

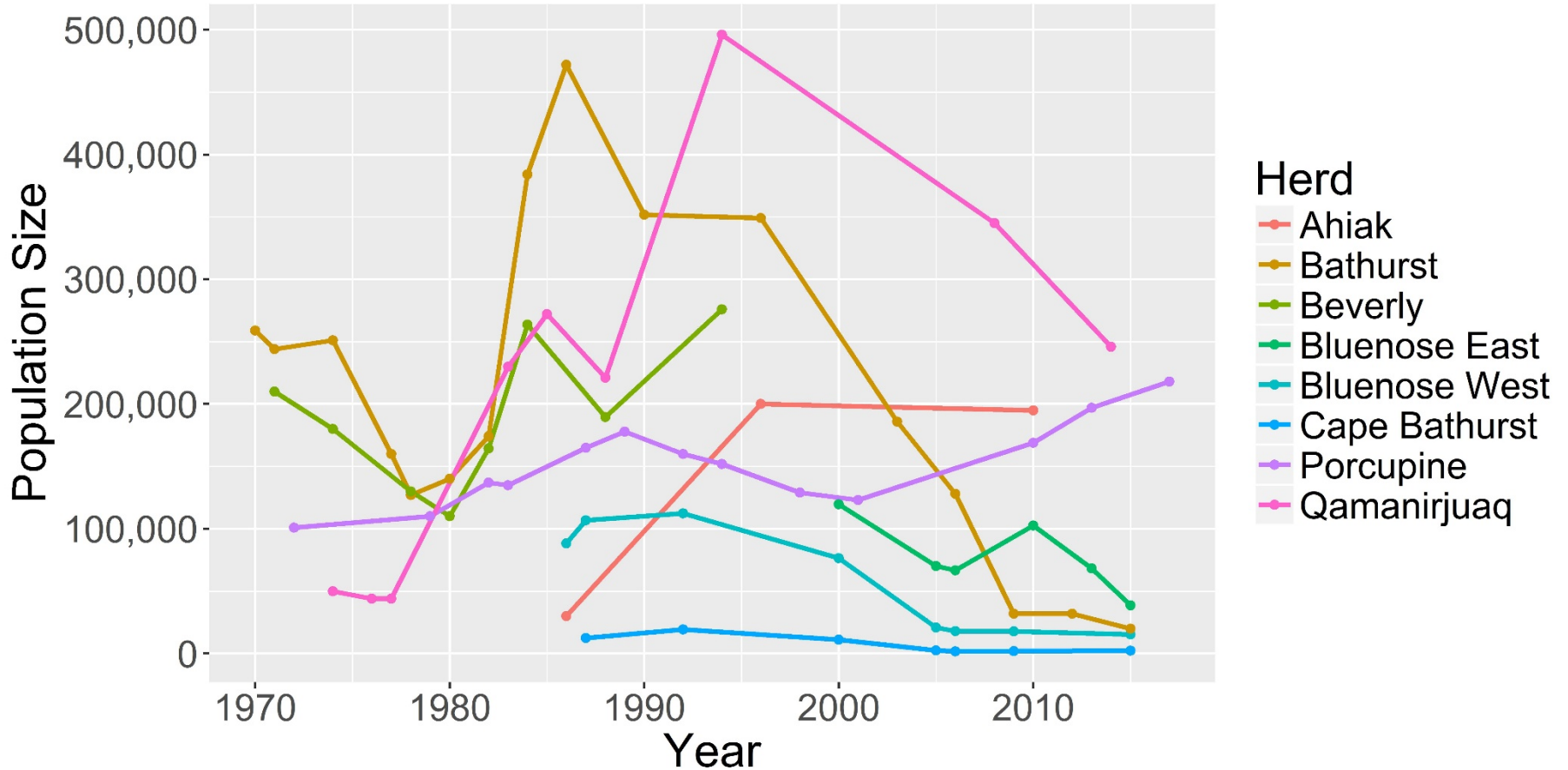
Putting models in the hands of decision-makers: The Caribou Cumulative Effects modelling framework

17th North American Caribou Workshop
November 1, 2018

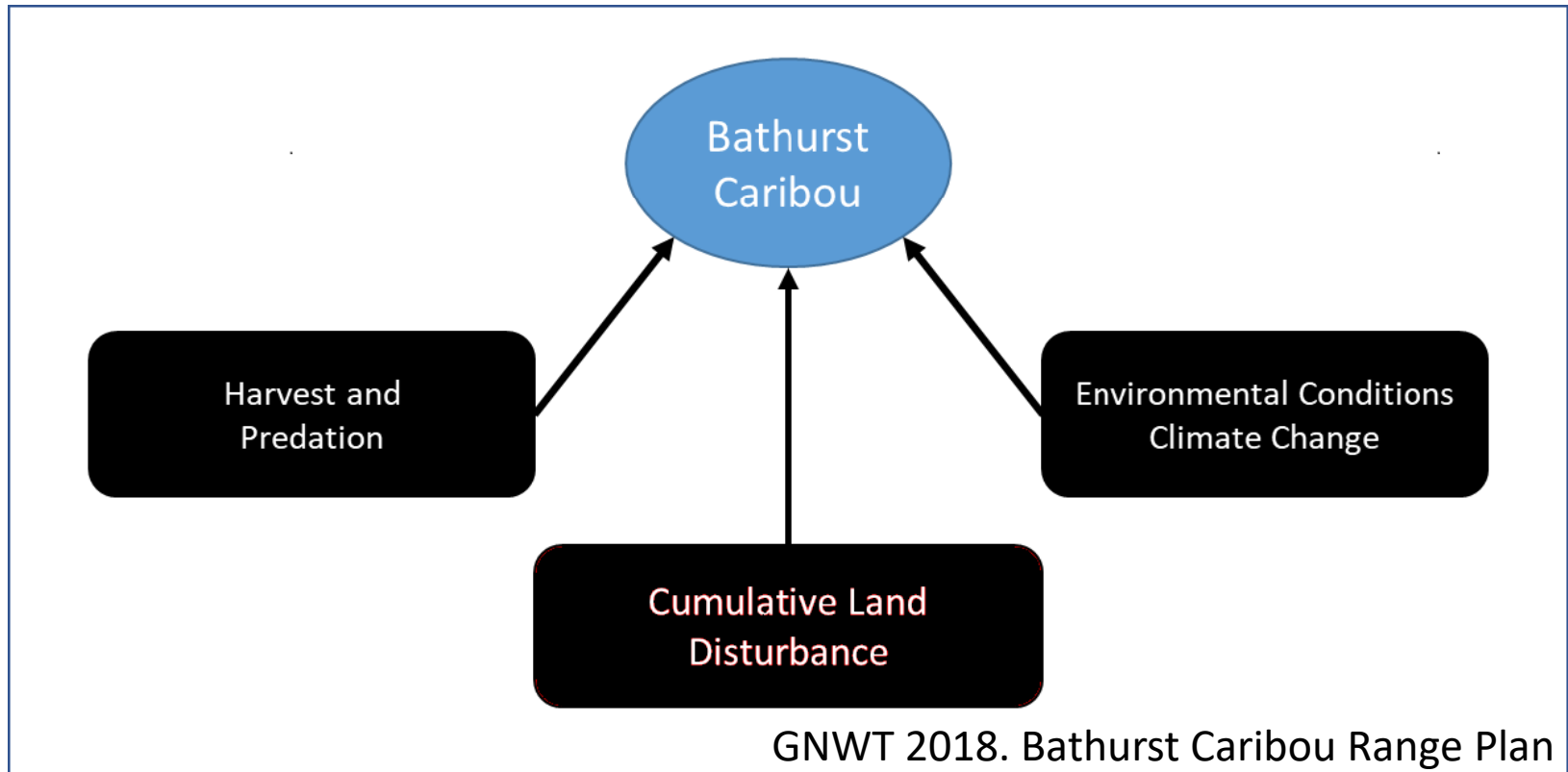
Presented by:
Colin Daniel
Apex Resource Management Solutions

Co-authors:
Leonardo Frid, Don Russell & Anne Gunn

Barren-ground caribou population trends



Key factors influencing populations

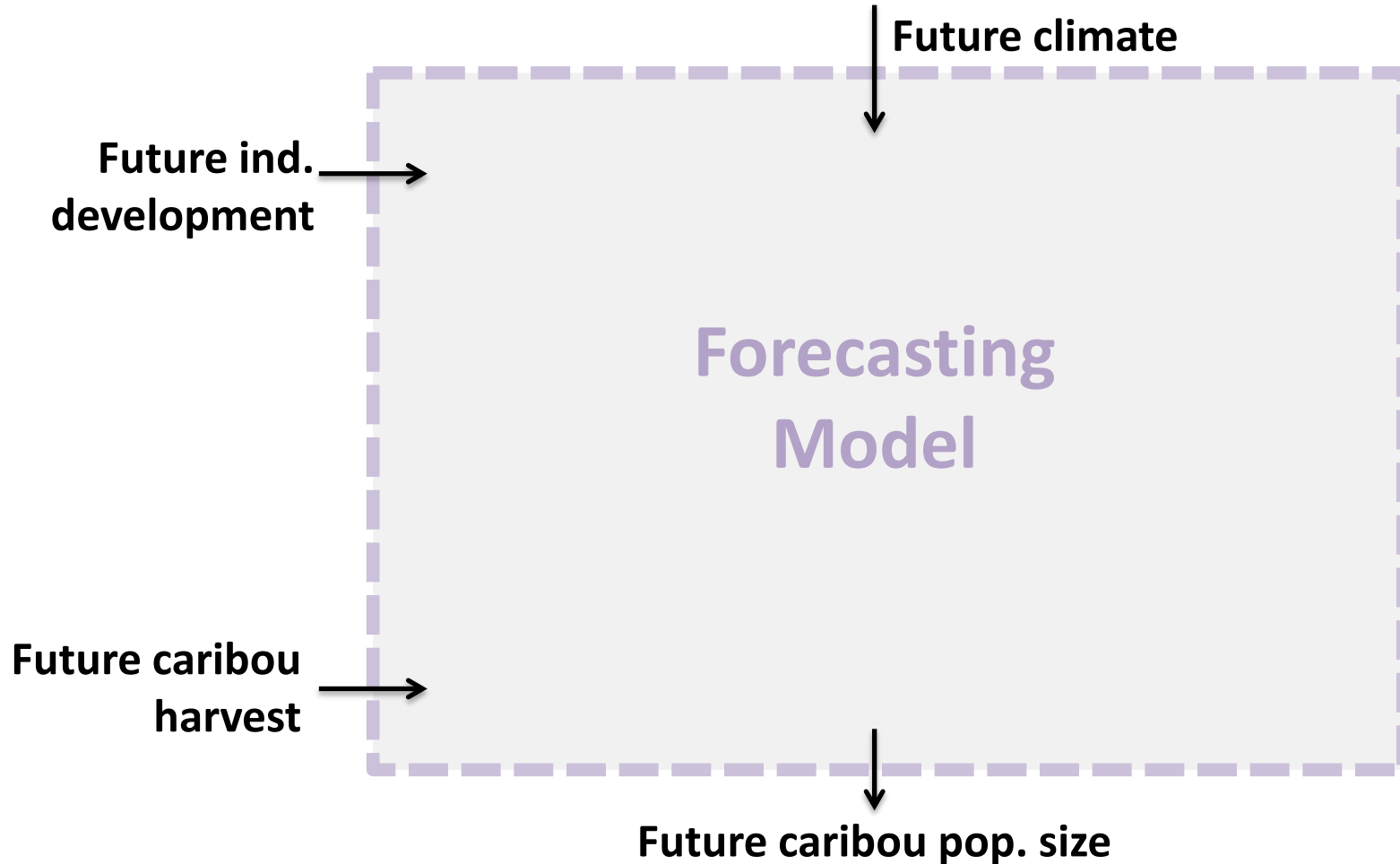


→ Need to project future cumulative effects

How to assess future cumulative effects?

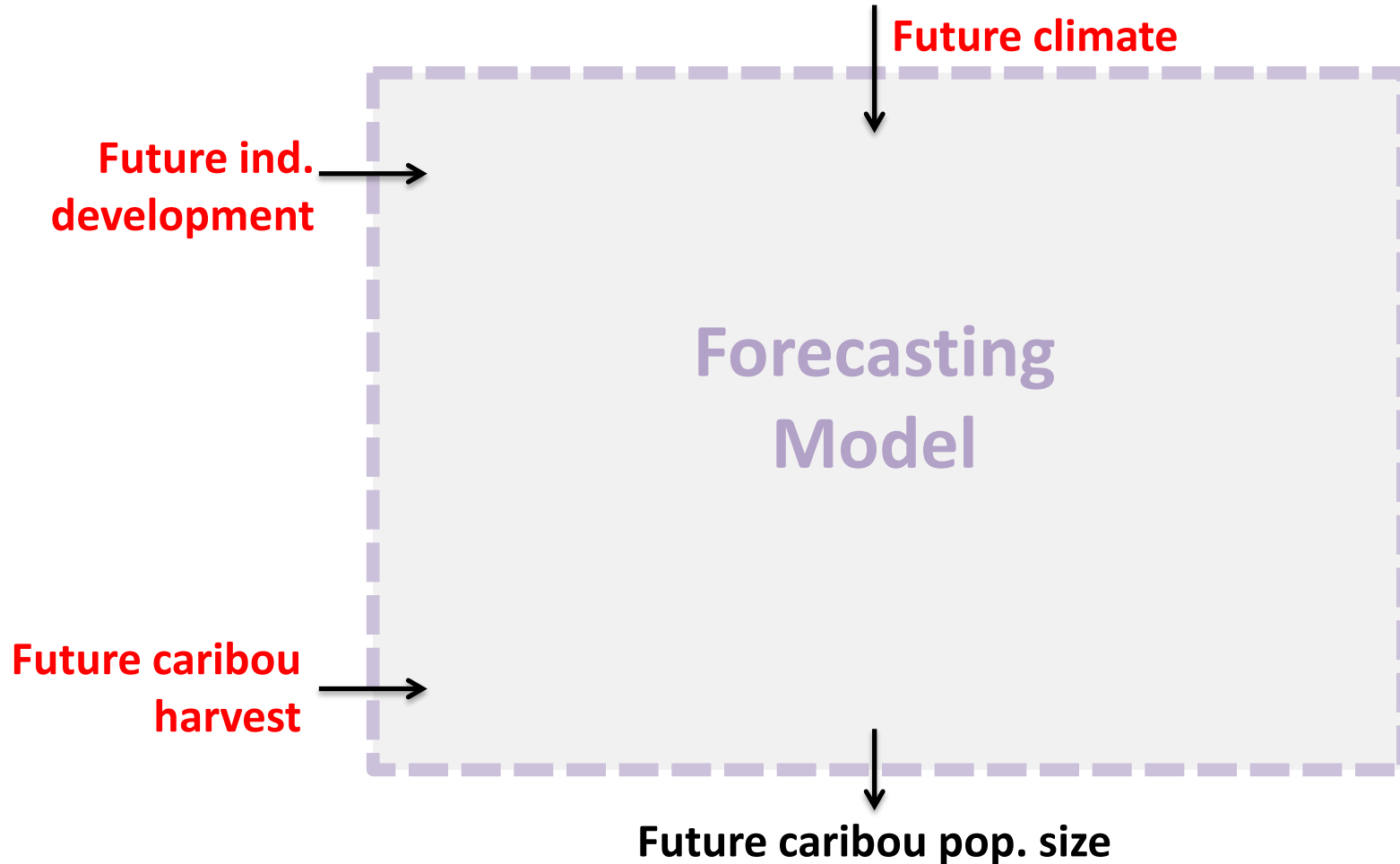
“All models are wrong, but some are useful”

Box 1979



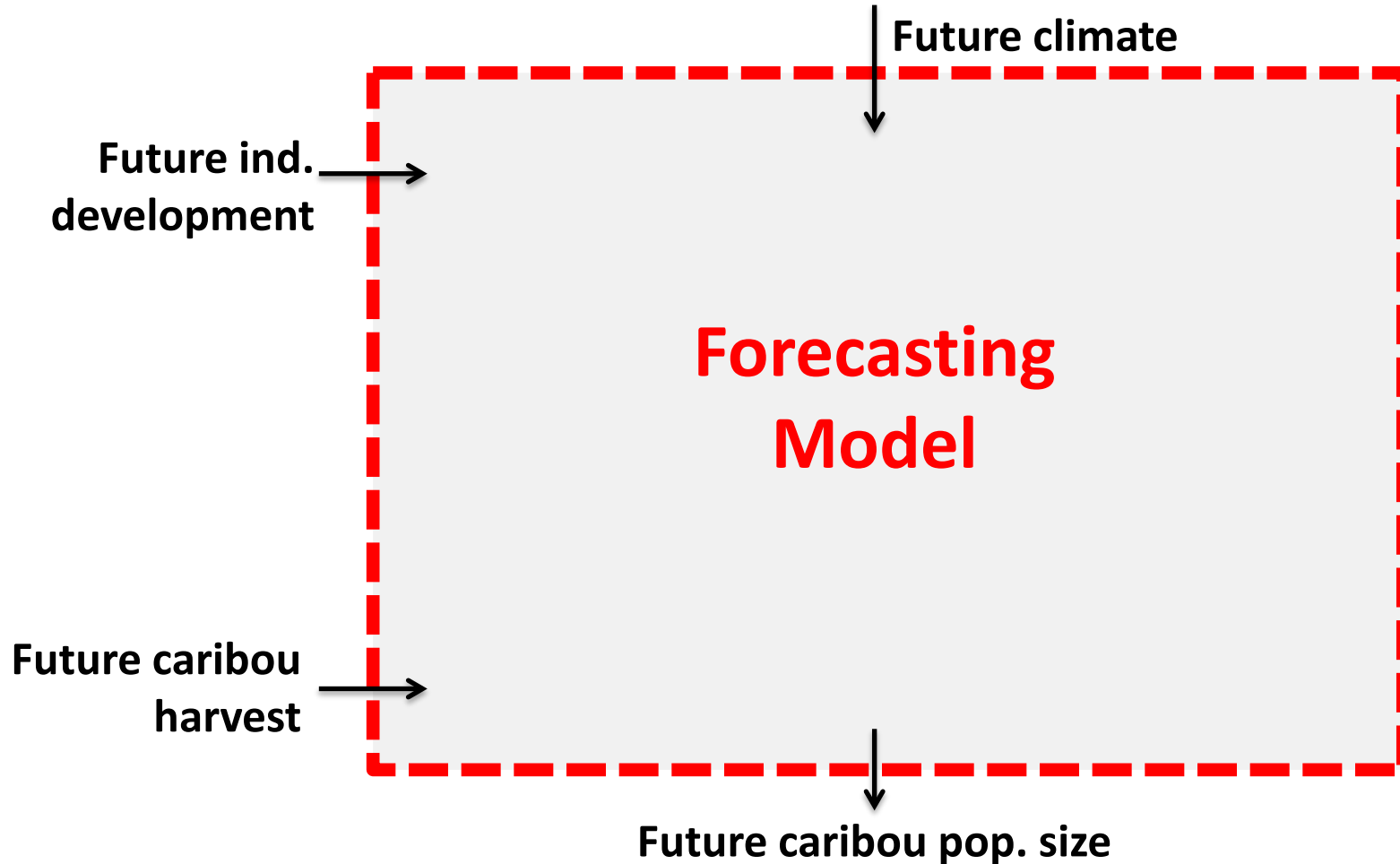
Why are all models **wrong**?

There are always **uncertainties**



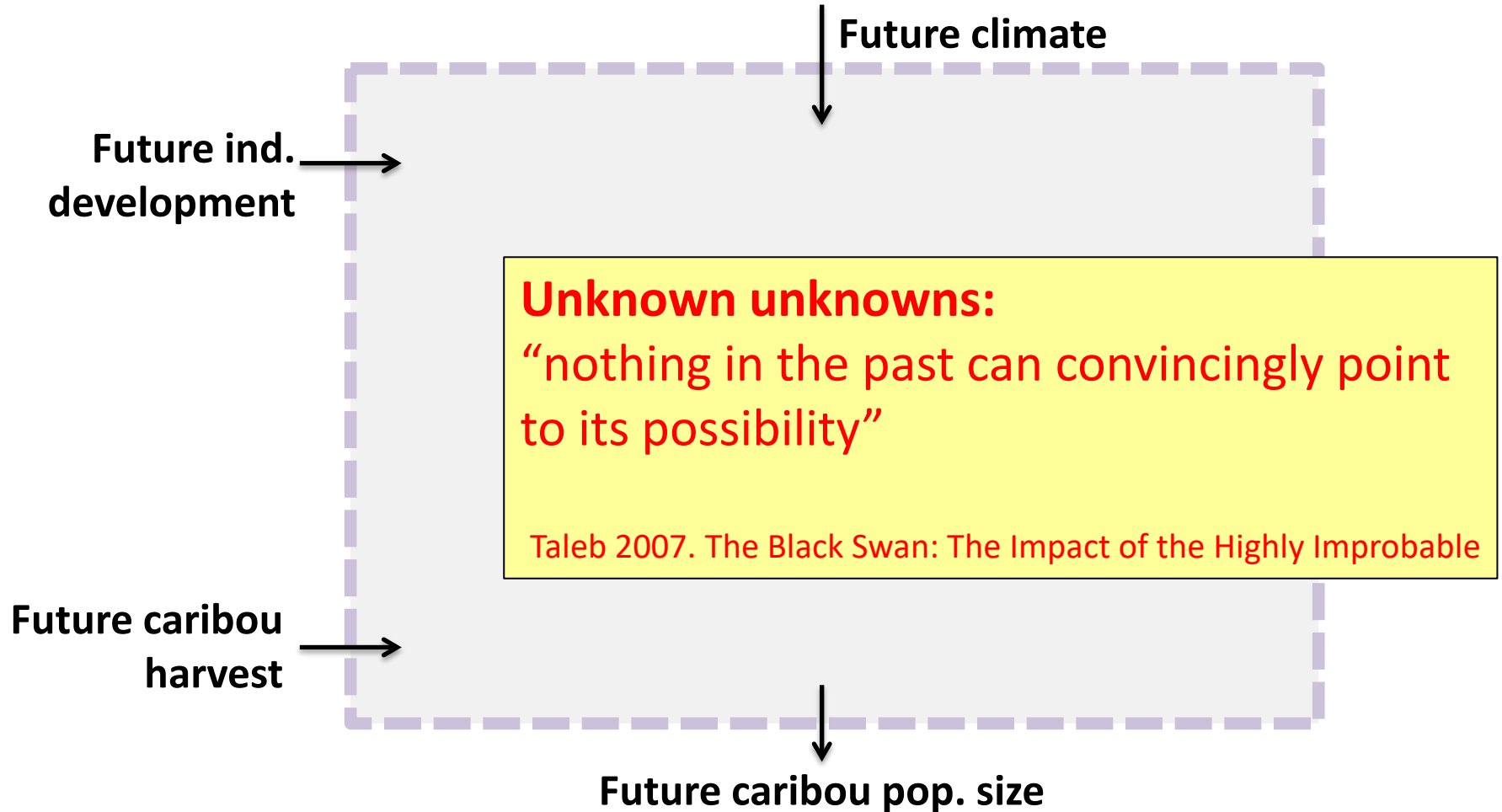
Why are all models **wrong**?

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There are always **uncertainties**

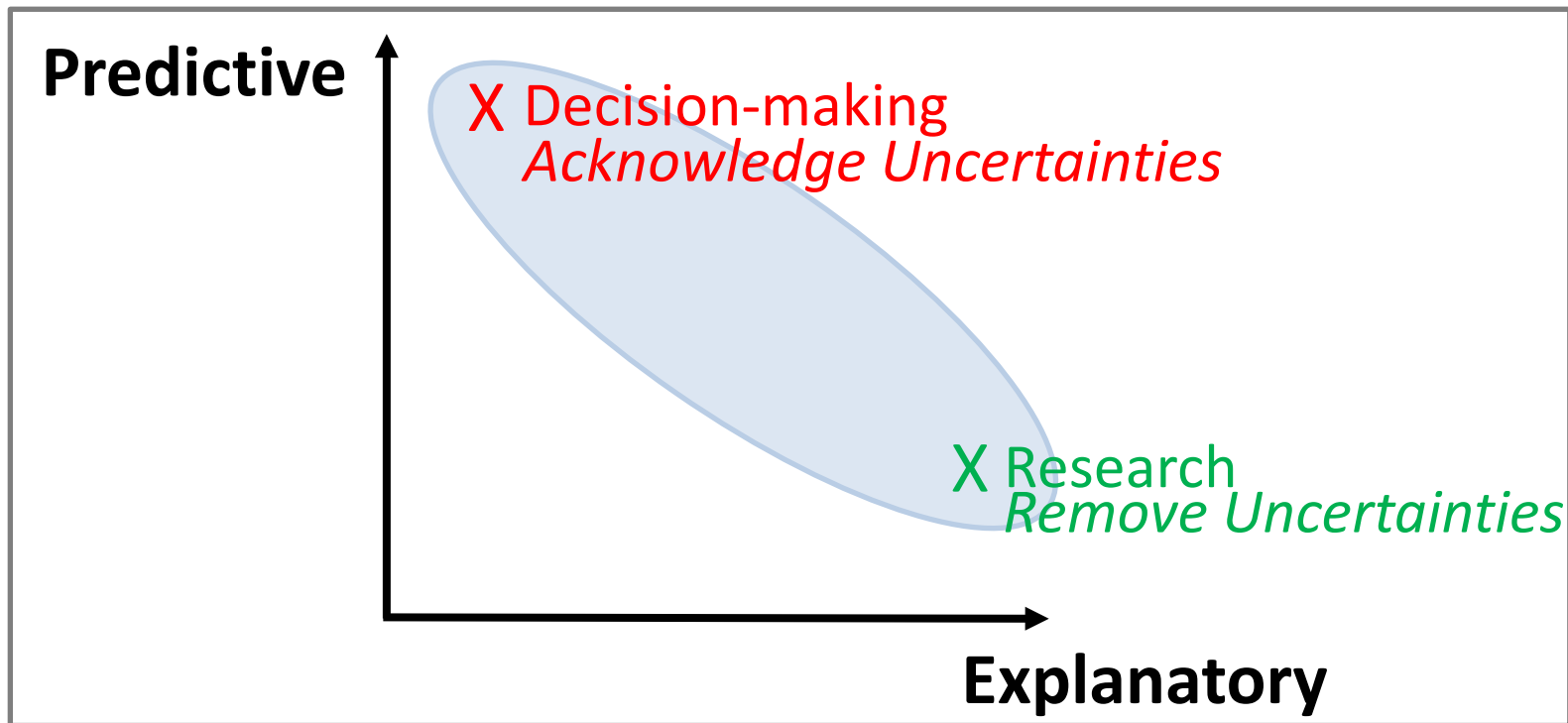


What makes some models **useful**?

1. **Appropriate** for objective/audience

→ *predictive*

→ *acknowledge uncertainties*



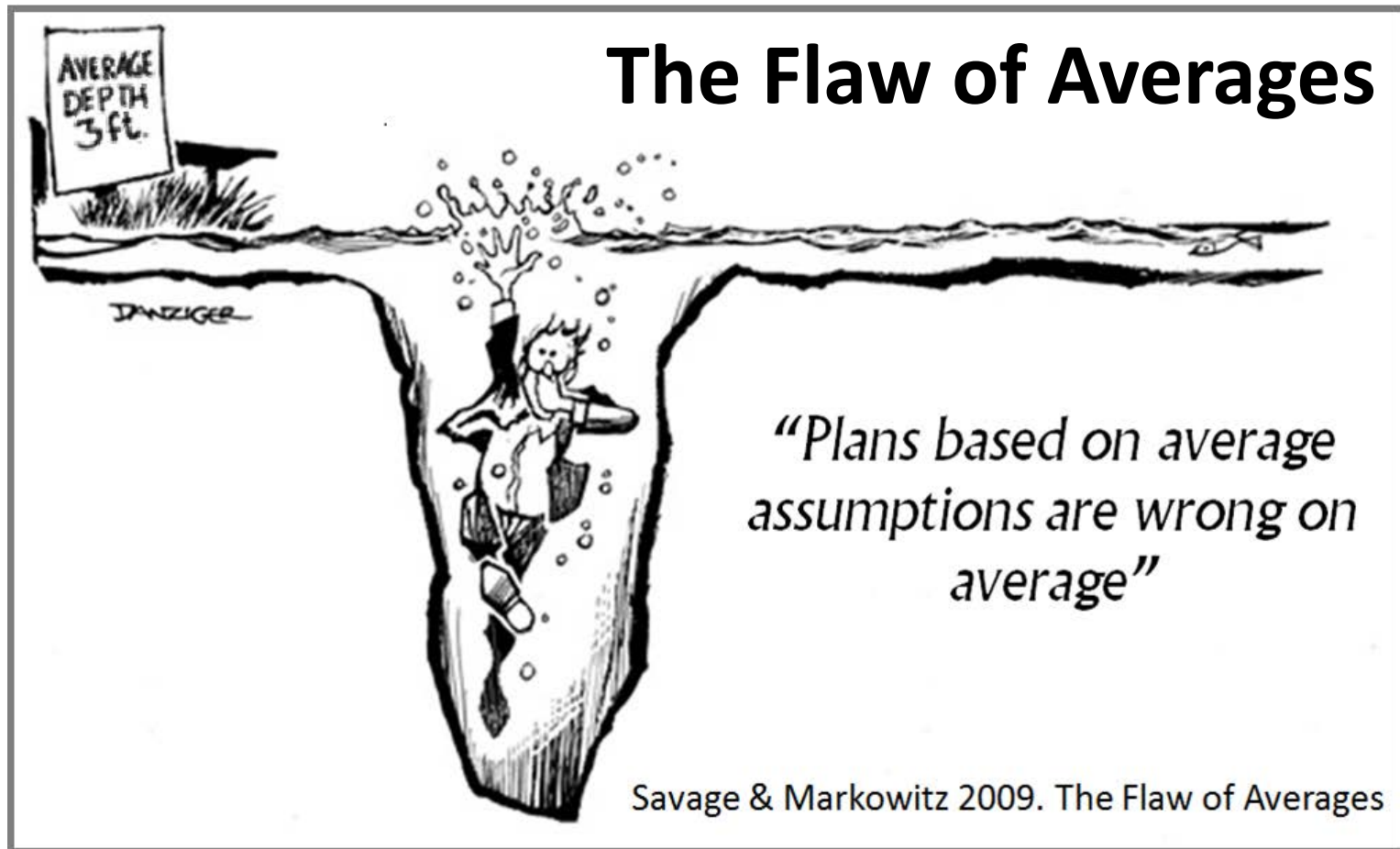
Shmueli 2010. Statistical Science

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What makes some models **useful**?

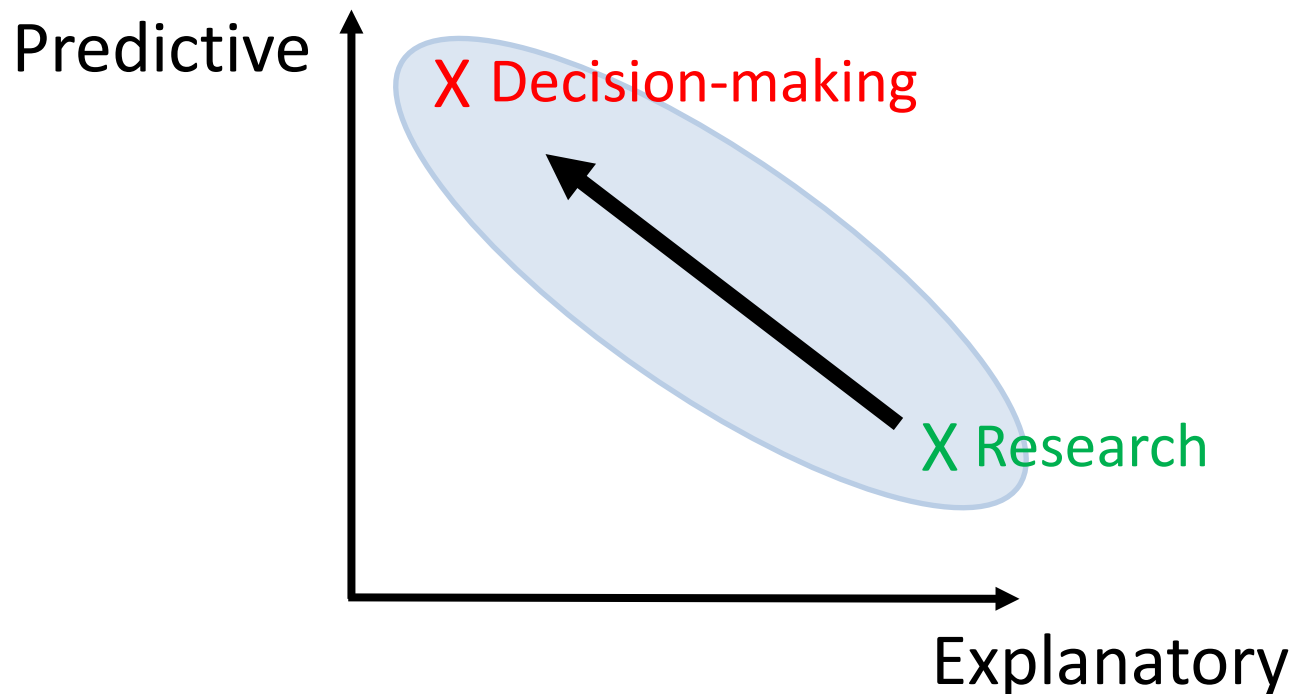
1. **Appropriate** for objective/audience

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2. **Credible**

→ *best available science (e.g. peer-reviewed)*



What makes some models **useful**?

1. **Appropriate** for objective/audience

→ *predictive*

→ *acknowledge uncertainties*

2. **Credible**

→ *best available science (e.g. peer-reviewed)*

3. **Accessible**

→ *open science*

→ *interactive (e.g. “what-if?” scenarios)*

The **objective** of our work -

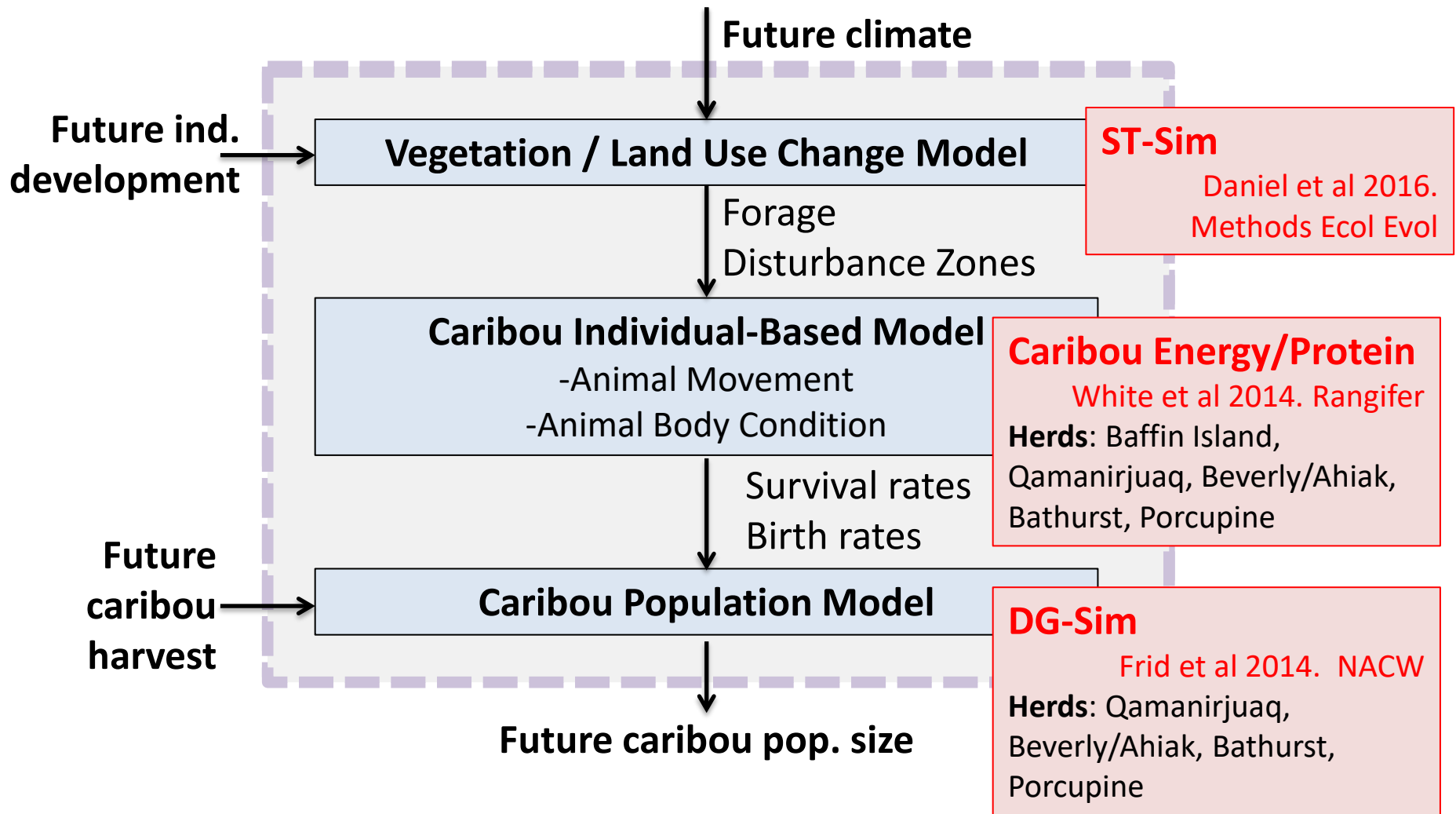
Develop a **general** approach
for **forecasting cumulative effects**
on **barren-ground caribou**



Better informs
management decisions
in the face of
future uncertainties

Appropriate + Credible + Accessible

Caribou Cumulative Effects Modelling Framework



SyncroSim

**Data management platform
for delivering
simulation models to decision-makers**

- Stochastic
- Spatially-explicit
- Free download:
www.syncrosim.com

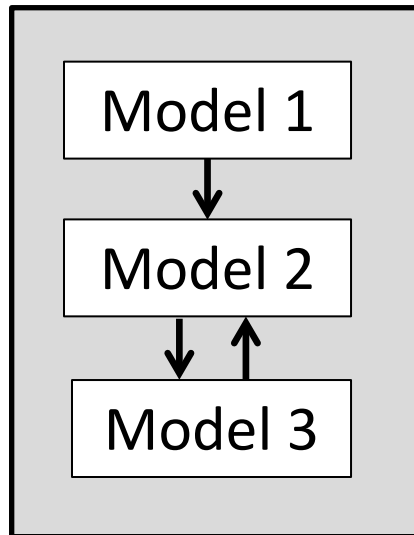
Key Sponsors:



Key features of SyncroSim

1. Links existing models

Calculations: R, Python, .NET (C#), *compiled .exe/.dll*



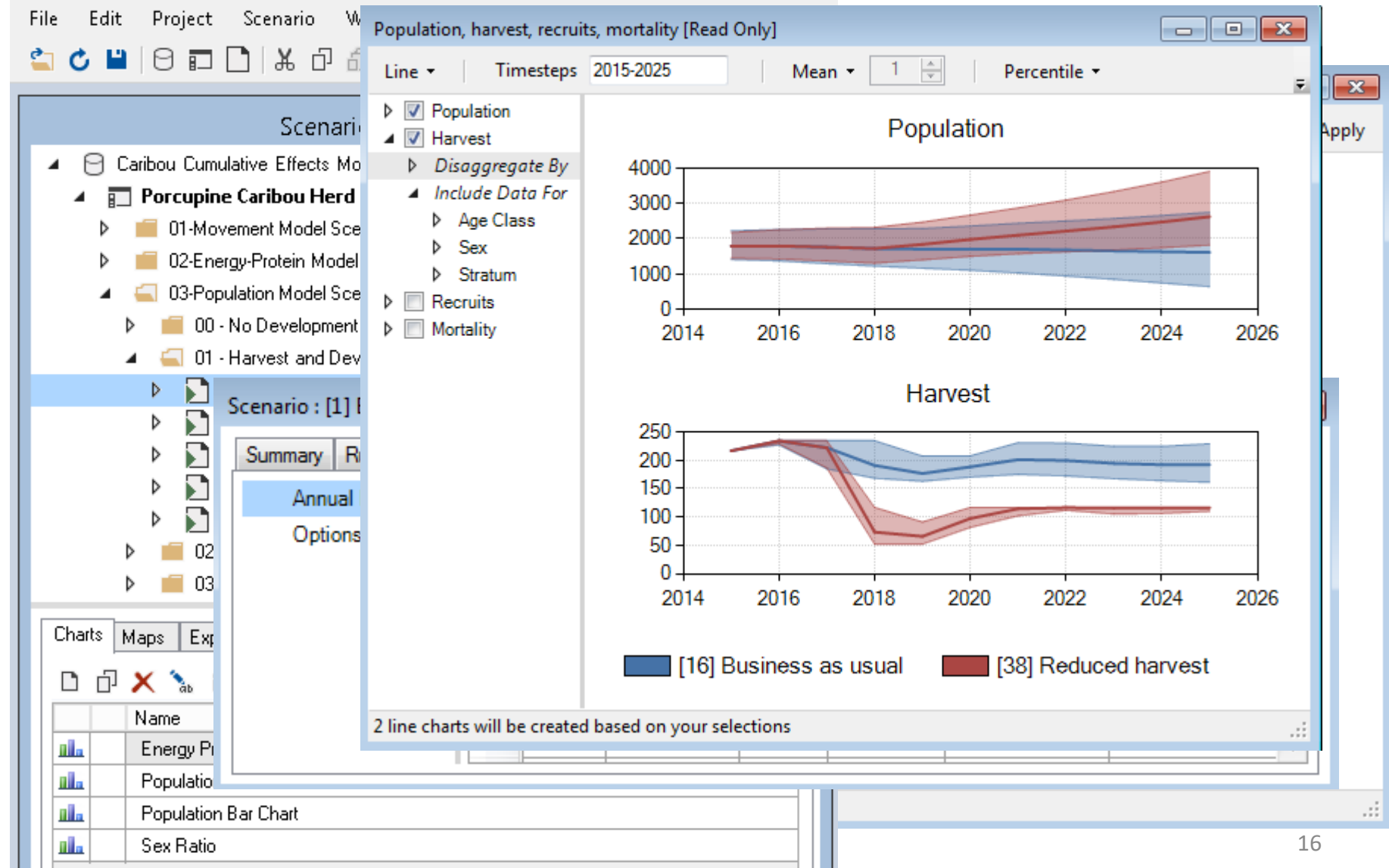
The screenshot shows the 'Modules' window in SyncroSim. It contains a table with the following data:

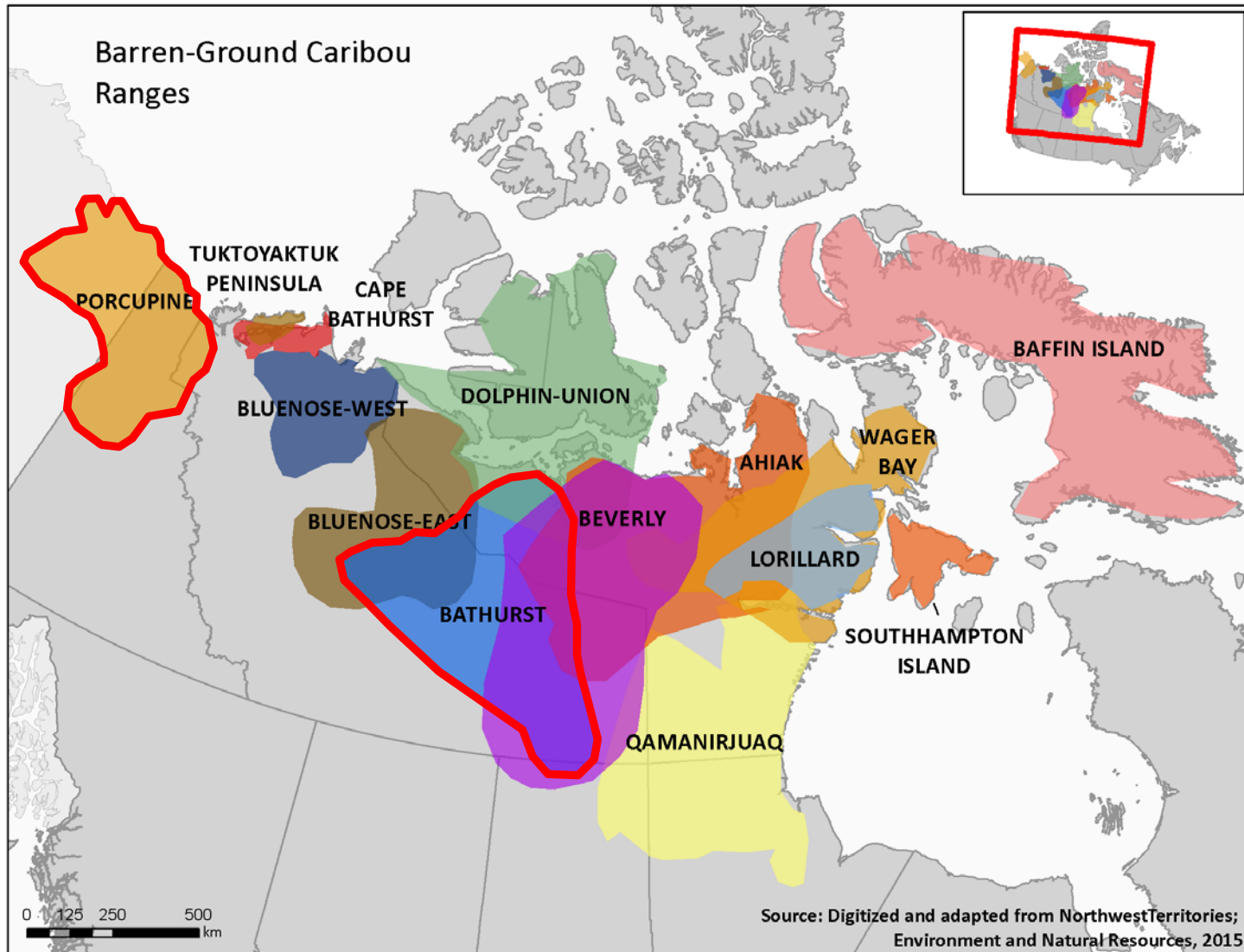
Name	Description	Version
carep	Caribou Energy Protein	2.1.32
cscape	Circuitscape	1.0.5
dgsim	Demographic Population	2.1.31
netlogo	NetLogo	1.0.5
sample-basic-dotnet	Sample Basic (.Net)	1.0.5
sample-basic-python	Sample Basic (Python)	1.0.5
sample-basic-r	Sample Basic (R)	1.0.5
stsim-farsite	STSim FARSITE Extensions	3.1.34
stsim	ST-Sim State and Transition	3.1.34
stsim-stockflow	ST-Sim Stocks and Flows Add-On	3.1.34

Below the table are two buttons: 'Add...' and 'Remove'.

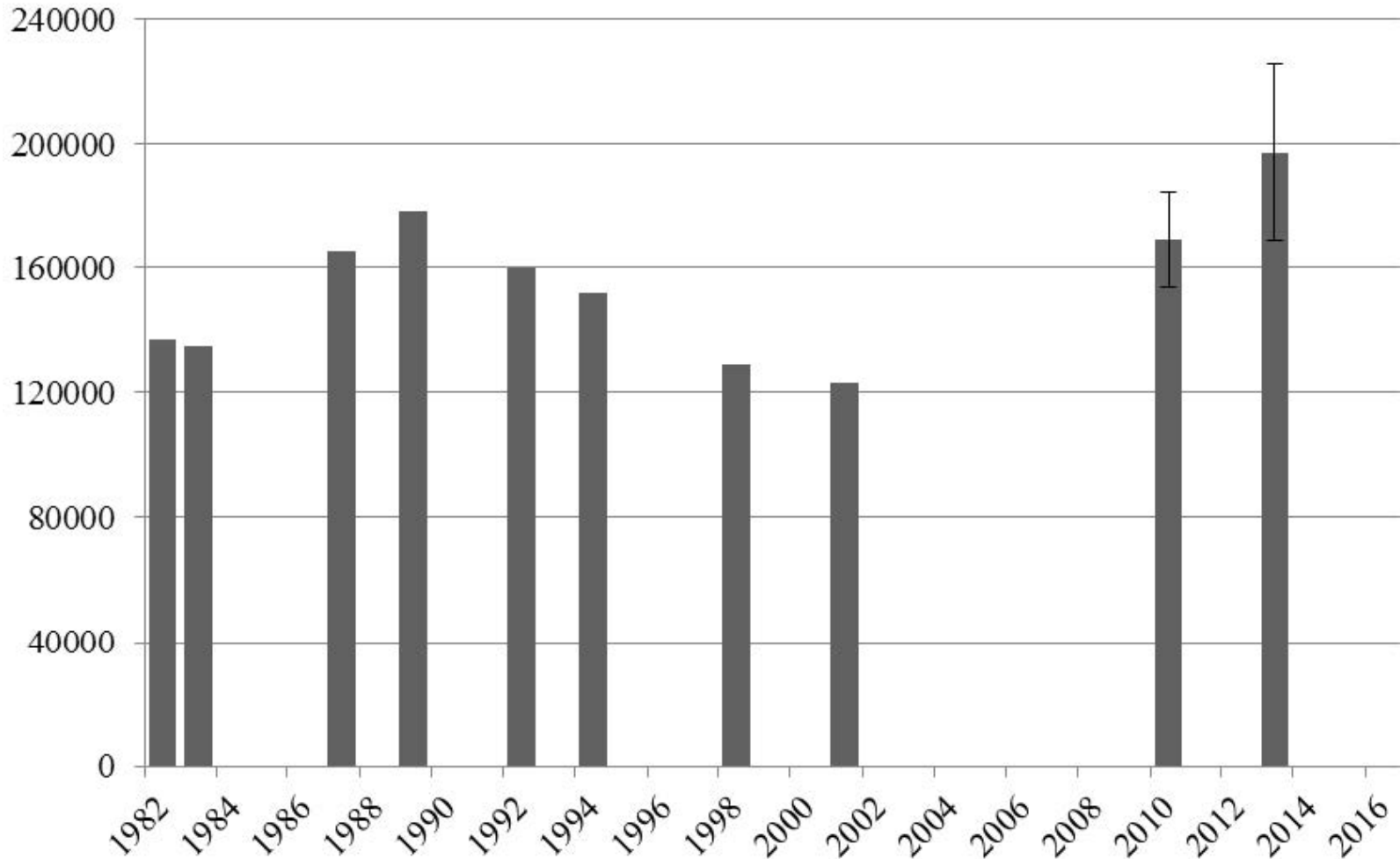
Key features of SyncroSim

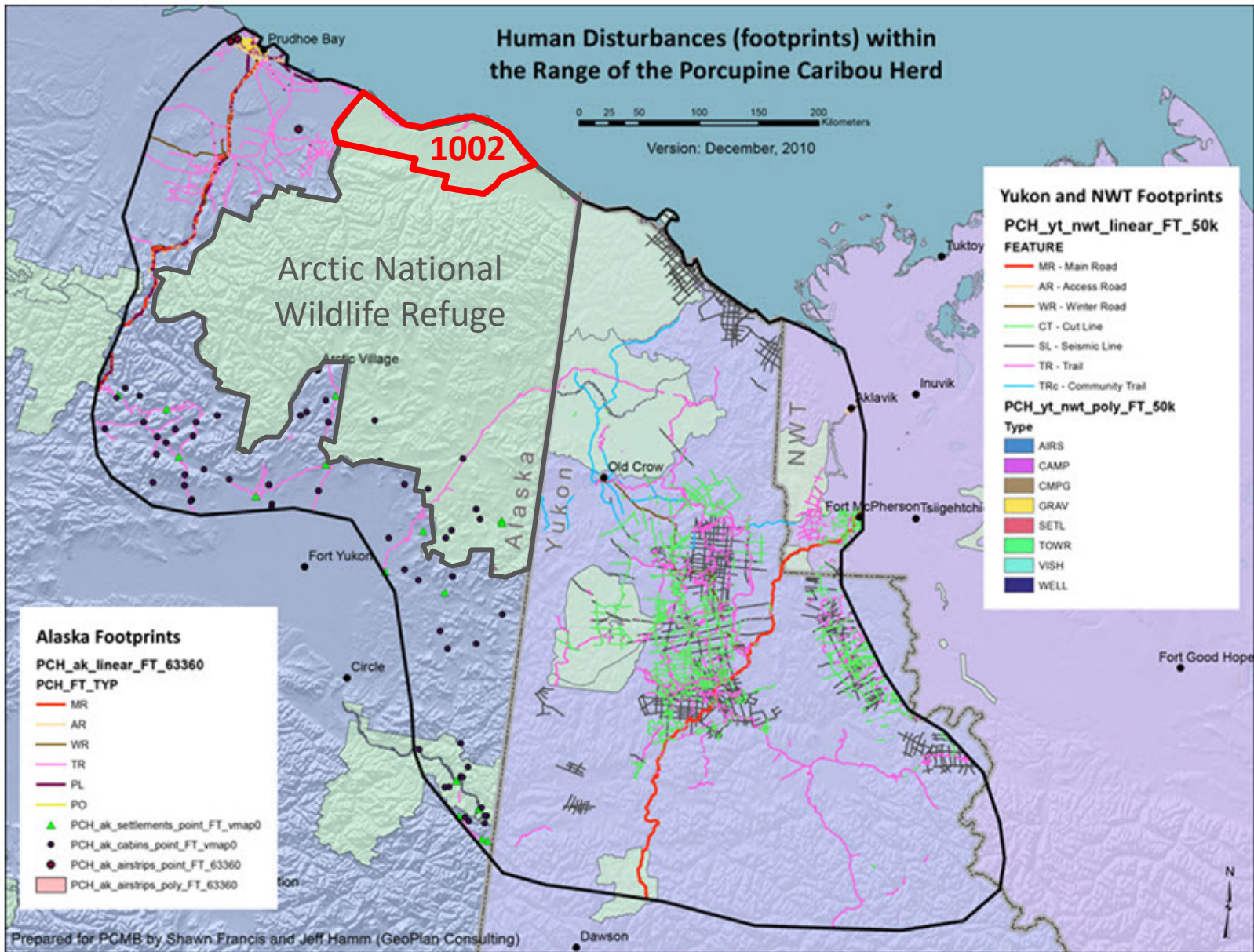
2. Customizable user interface



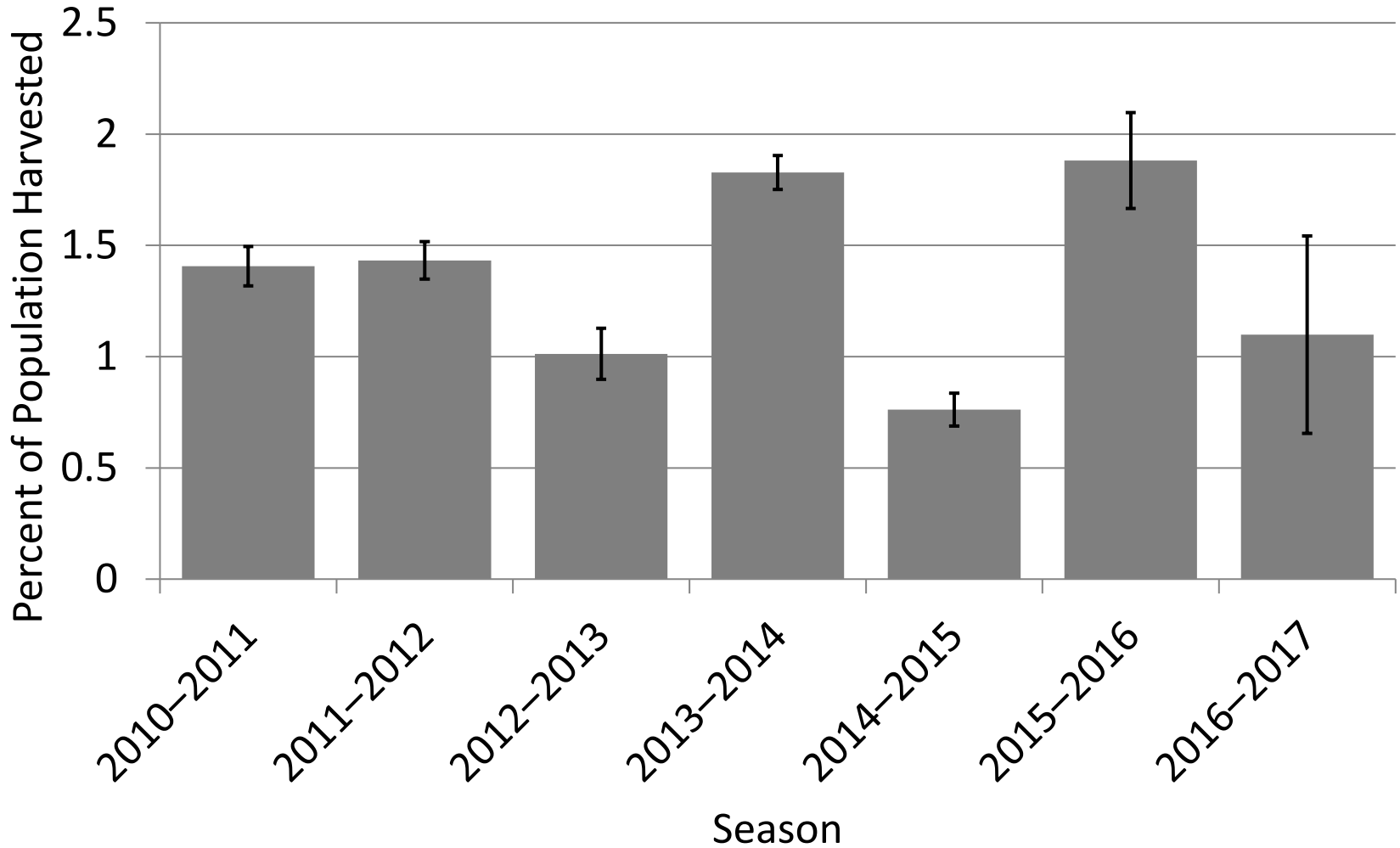


Porcupine Caribou Herd Population

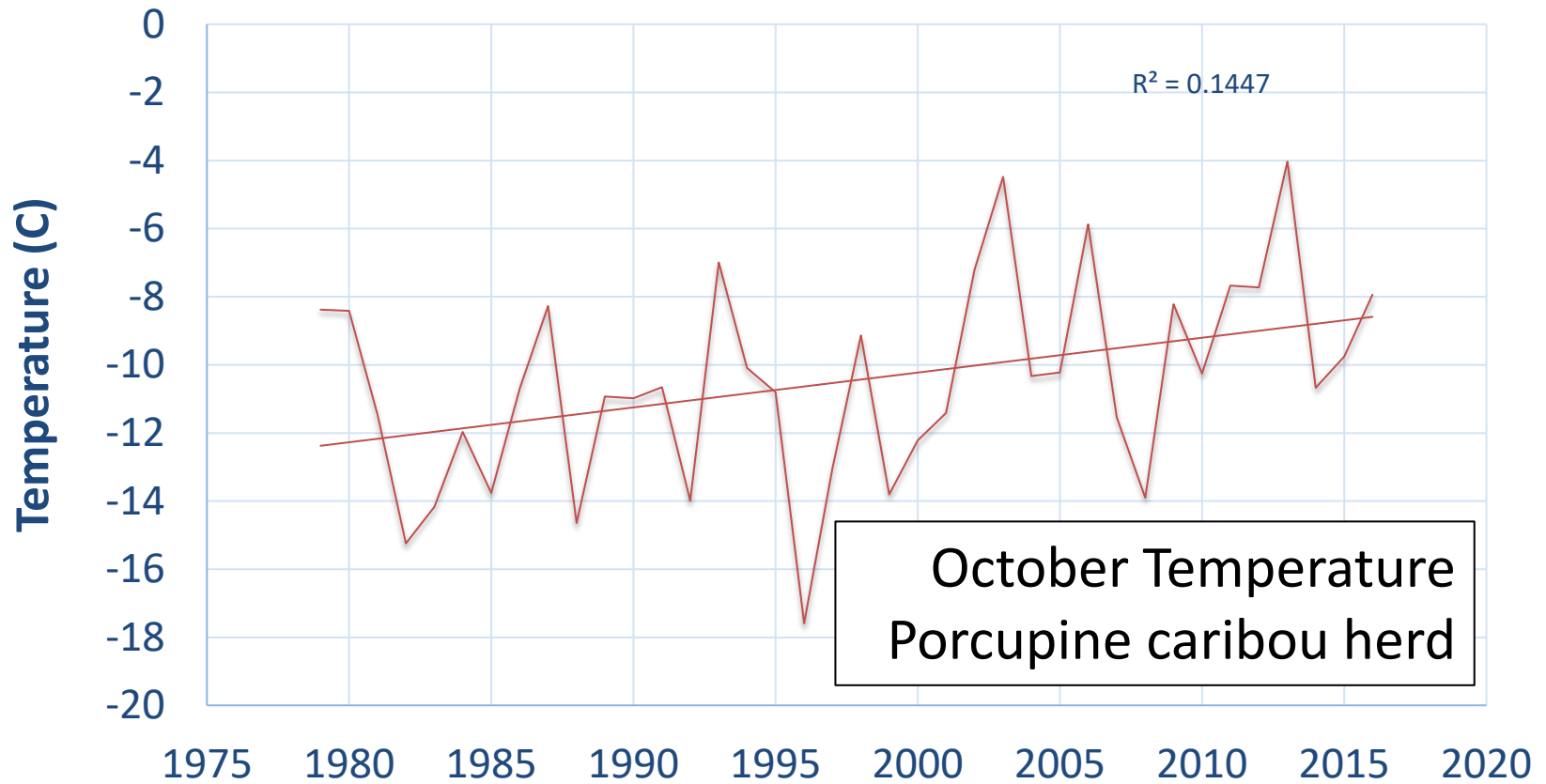




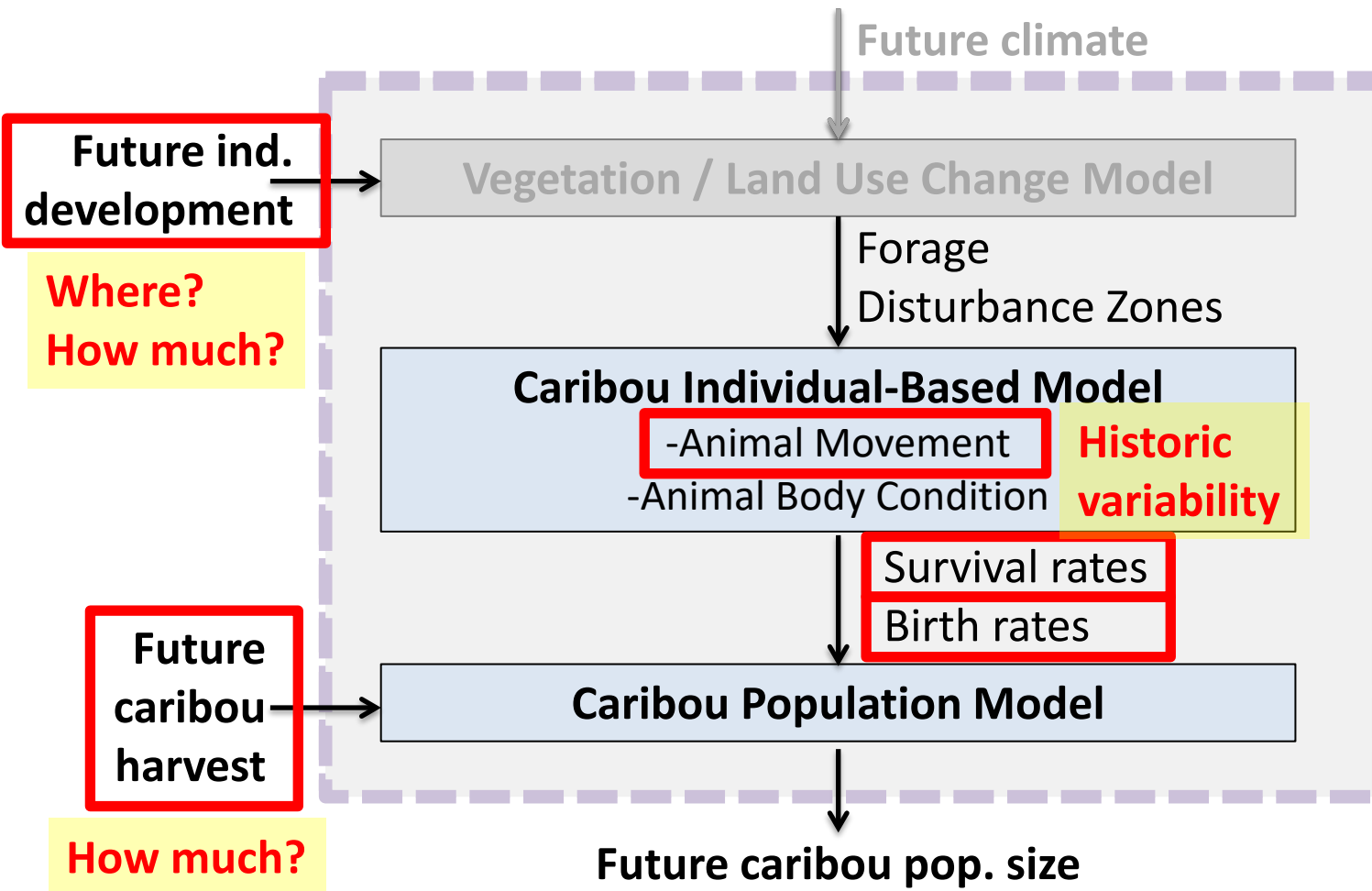
Porcupine Caribou Herd Harvest



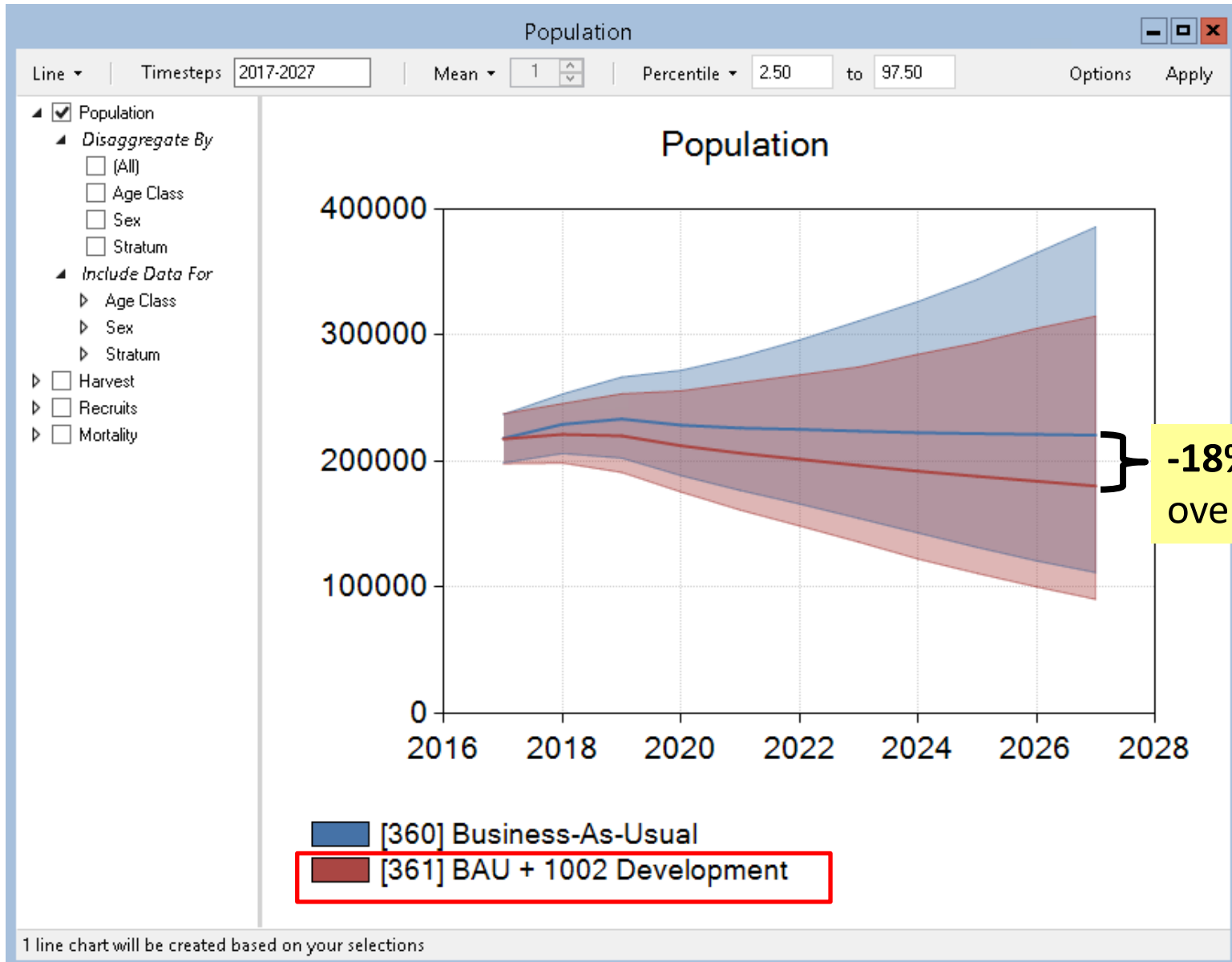
Climate Change



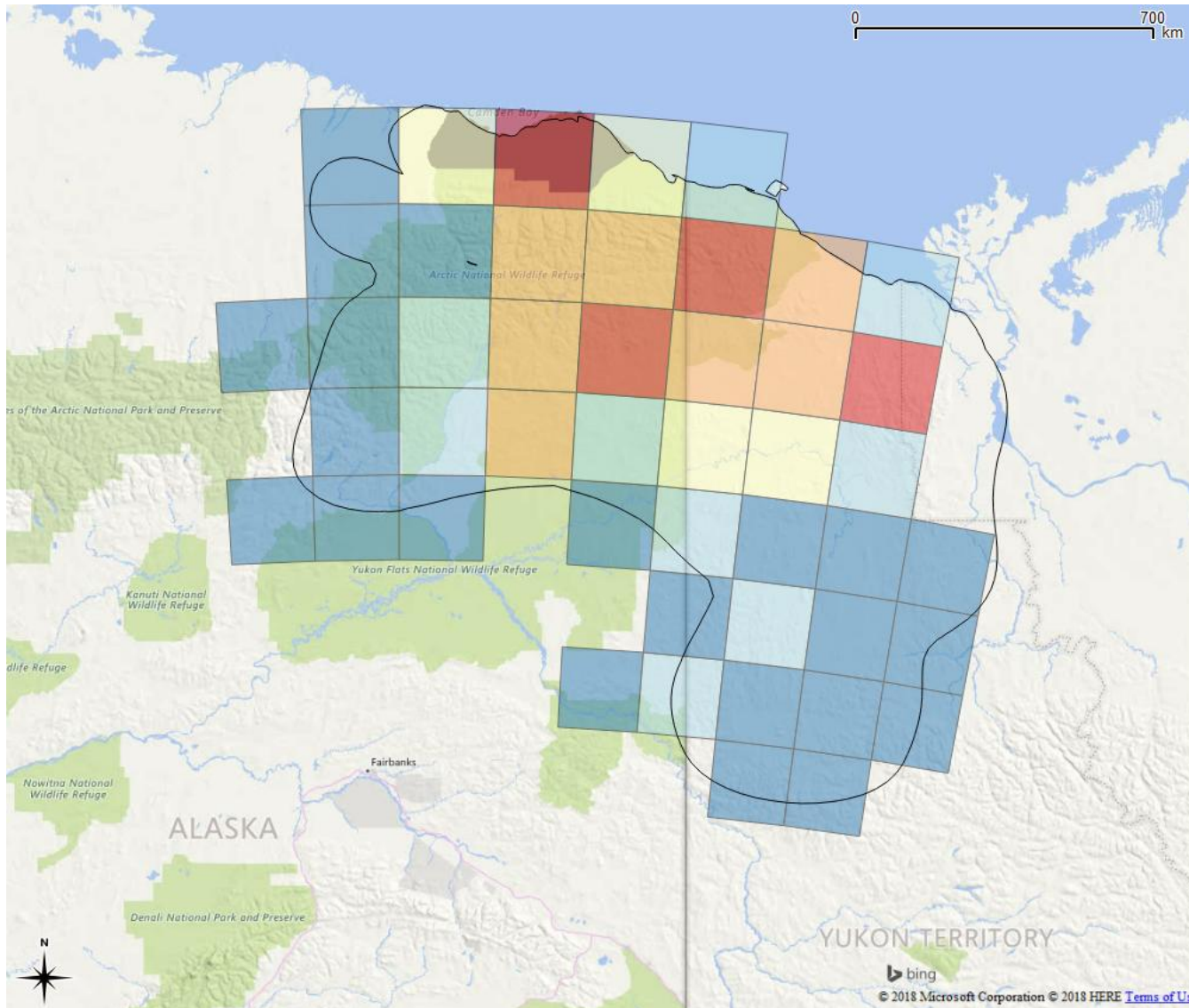
Caribou Cumulative Effects Modelling Framework



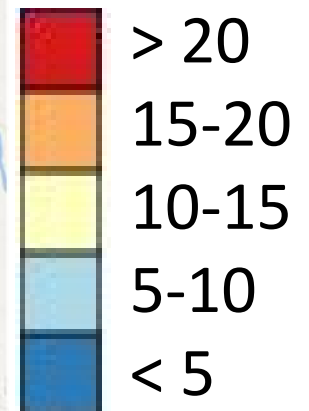
Forecasts of future population



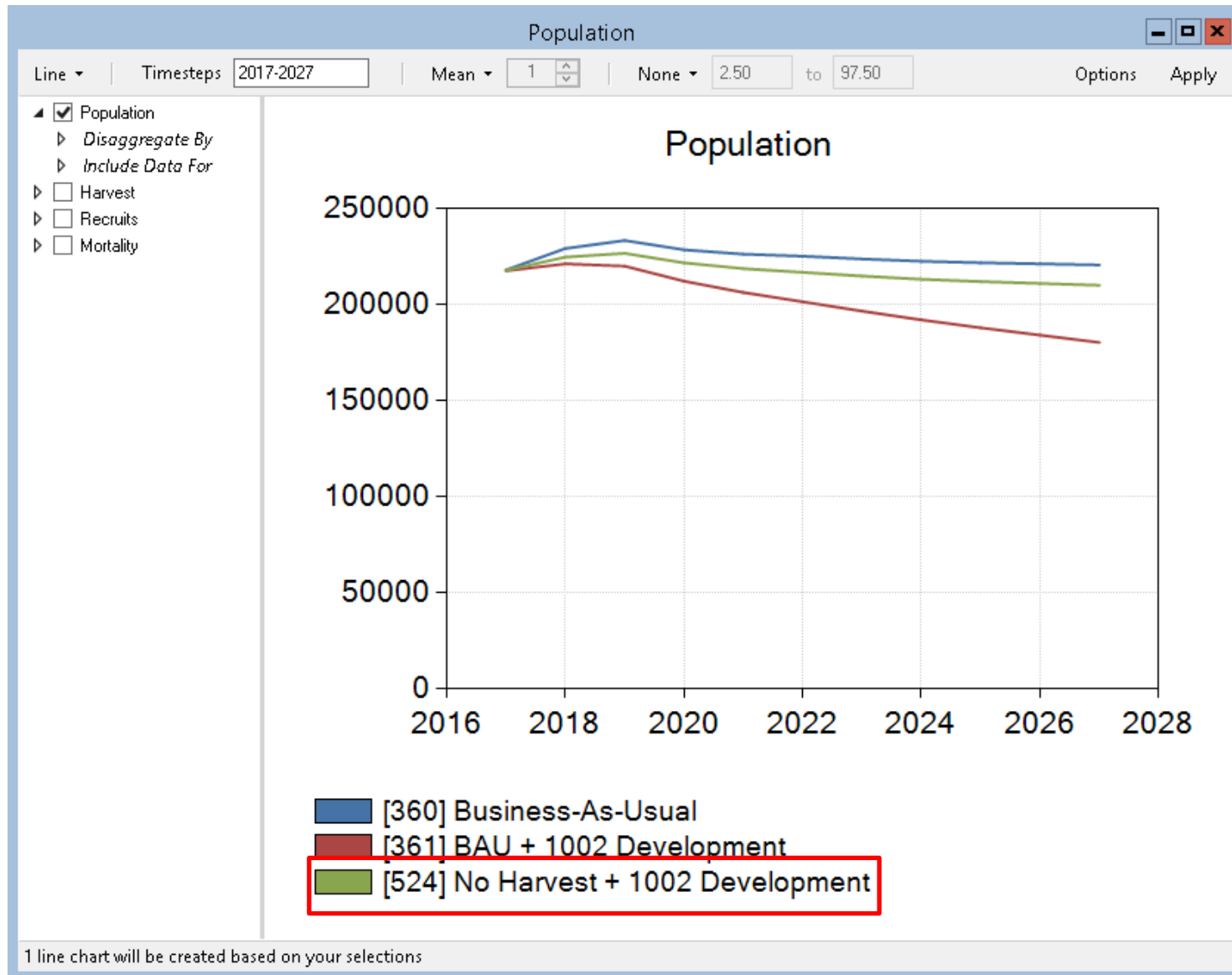
Sensitivity to future development location



**Projected
mean %
decrease in
popn.
over 10 yrs**



Development and harvest



To summarize...

Forecasting cumulative effects requires:

- Accounting for **uncertainty**
- **Integrating** existing peer-reviewed models
- **Delivering** models to decision-makers

Collaboration is key

- Brings research & stakeholders together
- However... requires **overall framework**

Funding provided by



Environment and
Climate Change Canada

