FISHER POPULATIONS DYNAMICS IN MIXEDWOOD FORESTS: MODELING BASED ON LOCAL KNOWLEDGE

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FURBEARERS

- Sensitive to forest management (provincial interest) *(Cheveau 2015)*

Stand composition, age structure, internal structure, deadwood

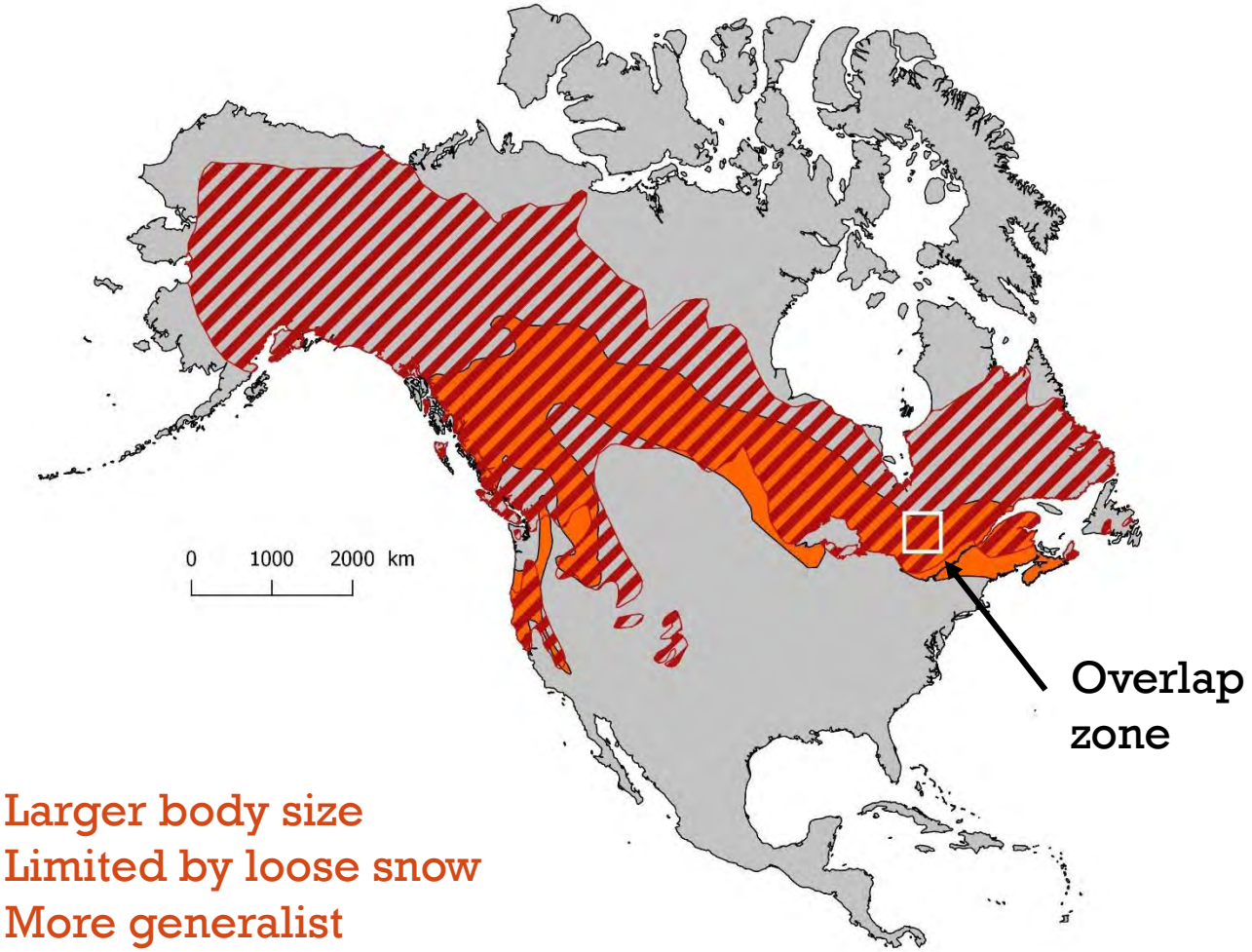
Fisher

Sugar maple – yellow birch stands

American marten

Balsam fir – yellow birch stands

GEOGRAPHICAL DISTRIBUTION



Larger body size
Limited by loose snow
More generalist

Smaller body size
Northern distribution

Agonistic relationship and habitat change

HABITAT CHANGE

- **Forest management**

Brings habitat availability outside natural range of variability

Fragmentation and habitat loss

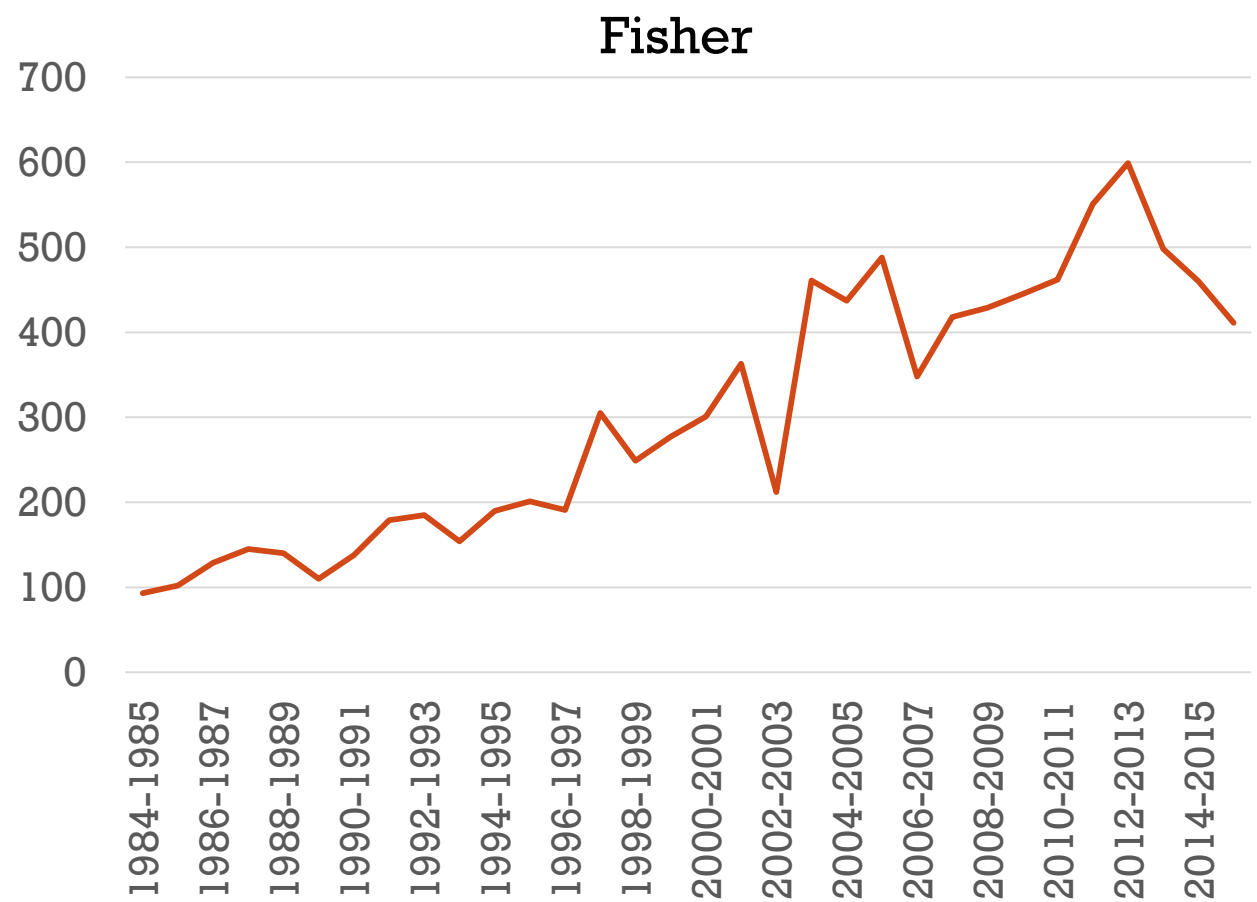
- **Climate change**

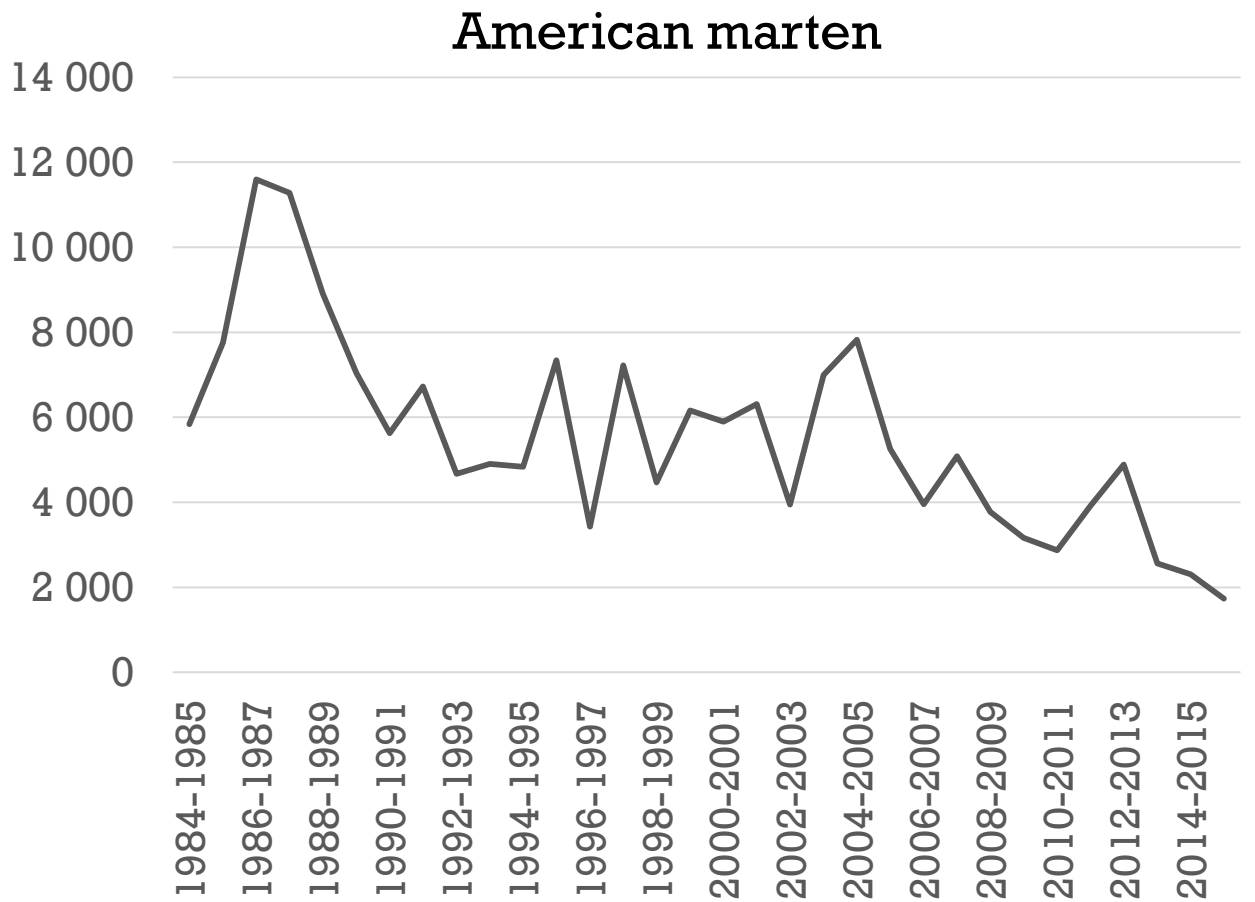
Potential change in winter habitat use through changes in snowfall

→ Changes that occur over long periods of time and cause complex cumulative impacts

Difficulty to understand and document effects on the abundance and distribution of the two species?

POPULATION INDICES BY FUR HARVESTING

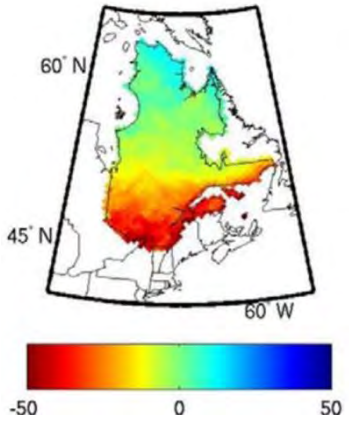




Number of sold pelts harvested in the Abitibi-Témiscamingue region (MFFP)

OBJECTIVE

Determine cumulative effects of human-induced disturbances and climate change on habitat use by fisher and its interaction with American marten



Fisher habitat

Co-occurrence

LOCAL KNOWLEDGE

- Mustelids : low-density species

- Limits of scientific knowledge in face of environmental challenges

- Trappers

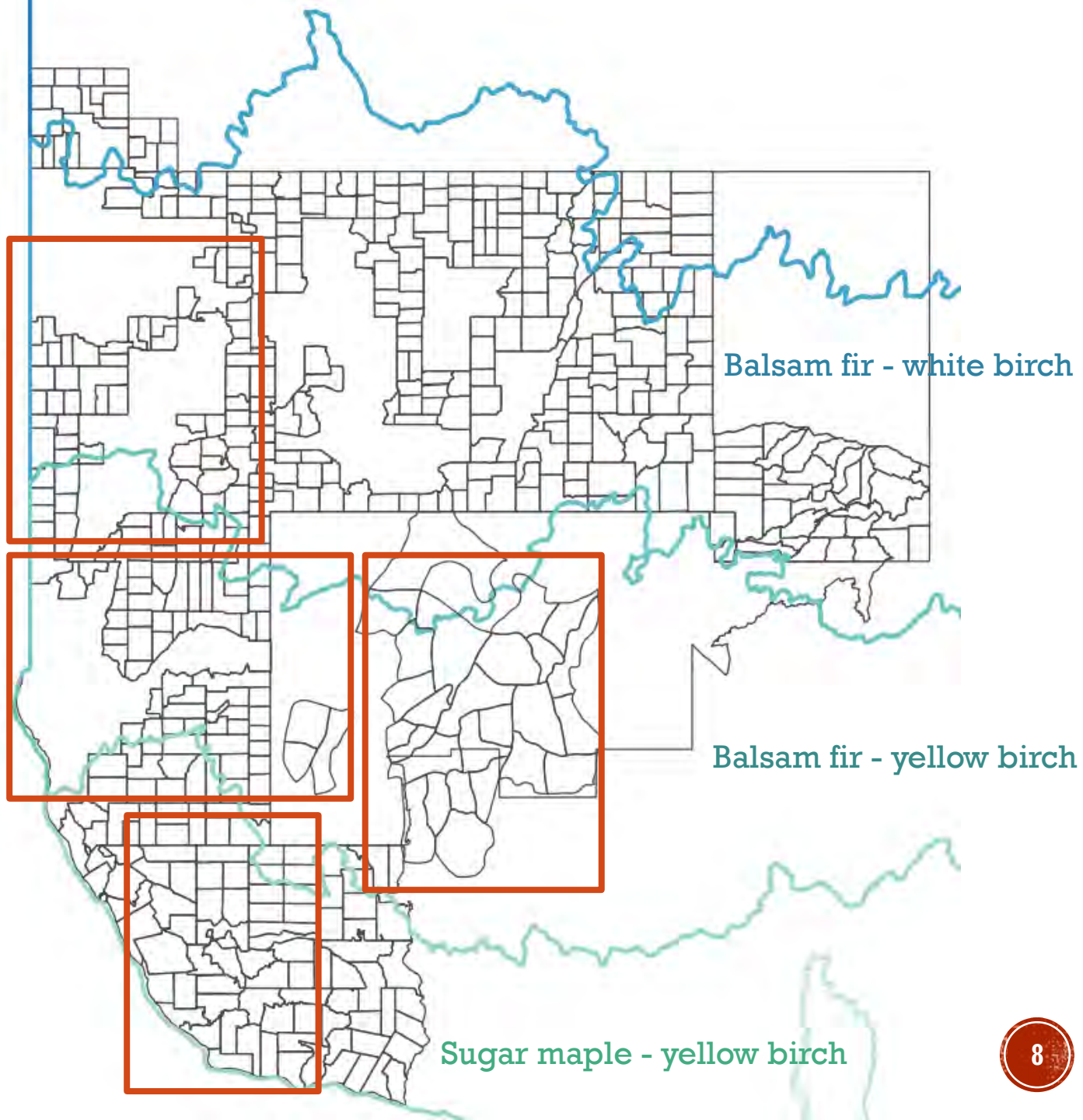
  - Experience and knowledge accumulated through trapping seasons
  - Witnesses of the effects of natural and human-induced disturbances
  - Large temporal and spatial scales

STUDY AREA

Northern-temperate

Managed mixed and hardwood forests

Mostly Témiscamingue



PARTICIPANTS

- 41 semi-structured interviews (French – English – Anishinabemowin)
- Trappers, elders and recommended experts
- Recommended by a contact person

  + Snowball sampling method until information saturation is reached

- Participating communities :

  Aboriginial: Kitcisakik (17 including 3 women)

  Kebaowek (5)

  Timiskaming First Nation (4)

  Wolf Lake (1)

  Non-aboriginal : Abitibi-Témiscamingue (14)

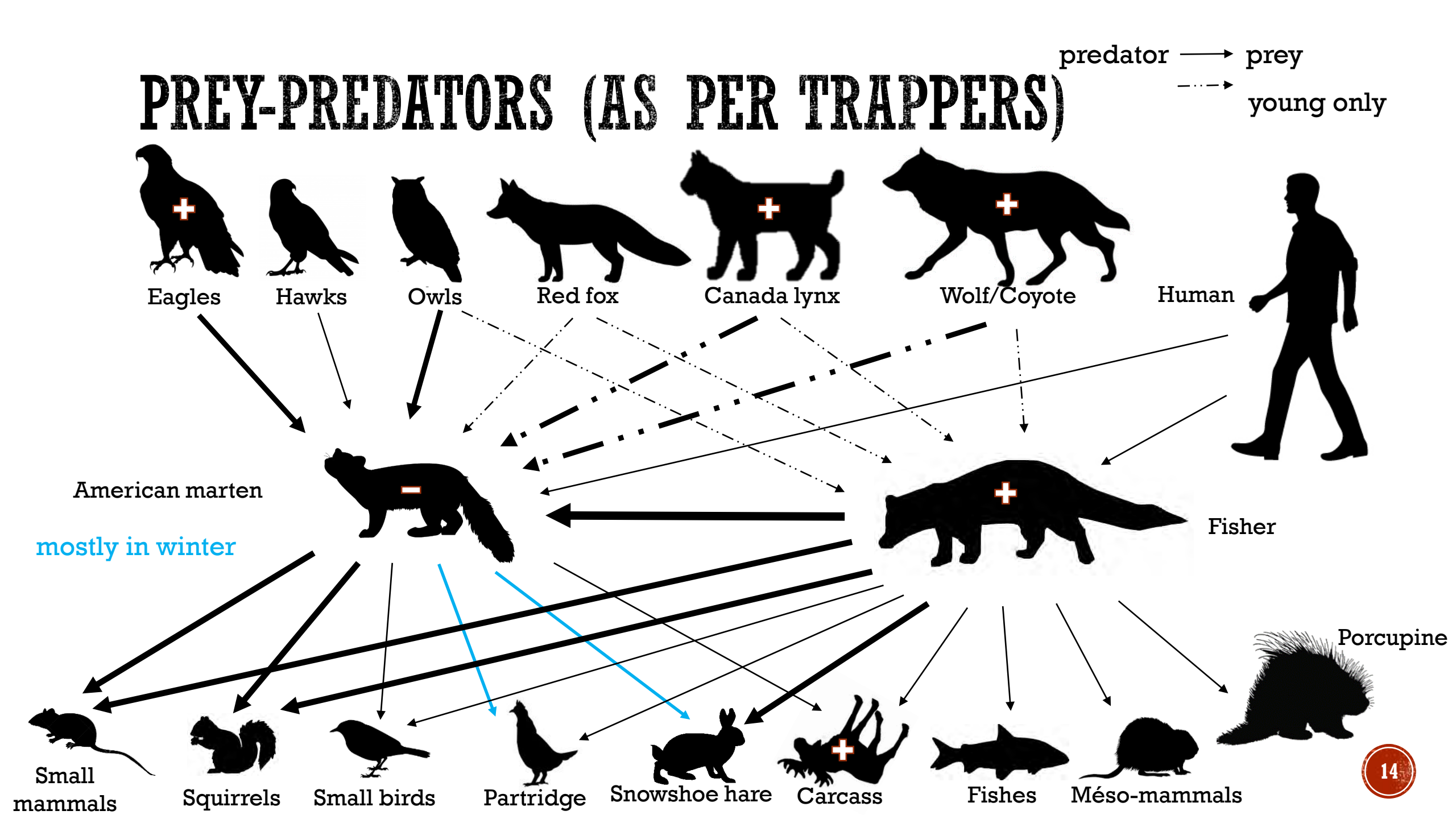
Thematic analysis of interview transcripts

QUALITATIVE ANALYSIS

Grouping by themes

- Annual harvest success and evolution with time
- Predators and prey
- Interactions between the two species
- Population changes of other species
- Habitat use and trapping sites
- Effects of forest management
- Effects of climate

PREY-PREDATORS (AS PER TRAPPERS)



EMERGING INFORMATION ABOUT FISHER

- Population increase since the 2000's at northern distribution limit
- Adults are not vulnerable to predation: use open area
- Seems to benefit from human activities (forest management and agriculture)
- Benefits from climate change : movement facilitated by less snow and more crust

Habitat loss + Competition and possible predation increasing for marten

But : Concern about decline of large conifers for resting sites (pine and cedar)

FROM LOCAL KNOWLEDGE TO MODELISATION

→ Factors supporting increased catches of fisher since 1984

Presence of pine and cedar (old softwood stands)

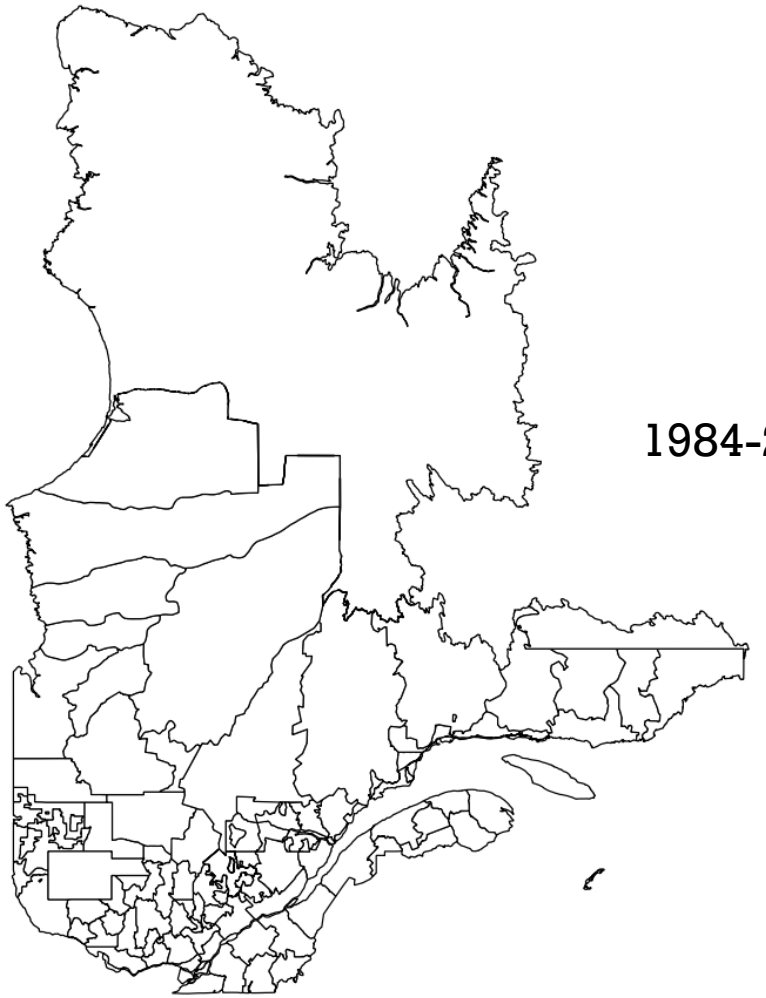
Response to canopy opening (young stands <4m)

Proximity to human activities (agriculture)

Winter weather conditions

INCREASED FISHER HARVEST SINCE 1984

- Number of fishers / Total of martens and fishers (sold pelts by UGAF per year)



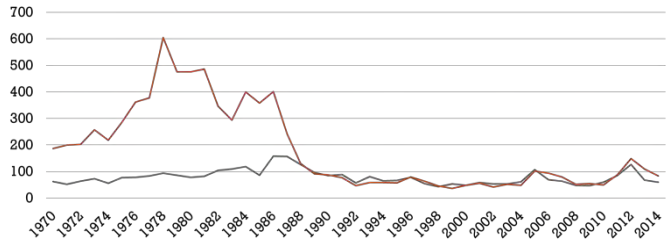
1984-2014

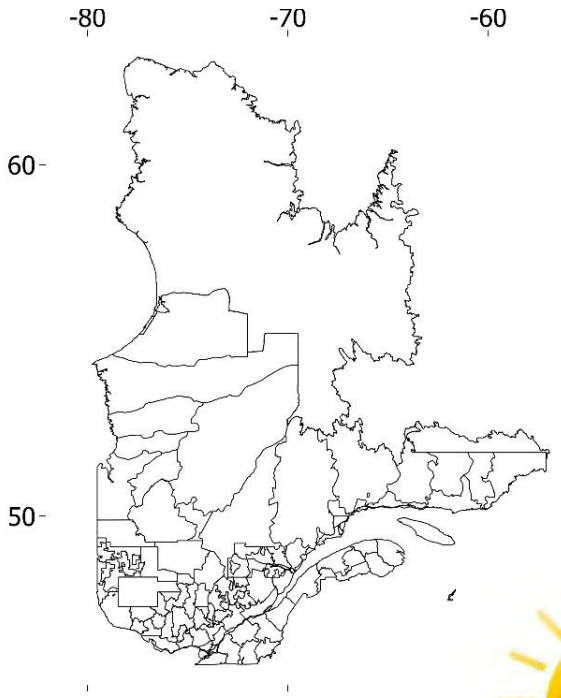
- Linear mixed-effects models (*glmer*)

INCREASED FISHER HARVEST SINCE 1984

- Number of fishers / Total of martens and fishers (sold pelts by UGAF per year)

Year
Latitude
Longitude





% Hardwood / Mixedwood / Softwood

x Old (>12m) /Medium/ Young (<4m)

% Agriculture

(1|Fur prices)
(1|UGAF)
weights=Total Martens and fishers

Snowfall total

Potential crust (January to April)
(days with T°>0, Rain, Radiation)

INCREASED FISHER HARVEST SINCE 1984

- Number of fishers / Total of martens and fishers (sold pelts by UGAF per year)

Model	K	AICc	Delata AICc	AICc Wt	Cum, Wt	LL
Medium softwood	8	24683.70	0.00	1	1	-12333.82
Old Mixedwood	8	24717.02	33.32	0	1	-12350.48
Agricultural[2]	9	24718.09	34.39	0	1	-12350.01
Old softwood	8	24727.76	44.06	0	1	-12355.85

```
mMSoft<- glmer(RatioPEK ~ Latitude.std + Annee.std + Latitude.std:Annee.std
                          + M2perc.std
                          + (1 | UGAF)+ (1 | PrixMavant)+ (1 | PrixPavant),
                         weights=MARPEK, family=binomial, data=Data_Pekan)
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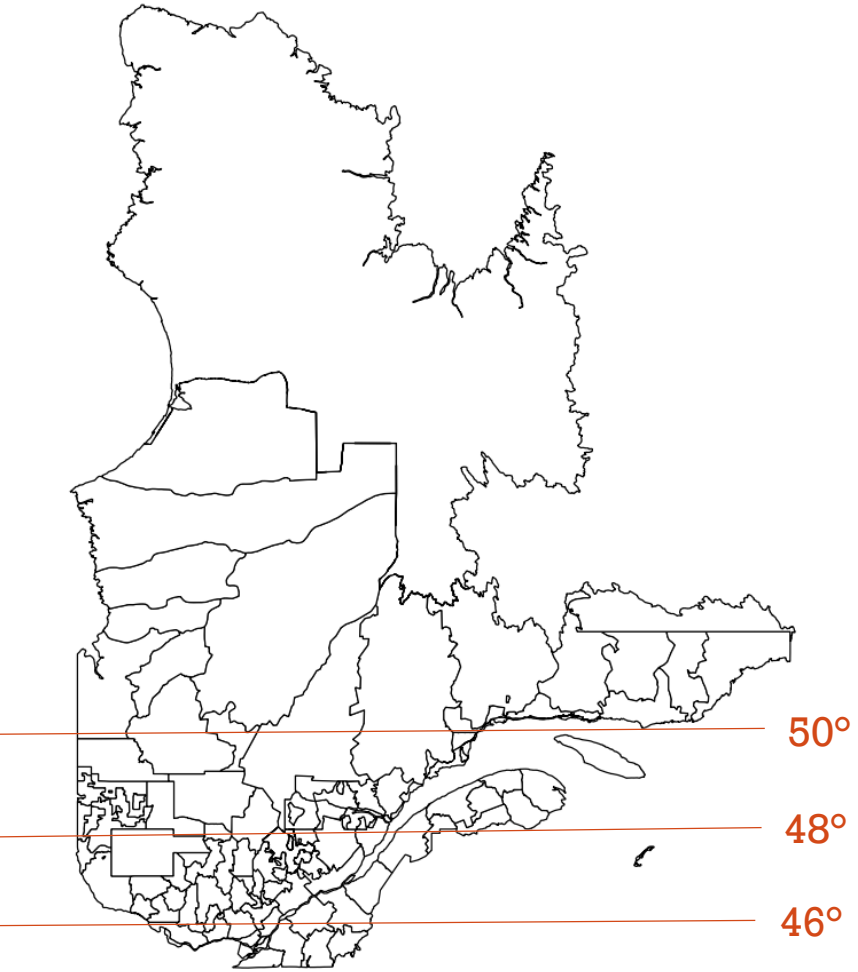
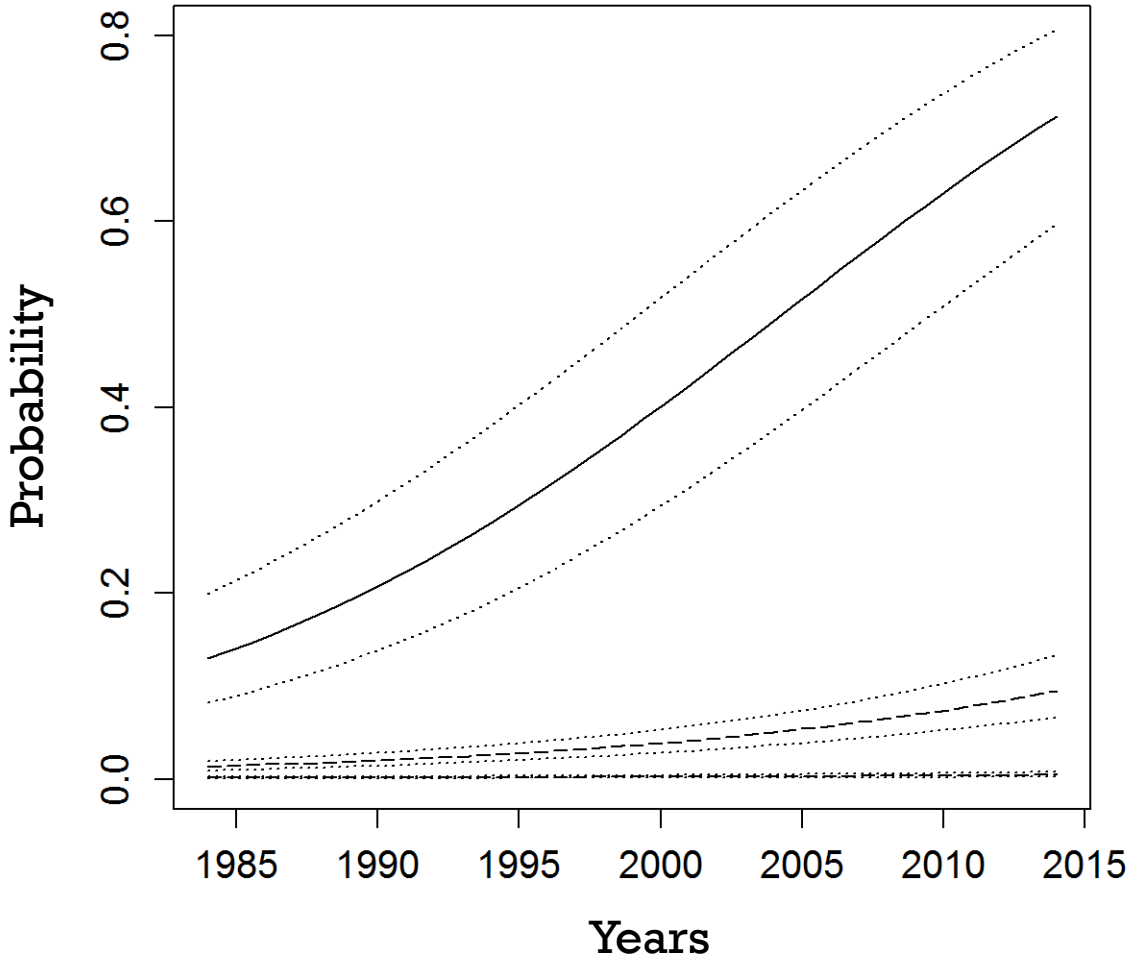
PROBABILITY THAT A MUSTELID HARVESTED IS A FISHER BY LATITUDE





Latitude = 46°

Latitude = 48°

Latitude = 50°

MERCI - THANK YOU - MIGWETCH

To all trappers who took the time

to share their passion with us

To our valuable partners:

Pascal Bibeau (Kebaowek)

Dany Bisson (TFN)

Simon Charest (Wolf Lake)

Claude Grenier

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an amazing guide and friend