Human Dimensions of Trophic Cascades

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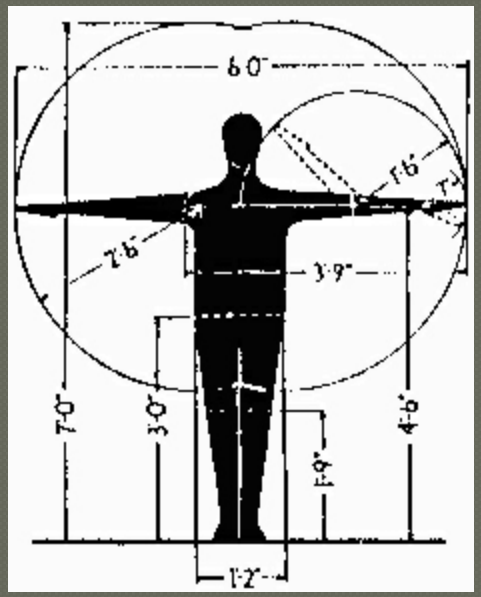
Overarching Goal

- Stimulate thinking on role of humans in trophic cascades in Interior Alaska
  - Extent and characteristics of how humans interact with the top trophic levels as the social and ecological environment changes

Human Dimensions

- Reference to the social attitudes, processes, and behaviors of people.
- *Science of human systems*



Human Dimensions of Wildlife

- Interactions and relationships between people and wildlife and the thoughts and behaviors of people toward wildlife.

Human Dimensions of Trophic Cascades

- Hunting
- Trapping
- ~~Human Development/Agriculture~~
- Predator control/extirpation
- ~~Predator introduction~~
- ~~Herbivore introduction~~

Hunting

- Moose ≥ 7,000
- Caribou ≈25,000
- Black bear ≥ 1,700
- Brown bear ≥ 450

ADFG 2012. Harvest Reports

Trapping (Interior)

- Wolf = 400-700/yr
  - Moose per wolf = up to 12-13 per year
- Wolverine = 500-600/yr
- Lynx = 1,200-5,400/yr
- Unknown actual harvest
  - Beaver (Hydrologists)
  - Coyote (Hare and rodents)
  - Marten (Microtine rodent eaters)

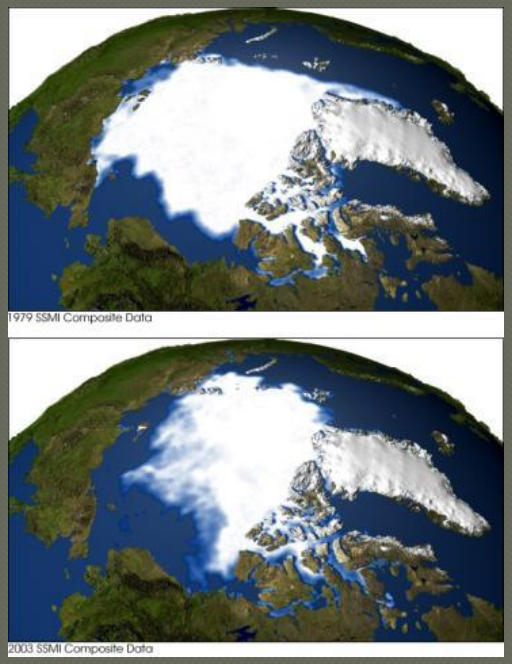
ADFG. 2013. Trapper Questionnaire

Predator Control

- Removal of significant proportion (~50%) of the population in certain areas.

Humans and Climate Change

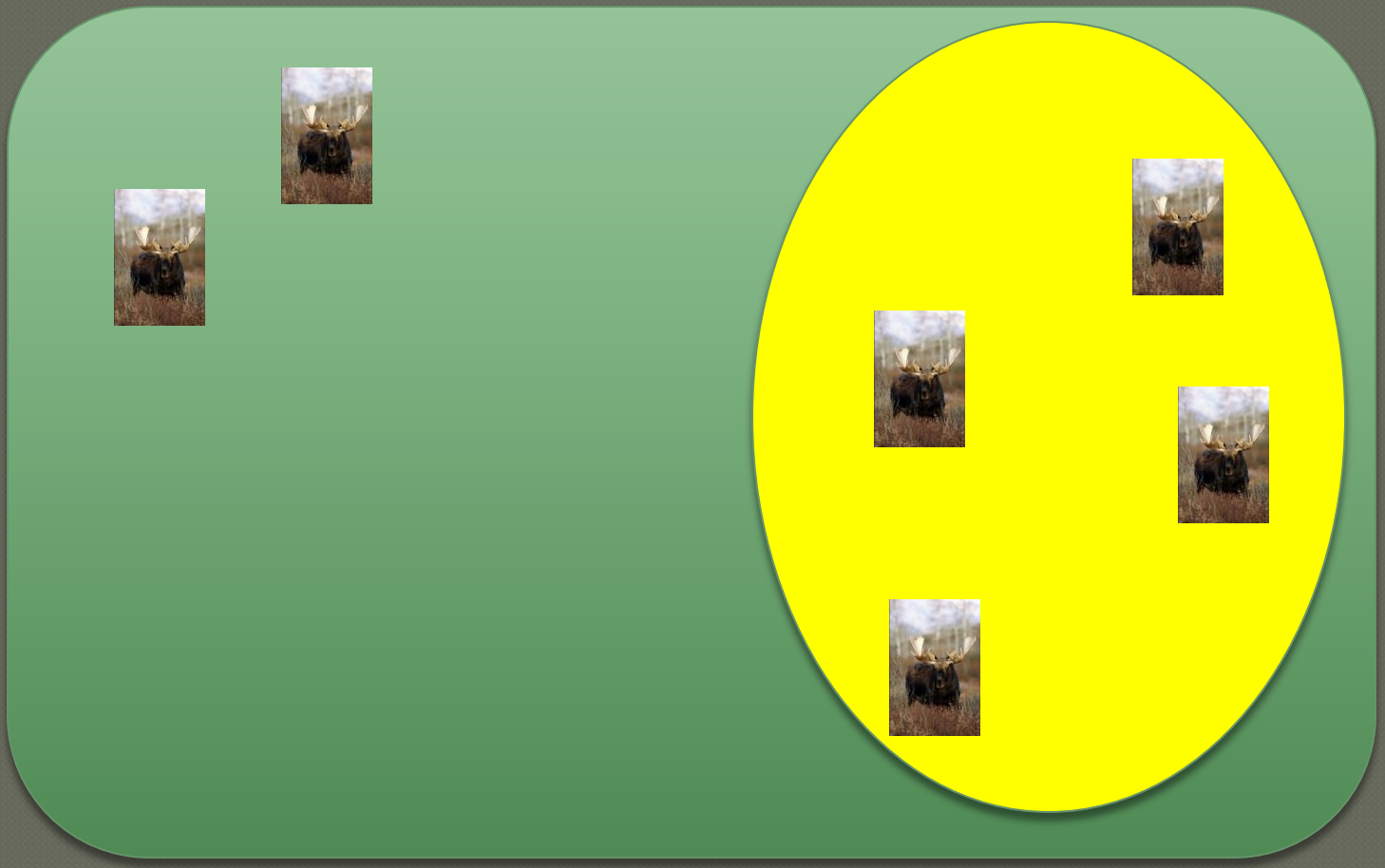
- Research Question
  - How are climate-driven changes in the environment affecting the availability of local wildlife that subsistence hunters depend on?



Brinkman, Chapin, Kofinas, Hansen, and Rupp


Wainwright. AK
Kaktovik
Venetie
Fort Yukon
Fairbanks, AK, USA
Alaska

Spatially-Explicit Model Structure

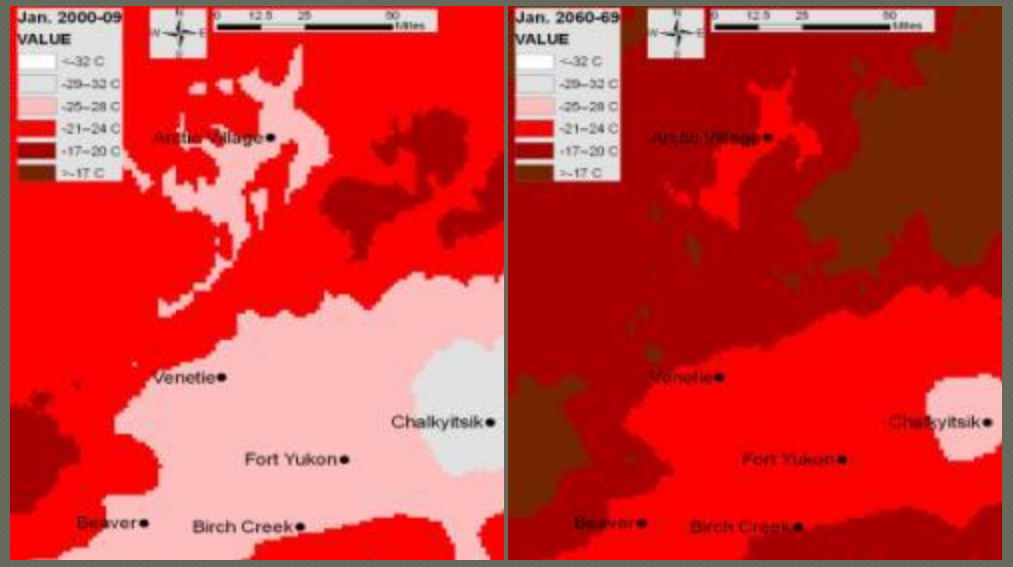


abundance + access + seasonal distribution = **availability**

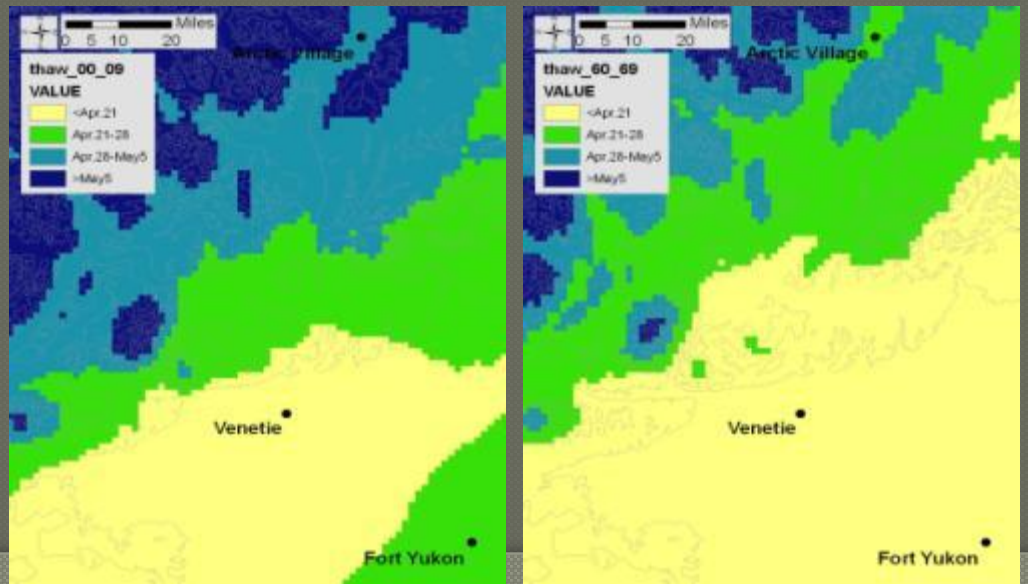
Community Identifies Critical Species

Climate Variables

Temperature



Thaw date



- Temperature
- Precipitation
- Growing season
- Freeze/Thaw date
- Snow
- Fire and Vegetation
- Hydrology
- Sea Ice
- Wind

Identify relationships between climate variables and availability of each species

	Temperatures	Rain & Drought	Snow	Freeze up /Thaw Date	Fire	Wind
Seasonal distribution						
Access						
Abundance						

Availability Summary (19 species)

Community	Decreasing	No change	Increasing
Fort Yukon (n = 3)	100%	0%	0%
Venetie (n = 4)	50%	50%	0%
Wainwright (n = 6)	33%	67%	0%
Kaktovik (n = 6)	50%	50%	0%
Total	**53%**	**47%**	**0%**

Environmental changes in access driving changes in availability

Availability Component	Positive	Negative	No change
Access	0	**13**	6
Distribution	3	3	13
Abundance	2	2	14

Availability Summary
IGNORING ACCESS

Community	Decreasing	No change	Increasing
Fort Yukon (n = 3)	33%	67%	0%
Venetie (n = 4)	25%	50%	25%
Wainwright (n = 6)	0%	83%	17%
Kaktovik (n = 6)	0%	83%	17%
Total	**11%**	**73%**	**16%**

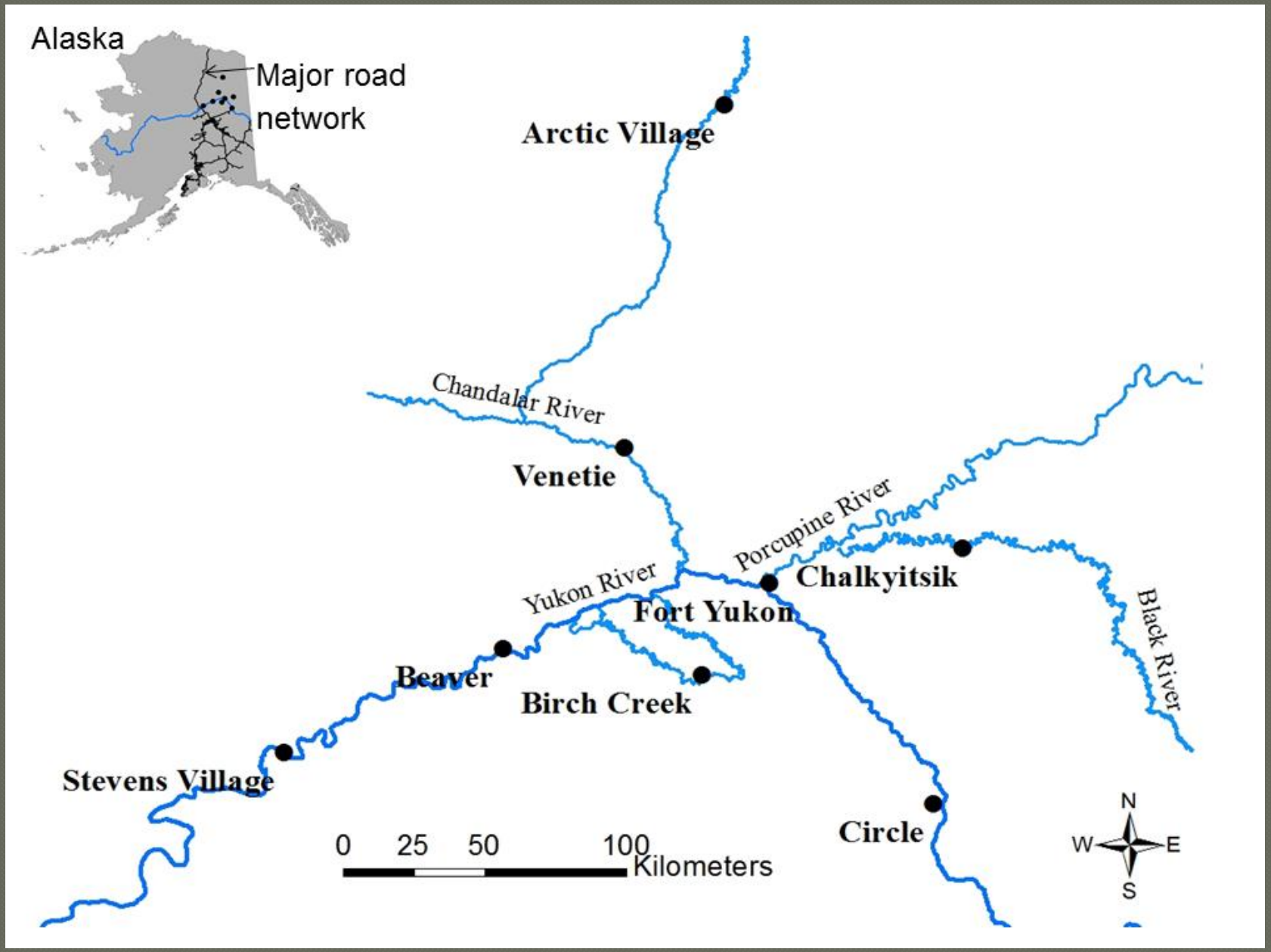
Hunters and Wildfire

"*Some trails are so block off* [from the fire], *they are hard to find. I figure that if we are ever going to clean it* [our trail network], *we are going to have to get an Elder to show us where it was. It really burned. It's our access to our hunting areas.*"

"The willows grow back fast. Right now, it is over our head, that is how fast it grew since the 2004 burn. Even the grass is tall, as tall as me."

"*I think the caribou know it* [that hunters move through burns easy]. *That is why they go in there. One time during a chase, they went into the middle of a small burn and stayed in there. I tried to go get them but there was too much deadfall*."

IMPACTS OF HIGH FUEL PRICES ON SUBSISTENCE HUNTING OPPORTUNITIES


Alaska
Major road network
Arctic Village
Chandalar River
Venetie
Porcupine River
Chalkyitsik
Yukon River
Fort Yukon
Black River
Beaver
Birch Creek
Stevens Village
Circle
0 25 50 100
Kilometers
N
W
E
S

- 81% of harvesters reduced distance traveled a mean of 60%
- 89% of harvesters reduced the number of trips a mean of 75%

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Brinkman et al. Submitted. Ecology and Society

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Human Dimensions of Wildlife Theory

- Applying social-science theories to human-wildlife issues.

Human Dimensions of Wildlife Theory

- Applying ecological theories to human-wildlife issues.

Monitoring humans and wildlife in similar ways

Optimal Foraging Theory

- Tested for prey switching among rural communities as a coping mechanism for fluctuations in availability of subsistence resources
- Resource substitution was not common.

Hansen et al. 2013. Human Dimensions of Wildlife

Community-Based Monitoring

- Document and describe important changes

YAMAHA


YAMAHA
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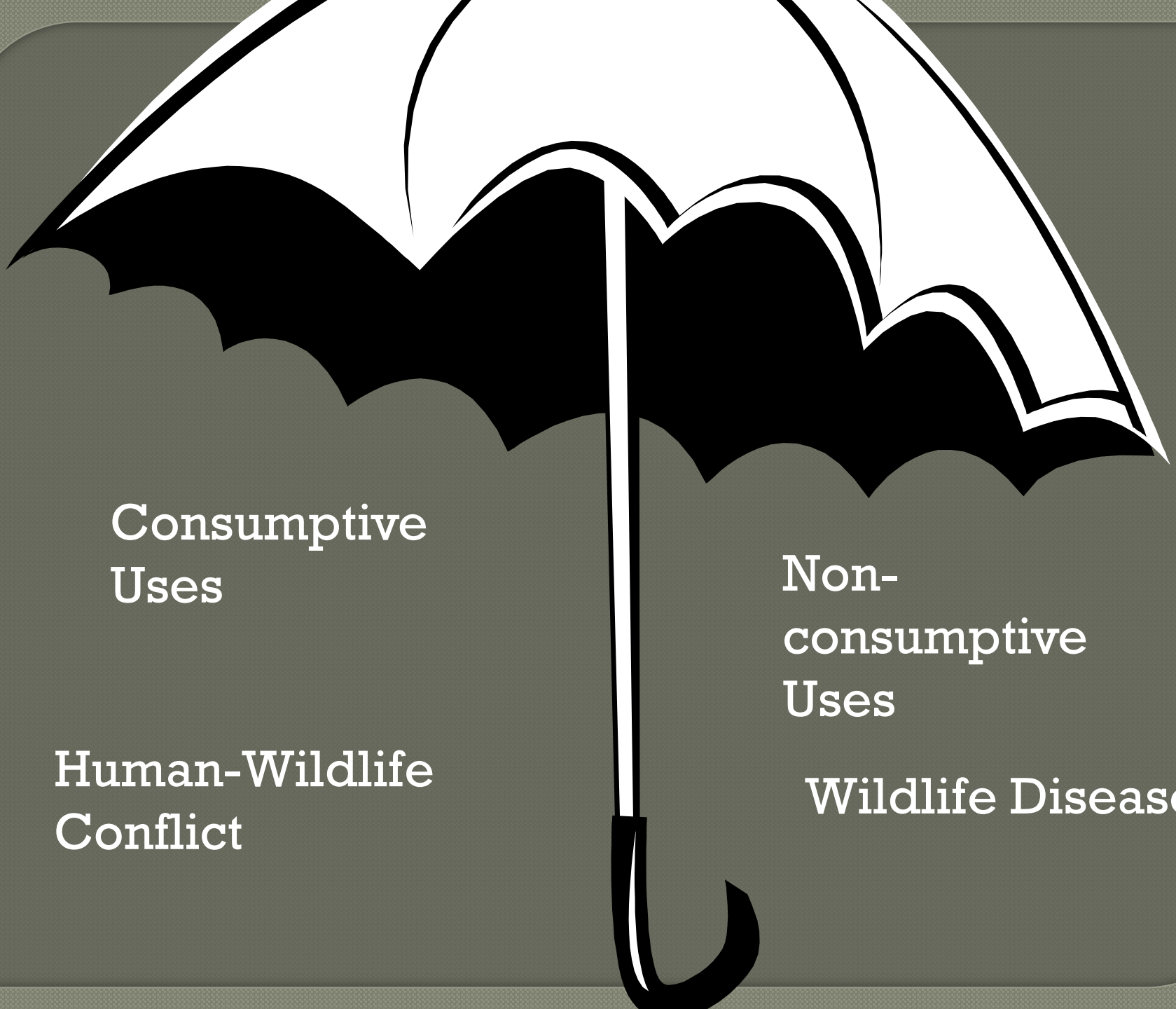
Take home message

- A rapidly changing social and ecological environment is significantly altering human-wildlife interactions.
- Consideration and integration of these interactions will give a more complete understanding of how and why Interior Alaska ecosystems are changing.
- Many ways to study them.

Thanks!

- Questions? Comments?
- Special thanks to all the hunters and tribal organizations that participated in this research.

- Funding and support was provided by: RAP, LTER, EPSCoR


Consumptive Uses
Non-consumptive Uses
Human-Wildlife Conflict
Wildlife Disease

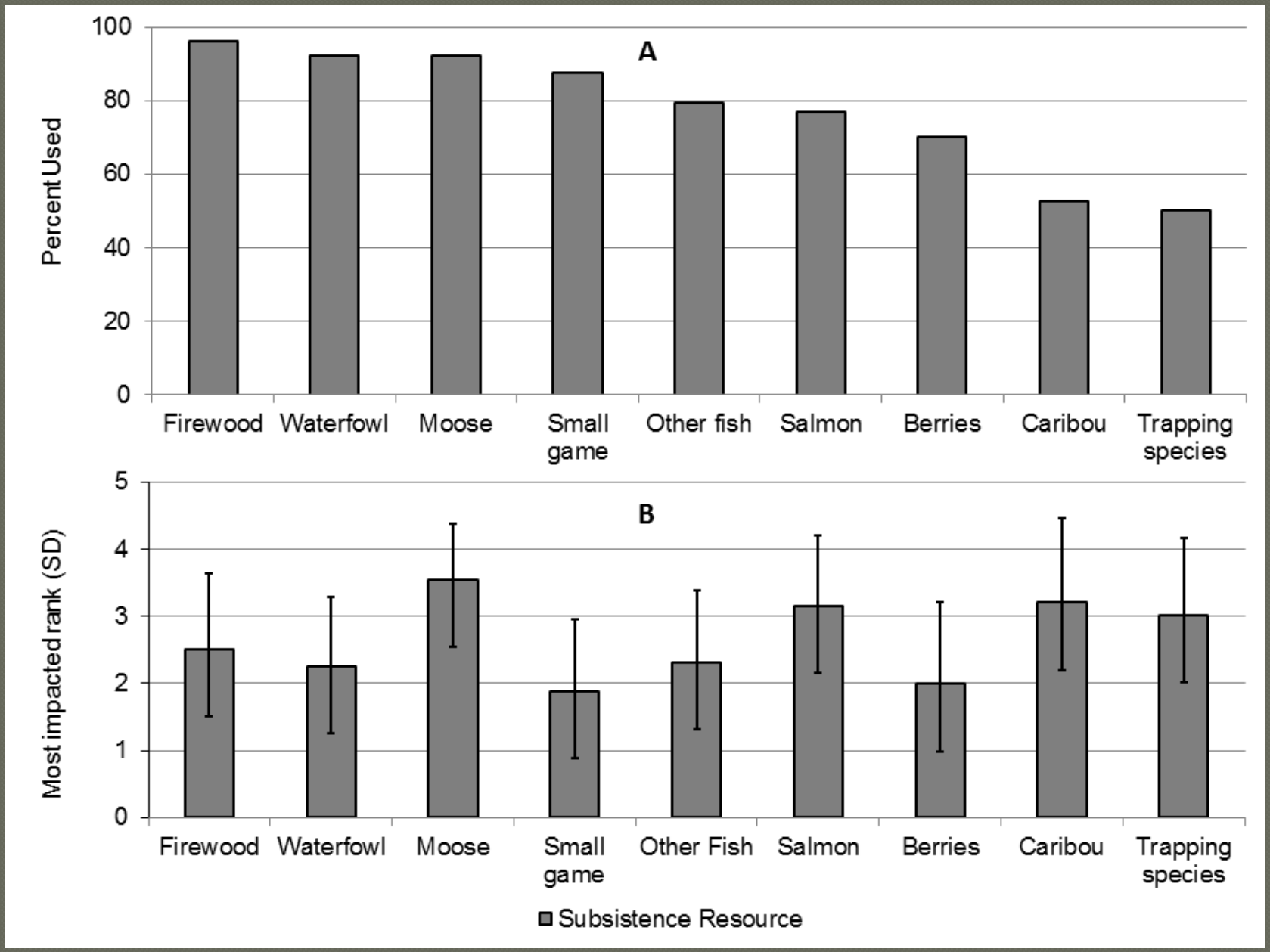
Casey Brown, PhD Candidate

- Camera Traps
  - Spatial & temporal activity patterns of hunters
- GPS Collars
  - Spatial & temporal activity patterns of moose

Effects of Wind on Hunting Opportunities

- Applied hunting safety thresholds to 40 years of wind data.
- Bowhead whale & caribou hunters have lost 7 days of hunting since 1971.

Hansen et al. 2013. Arctic


A
Percent Used
100
80
60
40
20
0
Firewood
Waterfowl
Moose
Small game
Other fish
Salmon
Berries
Caribou
Trapping species
B
Most impacted rank (SD)
5
4
3
2
1
0
Firewood
Waterfowl
Moose
Small game
Other Fish
Salmon
Berries
Caribou
Trapping species
Subsistence Resource