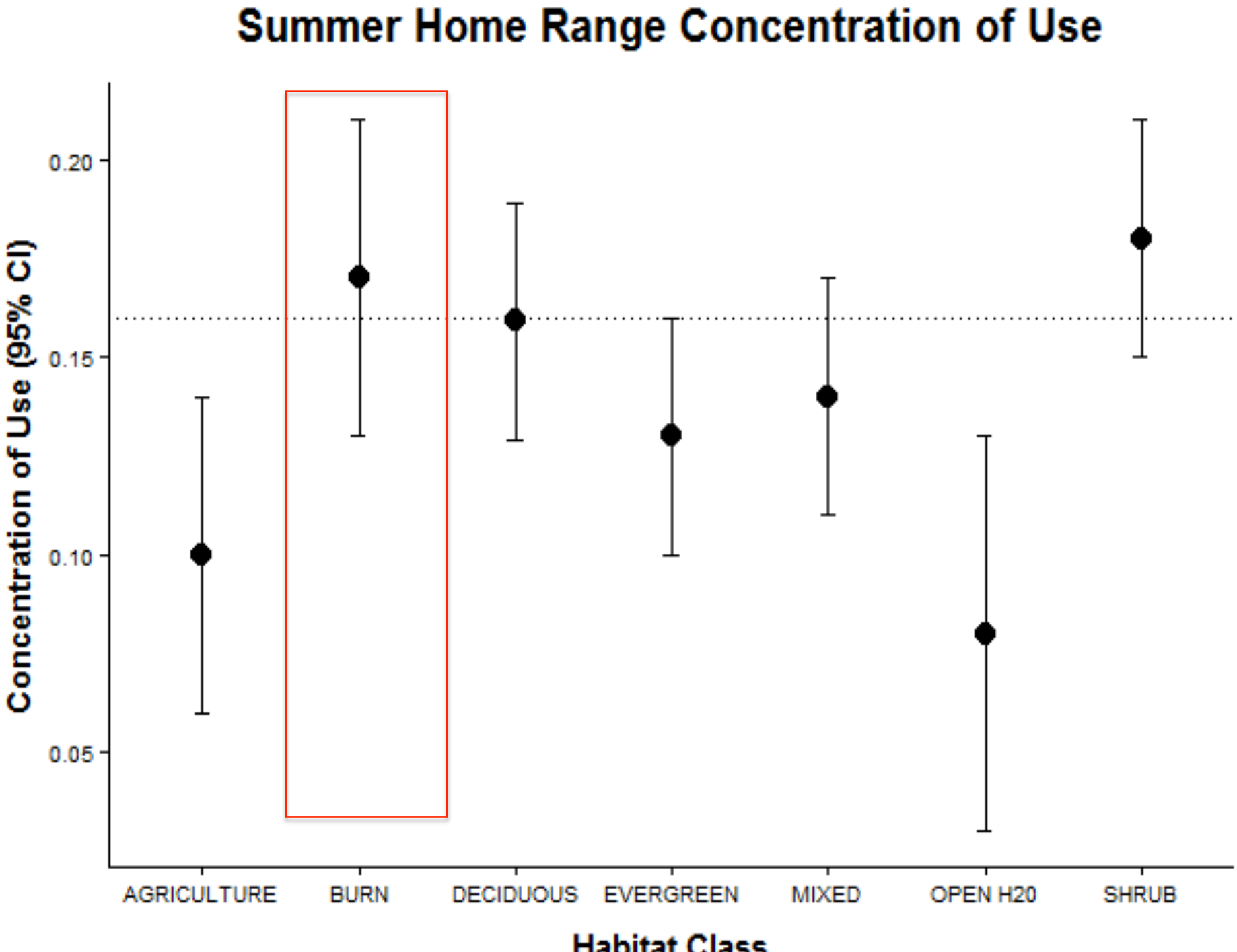
- Utilization Distributions estimate home range and core use area for individual moose.

- Proportion of different habitat types within the home range boundary.
  - burned: high, moderate and low severity
  - unburned: deciduous (unburned), coniferous , shrub, agriculture

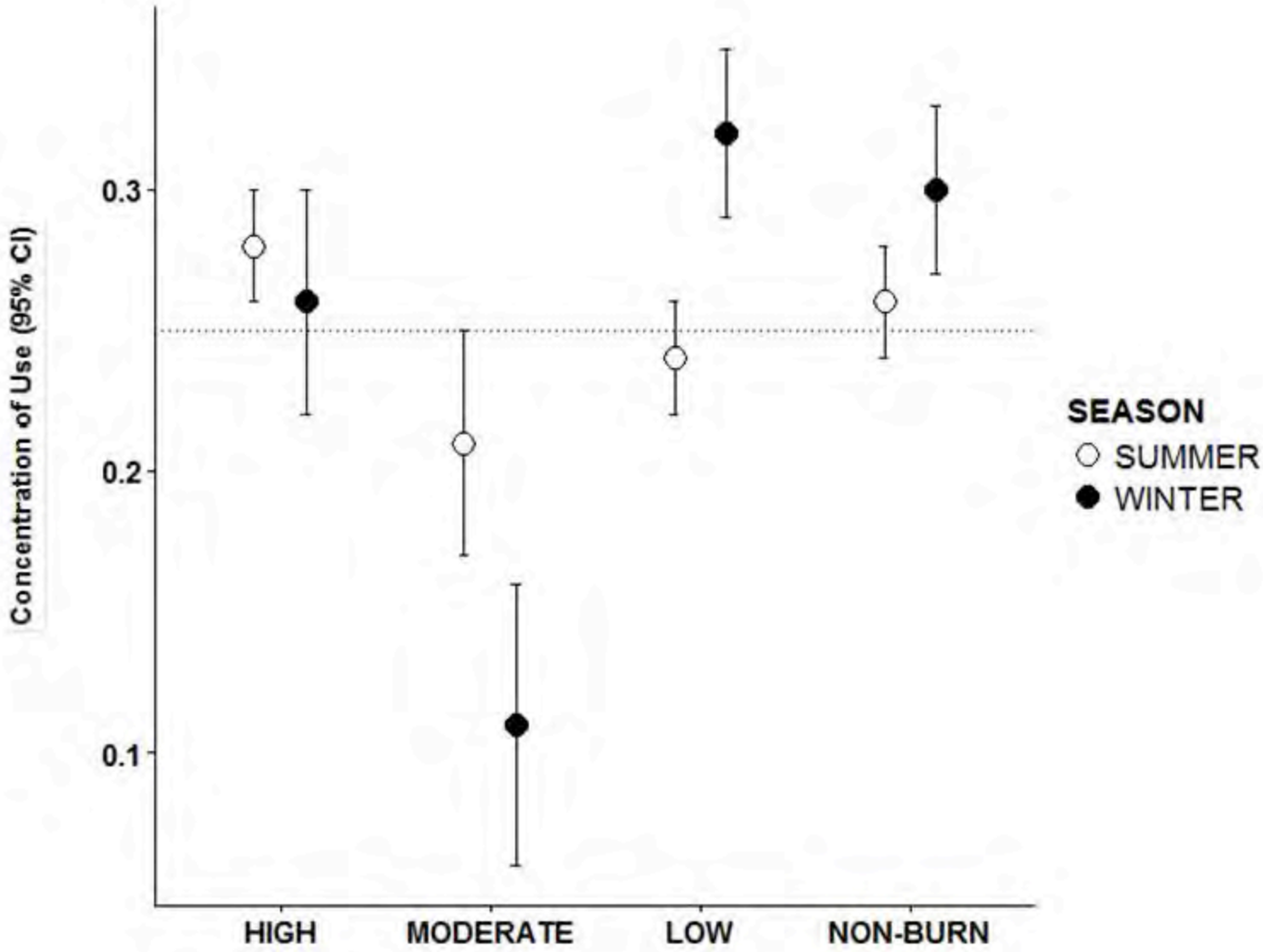

Winter Core Area Concentration of Use
Concentration of Use (95% CI)
0.20
0.15
0.10
0.05
AGRICULTURE
BURN
DECIDUOUS
EVERGREEN
MIXED
SHRUB
Habitat Class


Winter Home Range Concentration of Use
Concentration of Use (95% CI)
0.2
0.1
AGRICULTURE
BURN
DECIDUOUS
EVERGREEN
MIXED
SHRUB
Habitat Class


Summer Core Use Concentration of Use
Concentration of Use (95% CI)
0.20
0.15
0.10
0.05
AGRICULTURE
BURN
DECIDUOUS
EVERGREEN
MIXED
OPEN H20
SHRUB
Habitat Class


Summer Home Range Concentration of Use
Concentration of Use (95% CI)
0.20
0.15
0.10
0.05
AGRICULTURE
BURN
DECIDUOUS
EVERGREEN
MIXED
OPEN H20
SHRUB
Habitat Class

Results (Q1): Moose Habitat Use



Conclusions Q1: Moose Habitat Use

- The Hajdukovich Burn was the most abundant habitat class across individual moose home range and core use areas.

- Moose preferred:
  - Winter core use areas with high availability of willow biomass (i.e. low severity sites).
  - Summer core use areas with the most total available woody biomass.

- However, it appears that selectivity for burns decreases at the home range scale.

Methods (Q2): Deciduous Forage Production and Removal

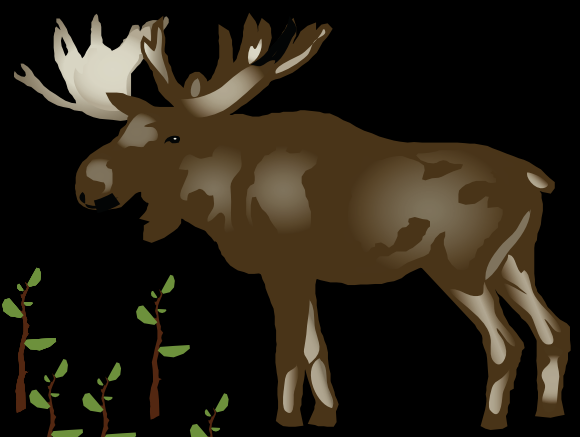
- Browse assessment survey:
  - 30 m diameter plot
  - Sampled 3 plants of each forage sp.
  - 10 twigs/plant: diameter of current annual growth and point of browsing.
- Estimate biomass of forage production and removal from estimated dry weights.
- Compared estimates between years.

(Paragi et al. 2008, Seaton et al. 2011)

Methods:
Browse Assessment Surveys

- Plant architecture
- Percent dead by volume
- Other signs of herbivory

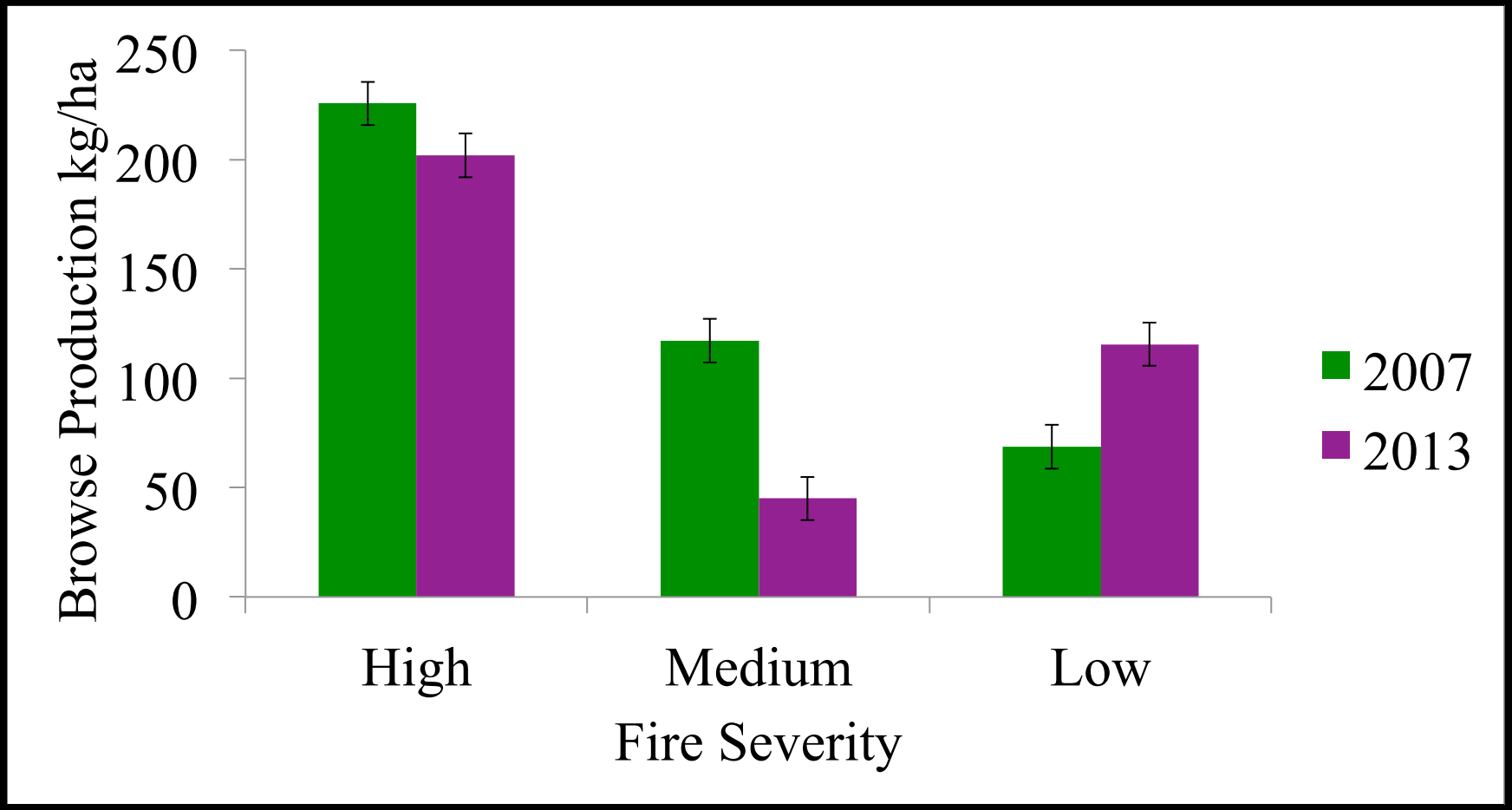
Results Q2: Deciduous Forage Production and Removal



199.1 kg/ha produced
- -high severity 267 kg/ha
- -low severity 172 kg/ha

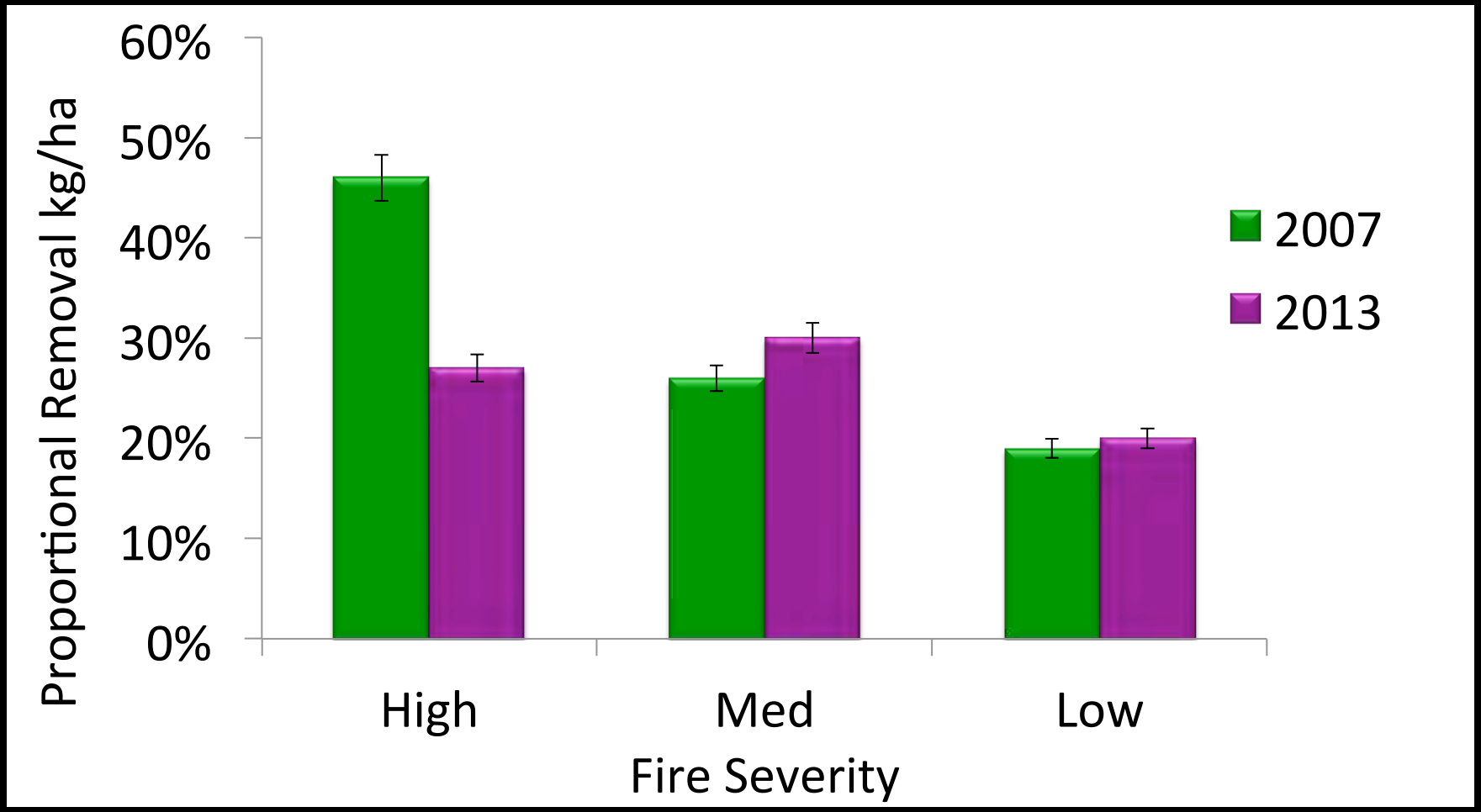
Moose removed 23% of available forage
- -high severity 27%
- -low severity 11%

Results Q2: Deciduous Forage Production and Removal



(Lord 2008, Brown unpublished

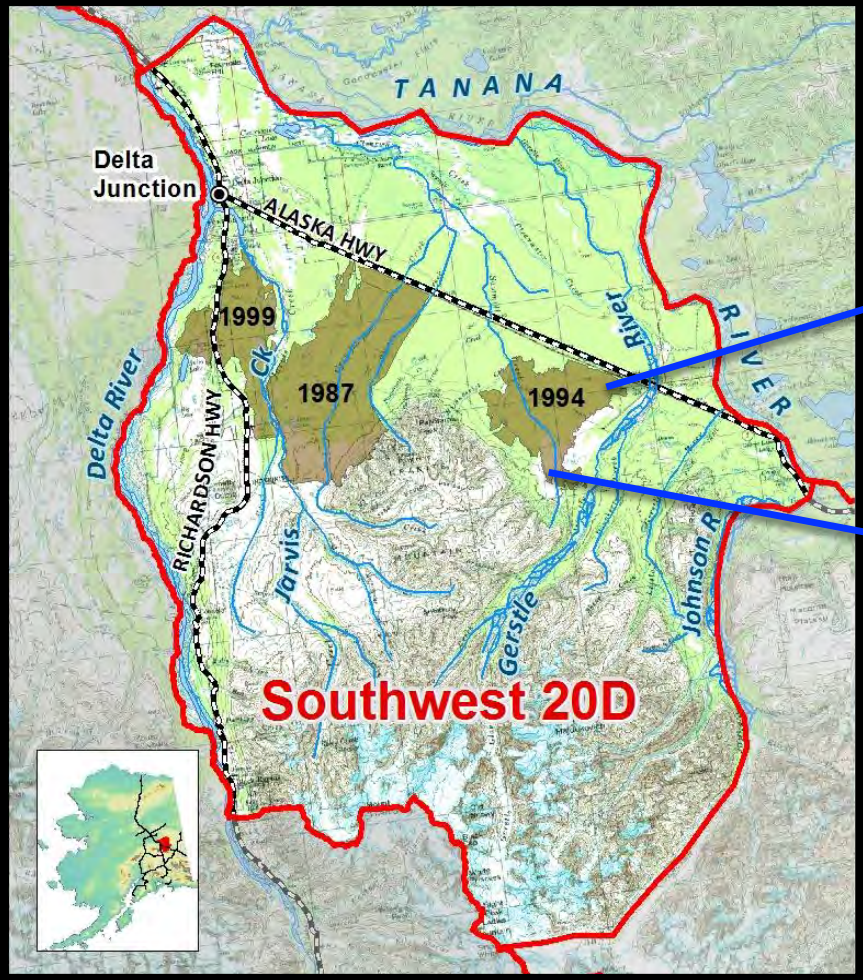
Results Q2: Deciduous Forage Production and Removal

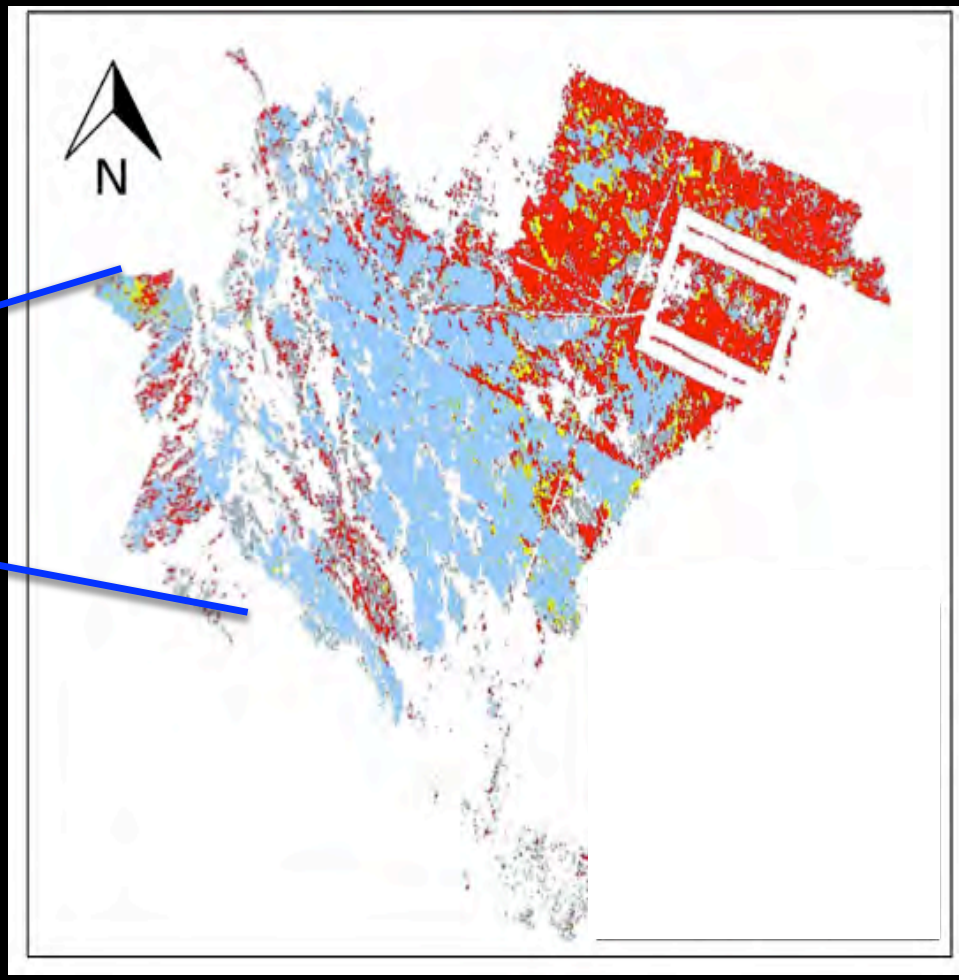


Conclusions Q2: Deciduous Forage Production and Removal

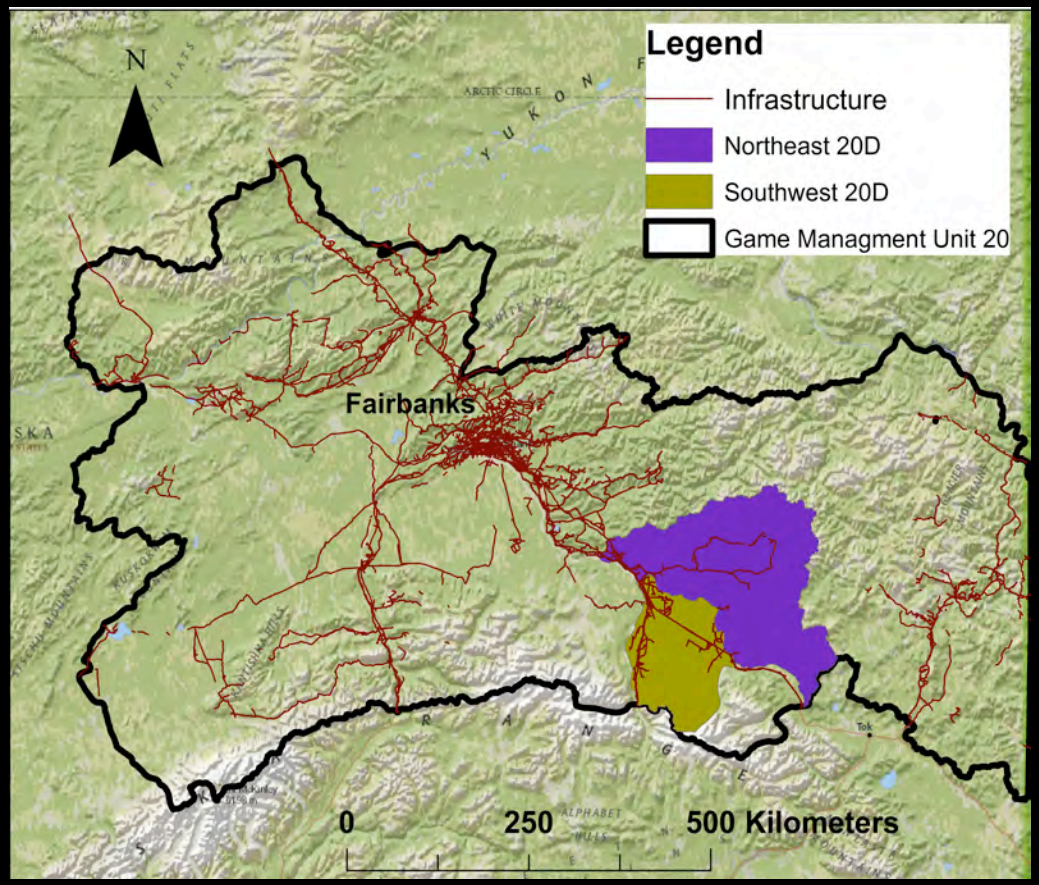
- Forage production and proportional removal is variable across fire severities.
- Willow biomass has increased 3-fold in low severity sites during winter.
- Proportional removal has declined suggesting that moose are beginning to utilize the burn less.

Q3: Hunter Harvest and Hunter Access



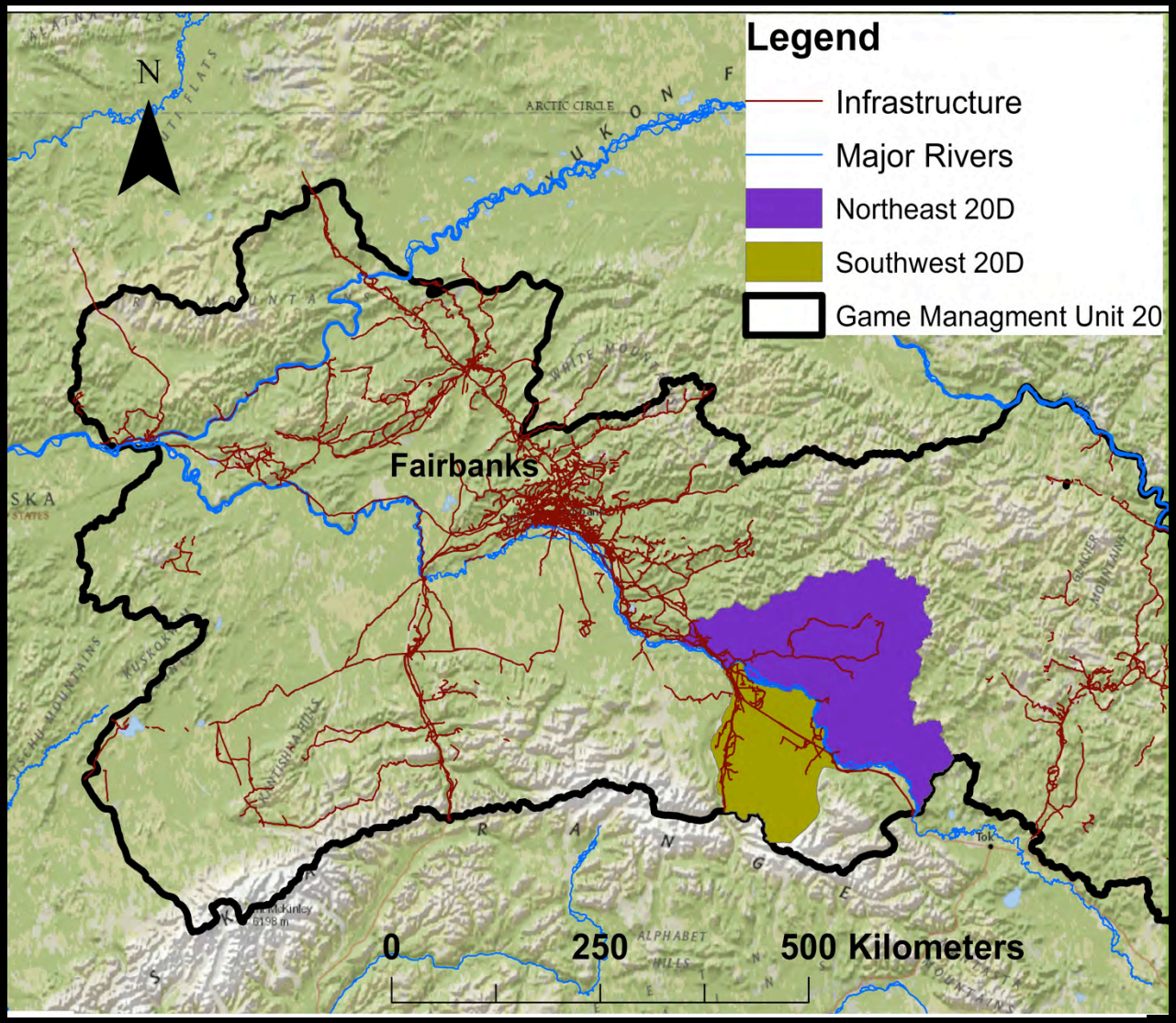


Q3: Hunter Harvest and Hunter Access

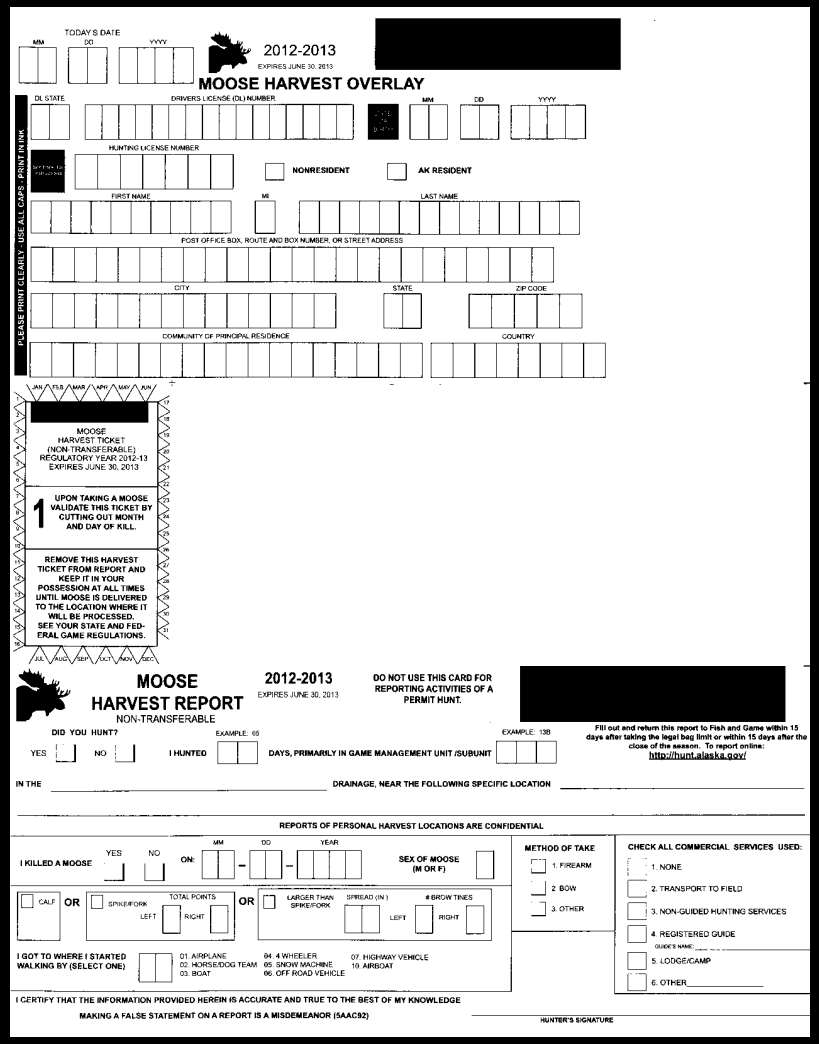


- Experienced extensive wildfires.
- Aerial surveys estimate that moose populations have increased steadily.
- Access is very different for hunters.

Methods (Q3): Hunter Access



Methods (Q3): Hunter Harvest Rates



TODAY'S DATE MM DD YYYY

2012-2013
EXPIRES JUNE 30, 2013

[redacted]

MOOSE HARVEST OVERLAY

PLEASE PRINT CLEARLY - USE ALL CAPS - PRINT IN INK

DL STATE | DRIVERS LICENSE (DL) NUMBER | MM DD YYYY

HUNTING LICENSE NUMBER

☐ NONRESIDENT ☐ AK RESIDENT

FIRST NAME | MI | LAST NAME

POST OFFICE BOX, ROUTE AND BOX NUMBER, OR STREET ADDRESS

CITY | STATE | ZIP CODE

COMMUNITY OF PRINCIPAL RESIDENCE | COUNTRY

JAN FEB MAR APR MAY JUN

[redacted]

MOOSE
HARVEST TICKET
(NON-TRANSFERABLE)
REGULATORY YEAR 2012-13
EXPIRES JUNE 30, 2013

1 UPON TAKING A MOOSE VALIDATE THIS TICKET BY CUTTING OUT MONTH AND DAY OF KILL.

REMOVE THIS HARVEST TICKET FROM REPORT AND KEEP IT IN YOUR POSSESSION AT ALL TIMES UNTIL MOOSE IS DELIVERED TO THE LOCATION WHERE IT WILL BE PROCESSED. SEE YOUR STATE AND FEDERAL GAME REGULATIONS.

JUL AUG SEP OCT NOV DEC

MOOSE HARVEST REPORT
NON-TRANSFERABLE

2012-2013
EXPIRES JUNE 30, 2013

DO NOT USE THIS CARD FOR REPORTING ACTIVITIES OF A PERMIT HUNT.

[redacted]

Fill out and return this report to Fish and Game within 15 days after taking the legal bag limit or within 15 days after the close of the season. To report online: http://hunt.alaska.gov/

DID YOU HUNT? YES ☐ NO ☐ I HUNTED (EXAMPLE: 46) ☐☐ DAYS, PRIMARILY IN GAME MANAGEMENT UNIT /SUBUNIT (EXAMPLE: 13B) ☐☐☐

IN THE _____ DRAINAGE, NEAR THE FOLLOWING SPECIFIC LOCATION _____

REPORTS OF PERSONAL HARVEST LOCATIONS ARE CONFIDENTIAL

I KILLED A MOOSE YES ☐ NO ☐ ON: MM DD YEAR SEX OF MOOSE (M OR F) ☐

☐ CALF OR ☐ SPIKE/FORK TOTAL POINTS LEFT ☐ RIGHT ☐ OR ☐ LARGER THAN SPIKE/FORK SPREAD (IN.) LEFT ☐ RIGHT ☐ # BROW TINES

I GOT TO WHERE I STARTED WALKING BY (SELECT ONE) ☐ 01. AIRPLANE 02. HORSE/DOG TEAM 03. BOAT 04. 4 WHEELER 05. SNOW MACHINE 06. OFF ROAD VEHICLE 07. HIGHWAY VEHICLE 10. AIRBOAT

METHOD OF TAKE
☐ 1. FIREARM
☐ 2. BOW
☐ 3. OTHER

CHECK ALL COMMERCIAL SERVICES USED:
☐ 1. NONE
☐ 2. TRANSPORT TO FIELD
☐ 3. NON-GUIDED HUNTING SERVICES
☐ 4. REGISTERED GUIDE
GUIDE'S NAME: _____
☐ 5. LODGE/CAMP
☐ 6. OTHER _____

I CERTIFY THAT THE INFORMATION PROVIDED HEREIN IS ACCURATE AND TRUE TO THE BEST OF MY KNOWLEDGE

MAKING A FALSE STATEMENT ON A REPORT IS A MISDEMEANOR (5AAC92)

HUNTER'S SIGNATURE

Results Q3: Harvest Rates and Hunter Access

- NE 20D: 5% of hunters
  36% avg. success rate
- SW 20D: 52% hunters
  28% avg. success rate

- NE 20D twice the amount of bured land than SW20D.
- Less than 100 ha of that land is accessible to hunters.

Conclusions

- Areas with greater proportion of accessible burned area supported greater numbers of hunters and harvested moose.

- However, there might be a tradeoff between having access and “harvest success”.

- See Brown, C. L., et al. 2015. Applications of resilience theory in management of a moose-hunter system in Alaska. Ecology and Society

Management Scenario Timeline:
Initial Prioritization (1-2 years post-burn)

Timeline

Year 1:

- Assess the fire's extent and severity.
- Assess whether hunter access exists.

Year 2:

- Monitor habitat conditions (e.g. browse production).
- Actively manage for access.

Management Scenario Timeline:
Continued Monitoring (3-20 years post-burn)

Timeline

Years 3-15:

- Monitor forage offtake.
- Incorporate aerial surveys.
- Monitor harvest reports.

Years 11-20:

- Reduce monitoring efforts.

Management Implications

- Monitoring social/ecological variables (forage availability/ hunter access) can provide mangers with information on habitat potential.

- Monitoring the variables (forage offtake/habitat use/ seasonal harvest rates) can provide managers with actual habitat use patterns.

Management Implications

- Availability framework that considers indices of seasonal wildlife distribution and hunter access.

- Hunter accessibility metric that accounts for proximity of regenerating burns to human infrastructure.

Opportunities for collaboration

- Collaboration with fire managers to adapt access where moose may increase (e.g. high severity burns).
- Adapt seasons and bag limits.
- Actively monitor predator densities and trapping records.
- Provide ongoing education to the community

Acknowledgements

- Graduate Committee: Knut Kielland, Eugenie Euskirchen, Roger Reuss, Scott Brainerd, Todd Brinkman
- ADF&G: Kalin Seaton, Tom Paragi, and Darren Bruening
- US Army
- Resilience and Adaptation Program
- NSF (IGERT)
- Bonanza Creek LTER
- Joint Fire Science Program
- Institute of Arctic Biology