Knowledge-Based Habitat Suitability Mapping in Dawson Regional Land Use Planning

Heather Clarke
Habitat Biologist
Environment Yukon

Outline

- Knowledge-based habitat suitability mapping:
  - What/Why
  - How
- Wildlife Key Area mapping.
- Ecologically Important Area mapping.
- Mapping for the Dawson Land Use Plan.

Why are we interested?

- Habitat = the place where an animal lives.
- Animals find some types of habitat better than others.
- By knowing what kind of habitat is best for a species, we can inform land use planning.

OR

Habitat suitability can be mapped

1. Using scientific data
   - Data collected during surveys or from collared animals
   - RSF models, machine learning models, etc.

Habitat suitability can be mapped

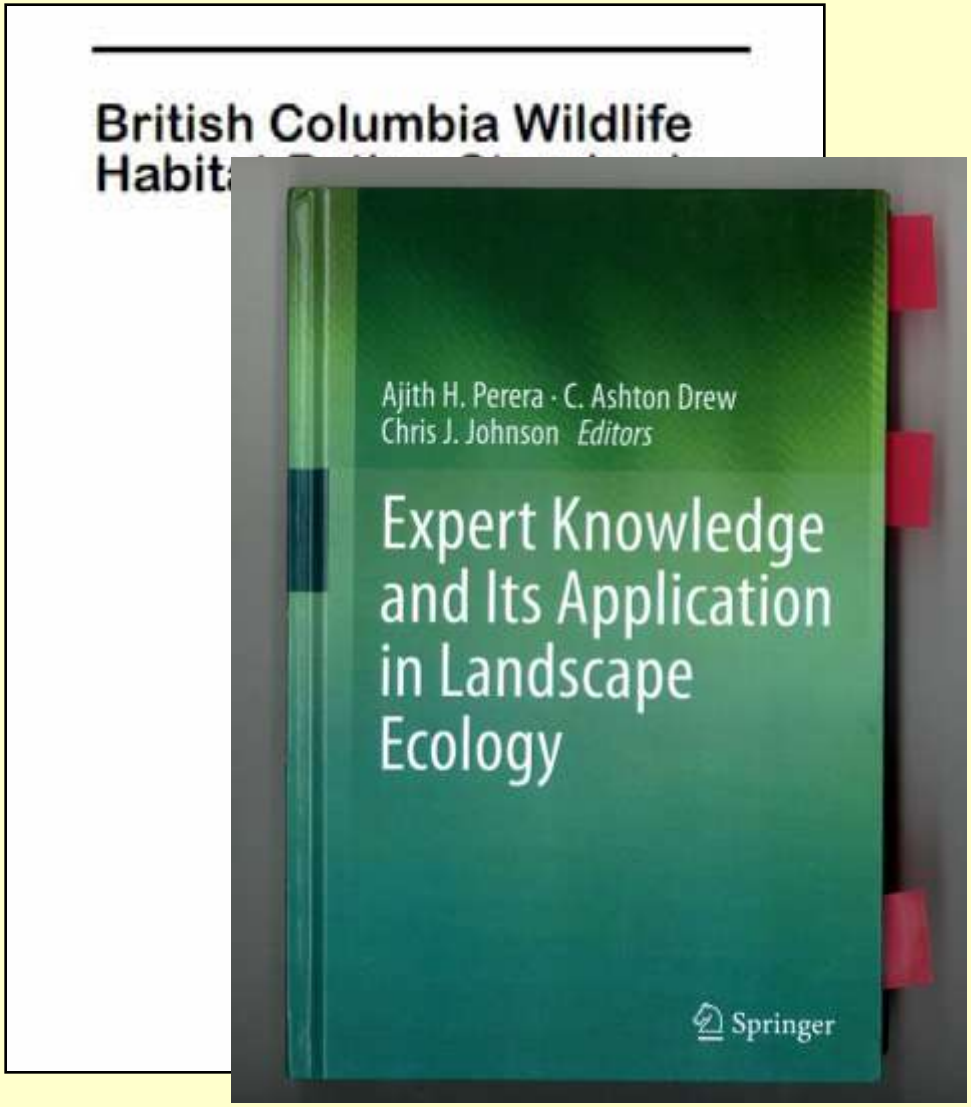
1. Using scientific data
   - Data collected during surveys or from collared animals
   - RSF models, machine learning models, etc.
2. Using knowledge
   - Information gathered from those experienced with the species of interest in the area of interest
   - Knowledge-based Habitat Suitability Index (HSI)

HSI Methods

- Highly variable

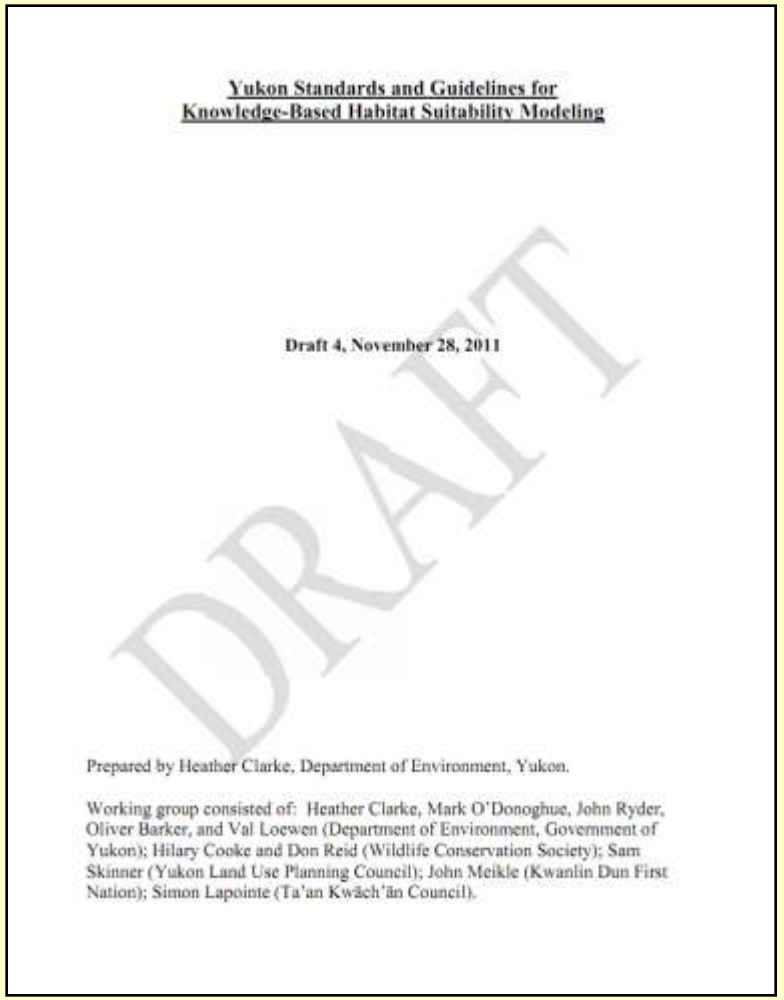
HSI Methods

- Highly variable
- Limited literature



HSI Methods

- Highly variable
- Recent literature
- YG has produced:



Yukon Standards and Guidelines for
Knowledge-Based Habitat Suitability Modeling

Draft 4, November 28, 2011

DRAFT

Prepared by Heather Clarke, Department of Environment, Yukon.

Working group consisted of: Heather Clarke, Mark O'Donoghue, John Ryder, Oliver Barker, and Val Loewen (Department of Environment, Government of Yukon); Hilary Cooke and Don Reid (Wildlife Conservation Society); Sam Skinner (Yukon Land Use Planning Council); John Meikle (Kwanlin Dun First Nation); Simon Lapointe (Ta'an Kwäch'än Council).

HSI Methods

1. Identify people with knowledge of species and habitat
2. Conduct interviews and rank habitats
3. Map information
4. Use in planning

HSI Methods

1. Identify people with knowledge of species and habitat

People with Knowledge

- First Nations → **Traditional knowledge**

- Hunters / Trappers
- Outfitters
- Conservation officers
- Miners
- Pilots
- Biologists

Local knowledge

Knowledge specific to:

- Different species
- Sexes or ages (male, female, old, young)
- Seasons (winter, summer, etc.)
- Life functions (calving, rutting, denning)

Information sharing agreements and confidentiality
- only share what you are comfortable with.



HSI Methods

1. Identify people with knowledge of species and habitat
2. Conduct interviews and rank habitats

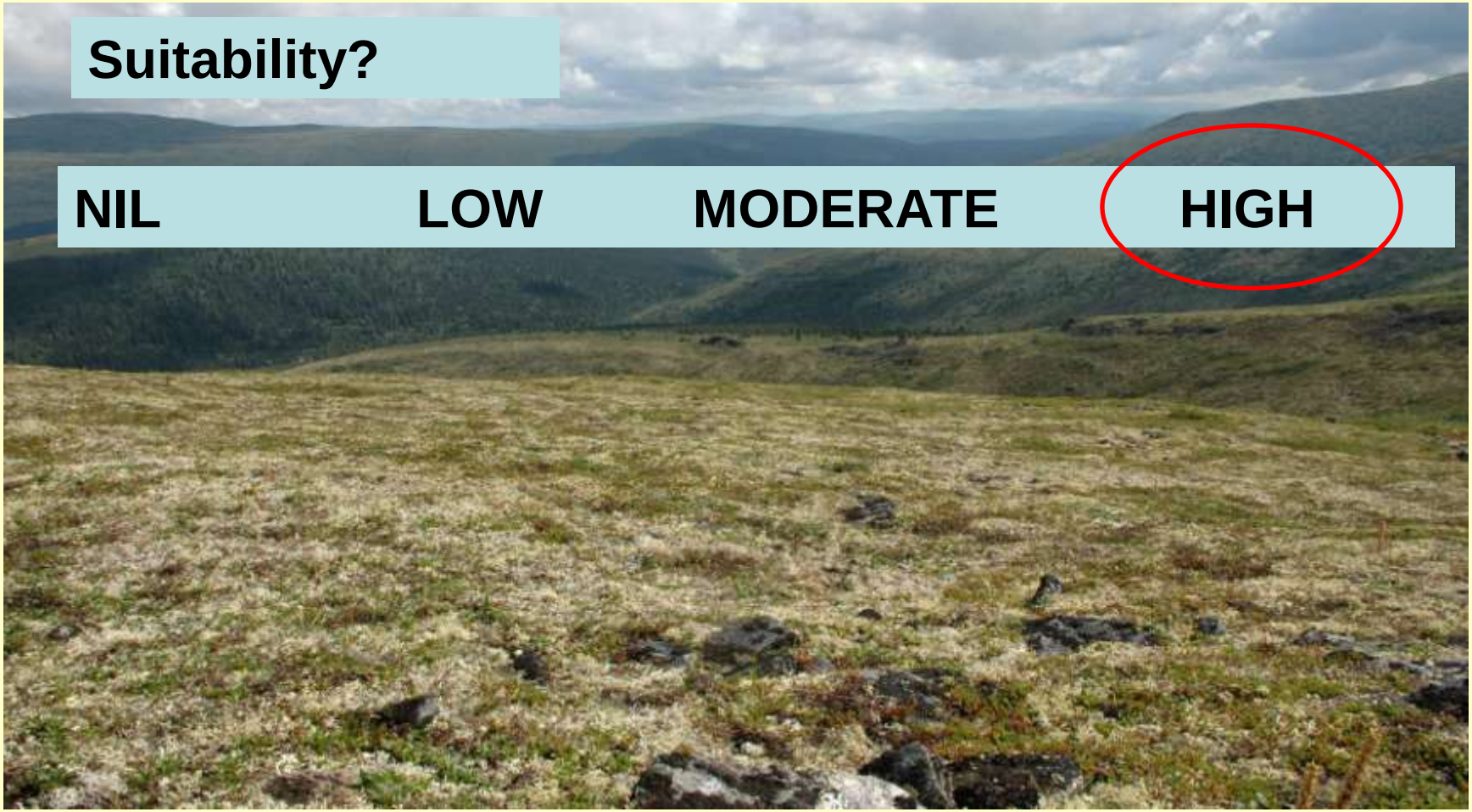
Interviews & Habitat Rankings

- Interviews can be conducted in a group or one-on-one.
- Group interviews are preferred.
- Can be by invitation or public open-house.
- Habitat "types" are selected *a priori*.
- Avoid biasing habitat type selection.

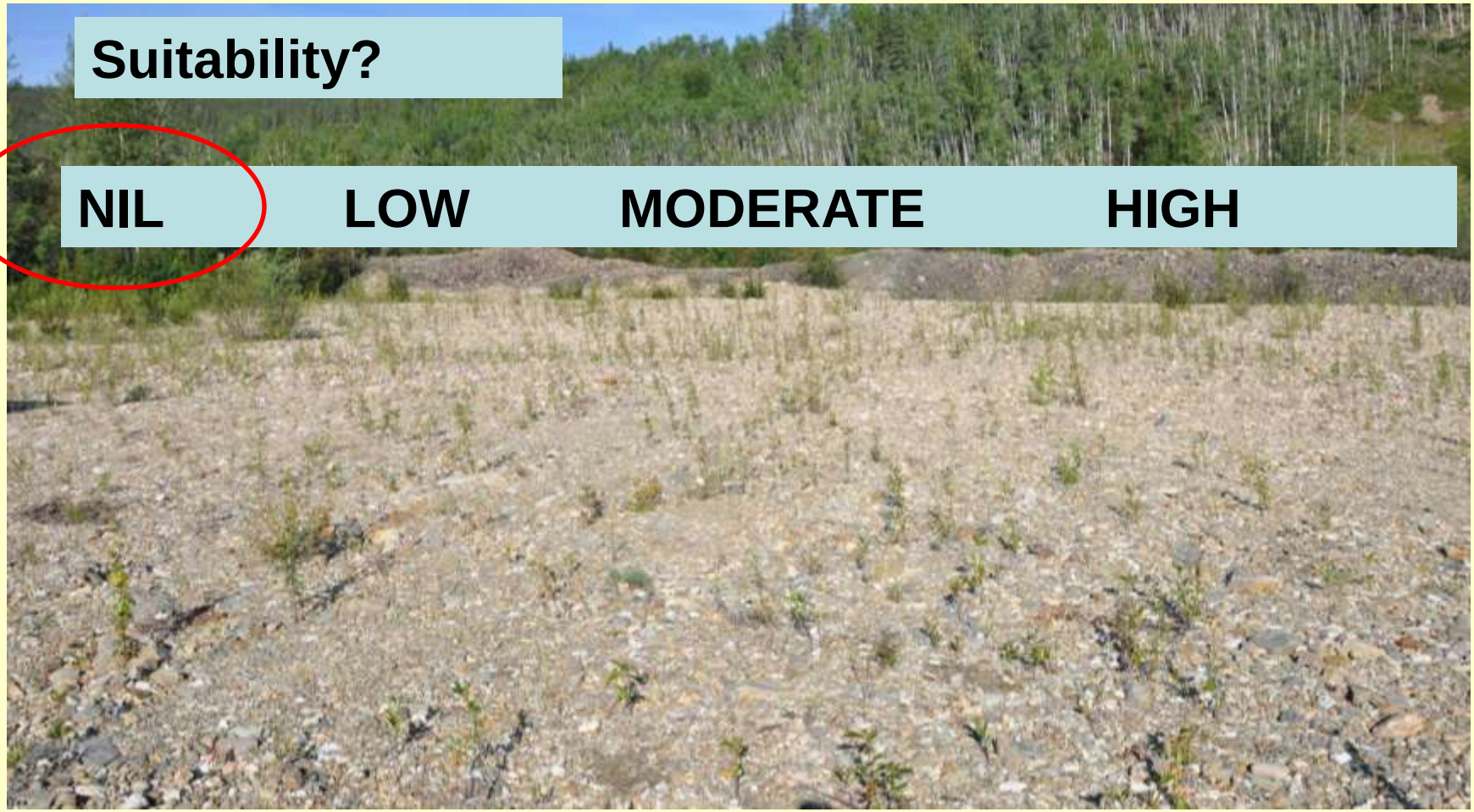
Interviews & Habitat Rankings

- Photos of different habitats are shown.
- Participant indicates how important (suitable) each habitat is for the species.
- This is "ranking".
- Ranking usually: **nil**, **low**, **moderate**, **high**.

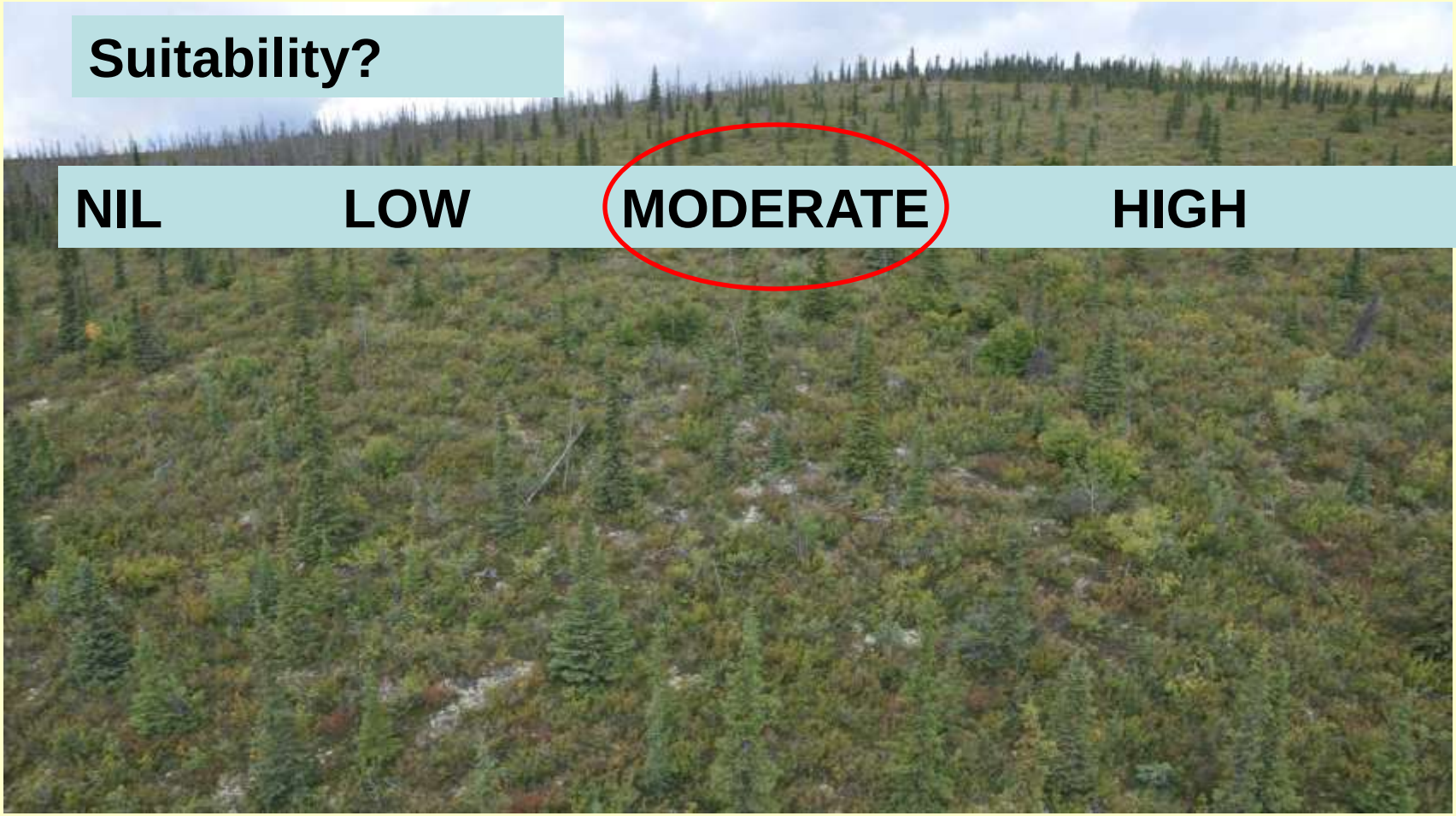
Example – Caribou in late-winter



Example – Caribou in late-winter



Example – Caribou in late-winter



DLUP Habitat Suitability Ranking Workshop

Species: Moose, woodland caribou, marten, lynx, grizzly	**Participant**		
Recorder	**Interviewer**	**Date**	

Suitability Ranks (importance): **0 = Nil** **1 = Low** **2 = Moderate** **3 = High**	**Species(Season/Life Requisite)**				
	Moose (late-winter)	Woodland caribou (late-winter)	Marten (winter)	Lynx (year-round)	Grizzly (spring / summer)
Exposed land/rock/snow/ice					/
Disturbed		**0**			/
Streams		**1**			/
Wide rivers/open water		**1**			/
Gravel bar		**2**			/
Riparian shrub		**3**			/
Riparian broadleaf/mixedwood					/
Conifer riparian					/
Herbaceous wetland					/
Shrub wetland					/
Treed wetland					/
Shrub lichen					/
Sub-alpine shrub					/
Boreal shrub					/
Lichen >50%					/
Herbaceous					/
Conifer lichen					/
Conifer open					/

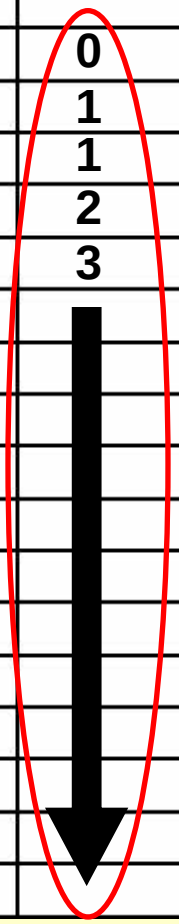
HSI Methods

1. Identify people with knowledge of species and habitat
2. Conduct interviews and rank habitats
3. Map information

DLUP Habitat Suitability Ranking Workshop

Species: Moose, woodland caribou, marten, lynx, grizzly	**Participant**		
Recorder	**Interviewer**	**Date**	

Suitability Ranks (importance): **0 = Nil** **1 = Low** **2 = Moderate** **3 = High**	**Species(Season/Life Requisite)**				
	Moose (late-winter)	Woodland caribou (late-winter)	Marten (winter)	Lynx (year-round)	Grizzly (spring / summer)
Exposed land/rock/snow/ice					/
Disturbed					/
Streams					/
Wide rivers/open water					/
Gravel bar					/
Riparian shrub					/
Riparian broadleaf/mixedwood					/
Conifer riparian					/
Herbaceous wetland					/
Shrub wetland					/
Treed wetland					
Shrub lichen					
Sub-alpine shrub					
Boreal shrub					/
Lichen >50%					/
Herbaceous					/
Conifer lichen					/
Conifer open					/

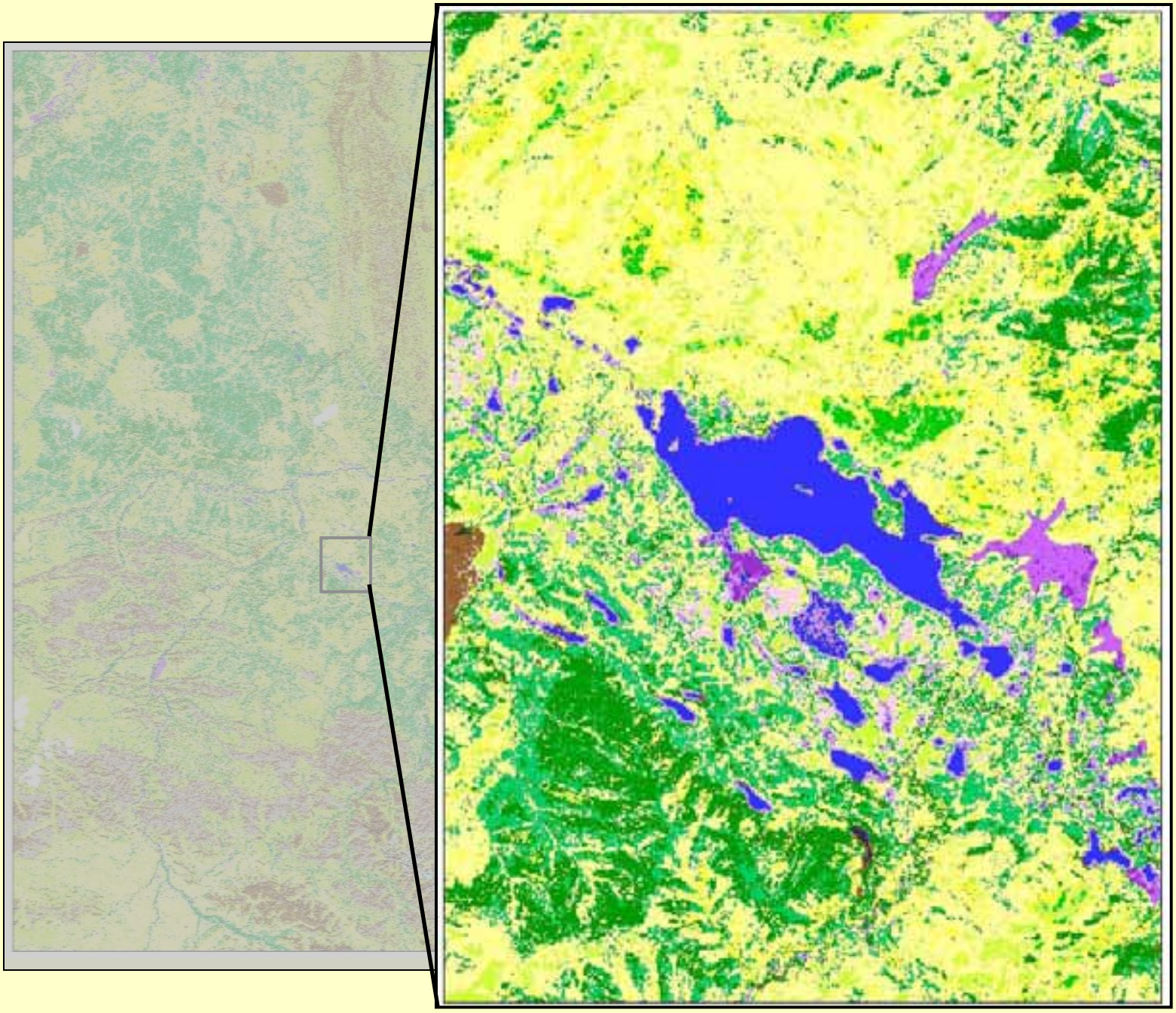


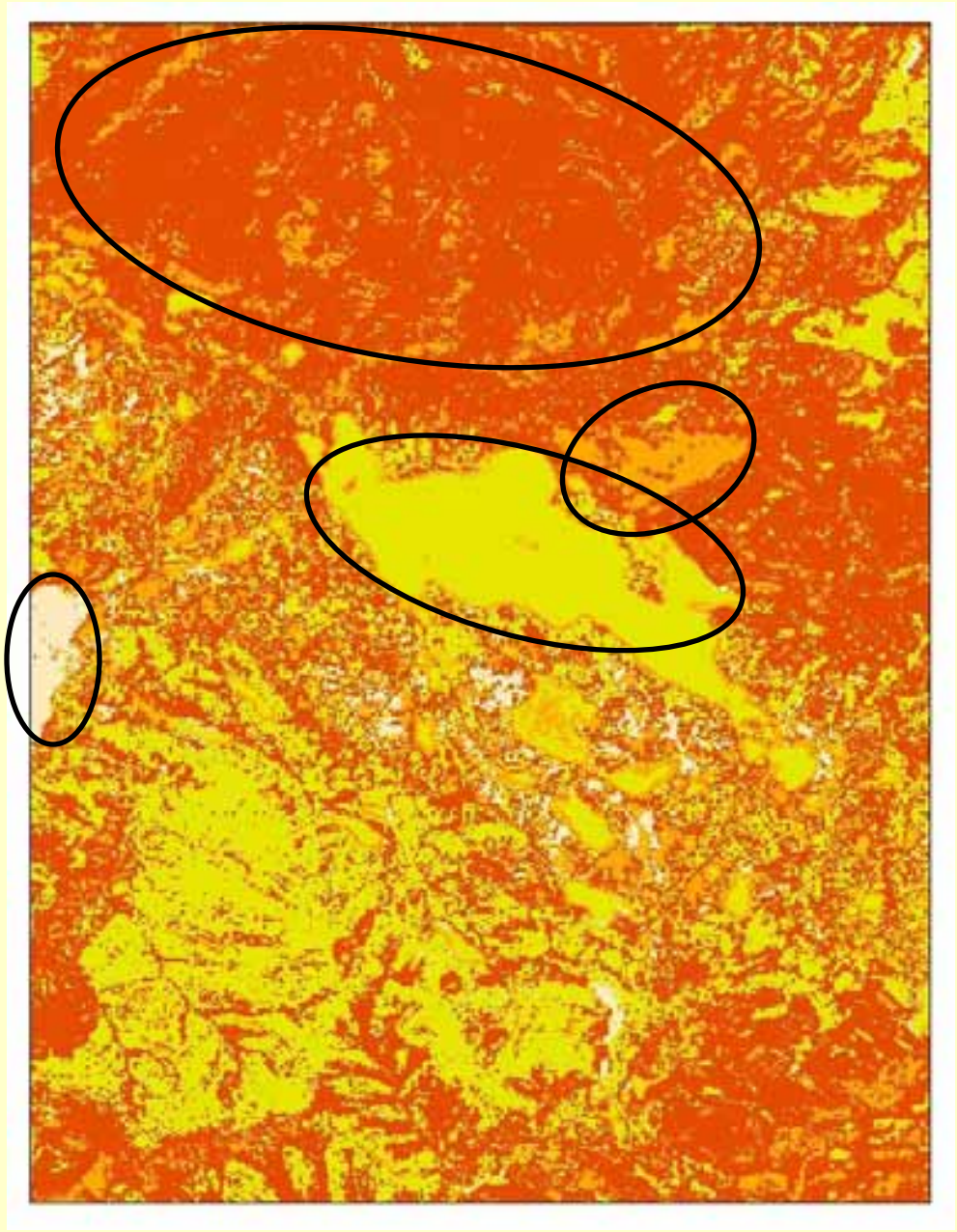
MODE

Apply in a GIS using a spatial inventory

Example:


EOSD Land Cover Classes
Coniferous Dense 1
Coniferous Open 1
Coniferous Sparse 1
Broadleaf Dense 2
Broadleaf Open 2
Broadleaf Sparse 2
Mixedwood Dense 2
Mixedwood Open 2
Mixedwood Sparse 2
Shrub Tall 3
Shrub Low 3
Herb 2
Wetland Treed 1
Wetland Shrub 3
Wetland Herb 2
Bryoid 0
Exposed Land 0
Rock/Rubble 0
Water 1
Snow/Ice 0
Shadow 0
Cloud/No Data 0





Nil

Low

Moderate

High

Information on relative habitat suitability can inform species and habitat management planning.

Not all good habitats are equal…

- Sometimes 2 similar habitats in different places on the landscape have different value for a species.
- E.g. moose may prefer shrubs close to water more than shrubs away from water
- This is called "landscape context"
- Rankings can be adjusted for it.

Main Habitat Type			
Landscape context		Shrub	Water
	Shrub	2	2
	Water	3	1

Shrub = 2

Water = 1

Shrub near water = 3

Water near shrub = 2

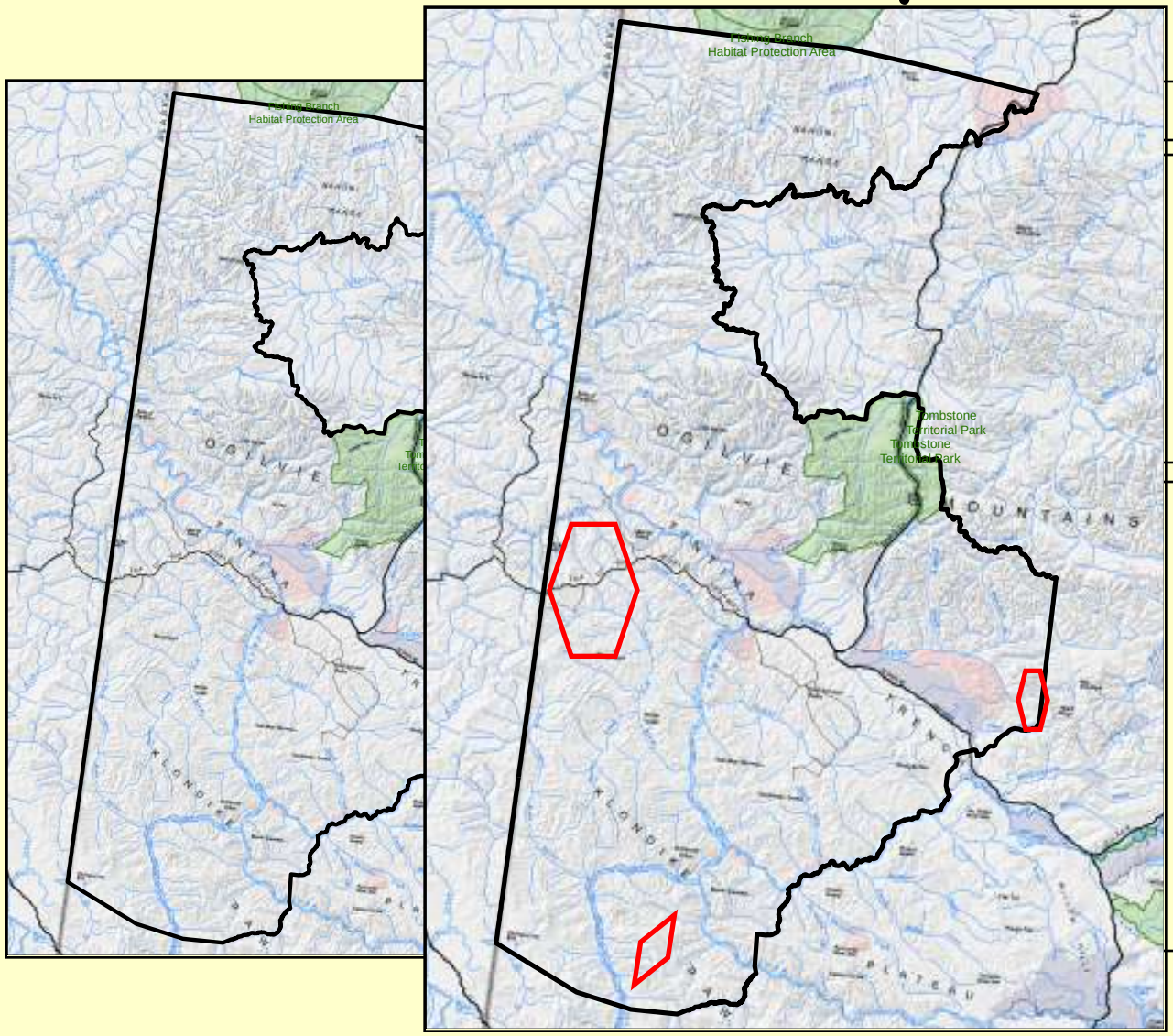
Example:


EOSD Land Cover Classes
Coniferous Dense 1
Coniferous Open 1
Coniferous Sparse 1
Broadleaf Dense 2
Broadleaf Open 2
Broadleaf Sparse 2
Mixedwood Dense 2
Mixedwood Open 2
Mixedwood Sparse 2
Shrub Tall 3
Shrub Low 3
Herb 2
Wetland Treed 1
Wetland Shrub 3
Wetland Herb 2
Bryoid 0
Exposed Land 0
Rock/Rubble 0
Water 1
Snow/Ice 0
Shadow 0
Cloud/No Data 0

Wildlife Key Area and Ecologically Important Area Mapping

- Not suitability *per se* but indicates areas of high value for wildlife.
- Local knowledge is an important source of information.
- Incorporated into HSI workshops.
- No ranking → spatial and verbal description.
- Highly sensitive areas are buffered.

Wildlife Key Areas



- *s = summer*
- *f = fall*
- *y = year round*
- *u = unknown*

- *s = stage (i.e., migratory stop-over area)*
- *m = moult*
- *y = rear young*
- *c = migration corridor*
- *a = all functions*
- *l = mineral lick*

Ecologically Important Areas

- Similar methods to WKA
- Other habitat / wildlife values not included in WKA
  - Rare habitats
  - Sensitive habitats
  - Areas with species of conservation concern
  - Areas of high biodiversity
  - Important or unique physical features (e.g. springs, caves, canyons)

HSI Methods

1. Identify people with knowledge of species and habitat
2. Conduct interviews and rank habitats
3. Map information
4. Use in planning

HSI in the Dawson Land Use Plan

- YG plans to provide the Planning Commission with the following local knowledge-based HSI maps:
  - Late winter MOOSE
  - Late winter WOODLAND CARIBOU
  - Winter MARTEN
  - Pre-berry, Berry, Denning Shoulder – GRIZZLY
  - Breeding - PEREGRINE
  - Annual LYNX, BEAVER, MUSKRAT
- YG also collecting WKA and EIA information.
- 2 knowledge workshops – December 2011, January 2012.