

Caribou population cycles, CARMA and Frame Size

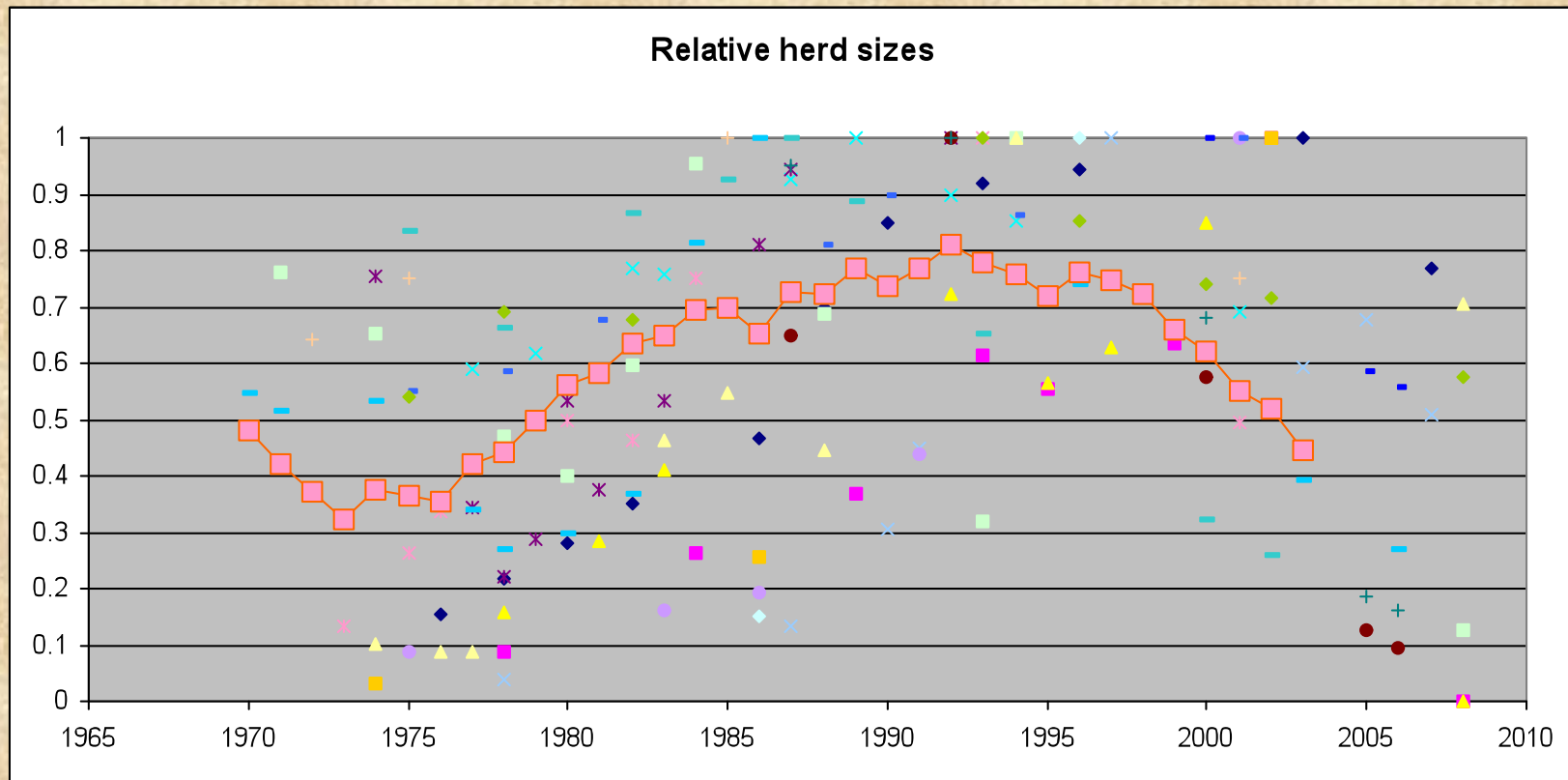


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This Talk

- Caribou Cycles – theories and tests
- Role of the CircumArctic Rangifer Monitoring and Assessment (CARMA) Network
- Frame Size Model – one tool

Relative herd sizes for wild *Rangifer* herds



What ultimately controls the size of herds?



predators



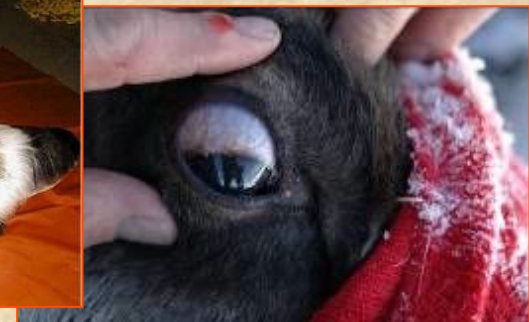
harvest



climate

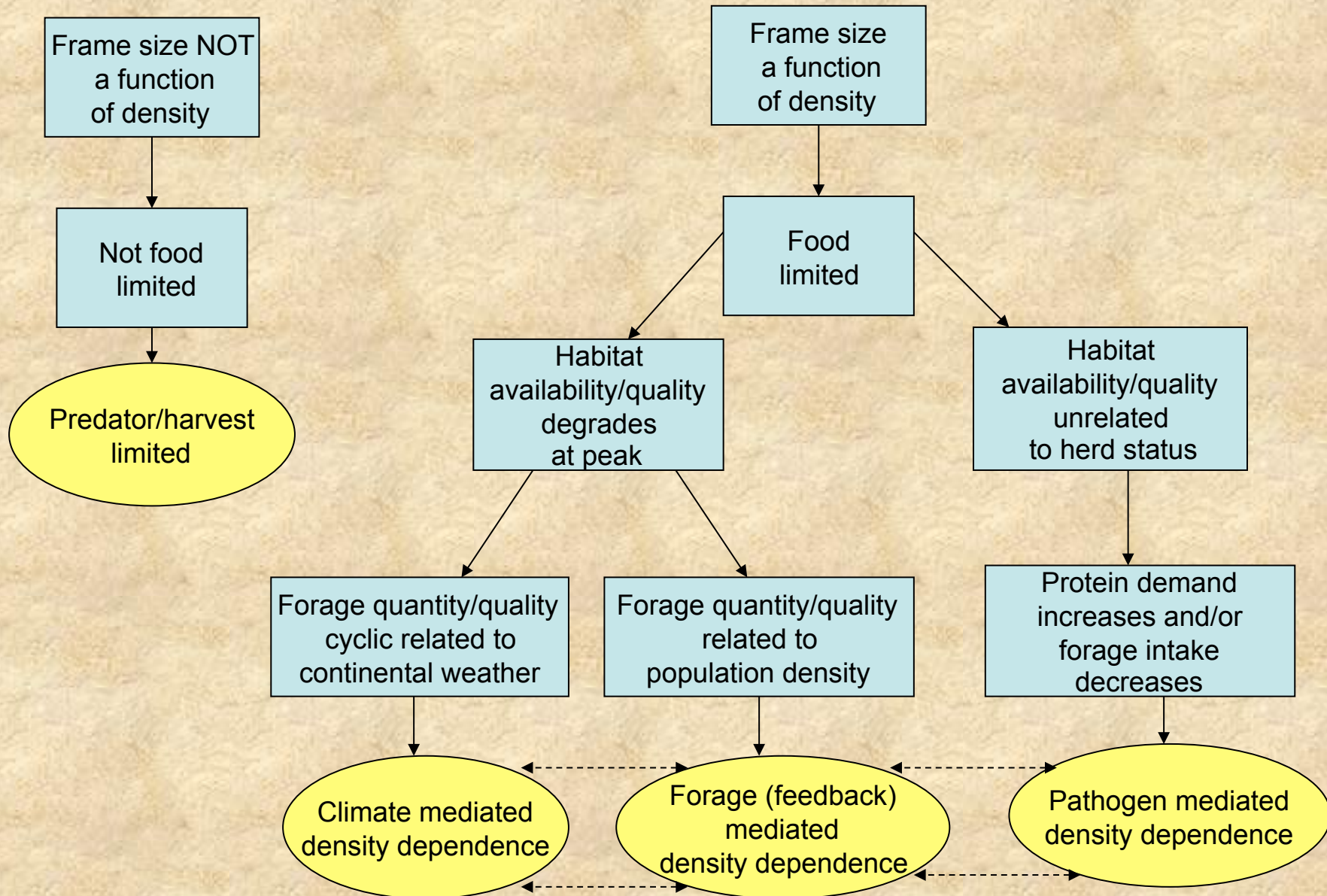


grazing pressure

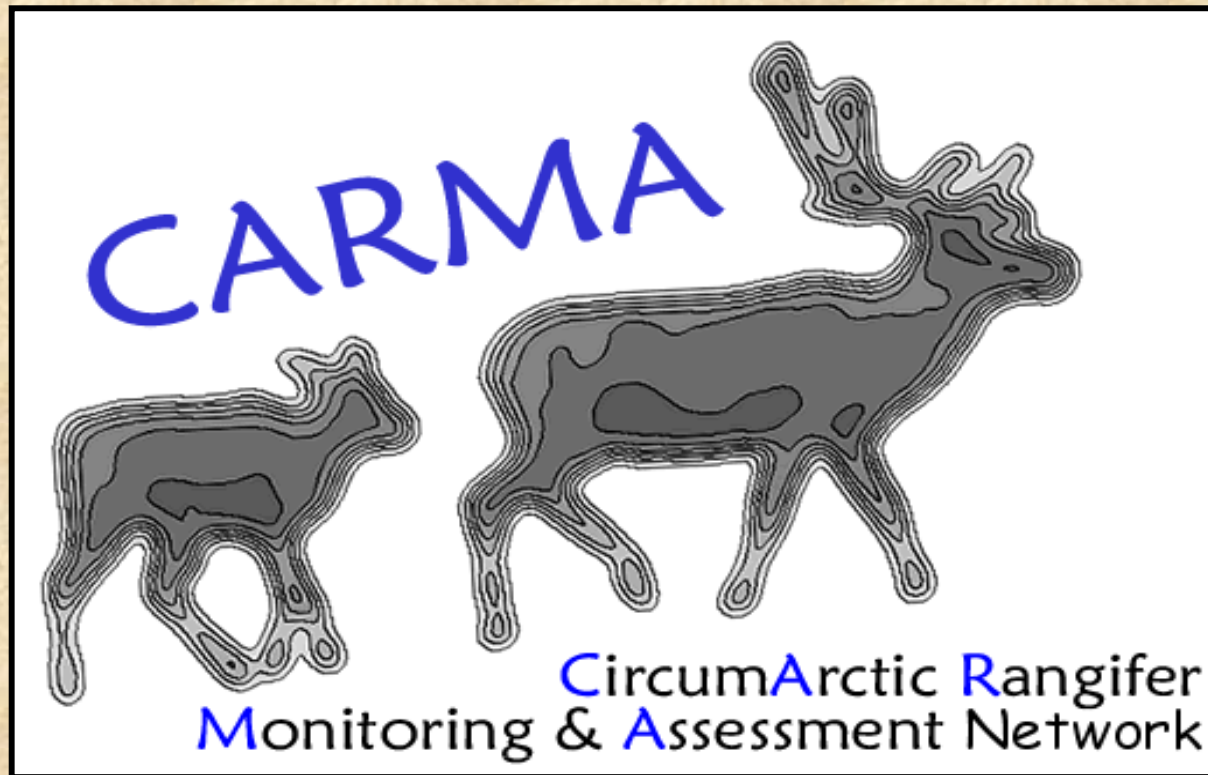


Pathogens (parasites and disease)

4 hypothesis for migratory tundra caribou population limitation – what happens at the peak?



THE CARMA NETWORK



Mission is to.....

Monitor and assess the impacts of global change on Human-Rangifer (reindeer, caribou) systems across the circumarctic, through cooperation, both geographically and across disciplines

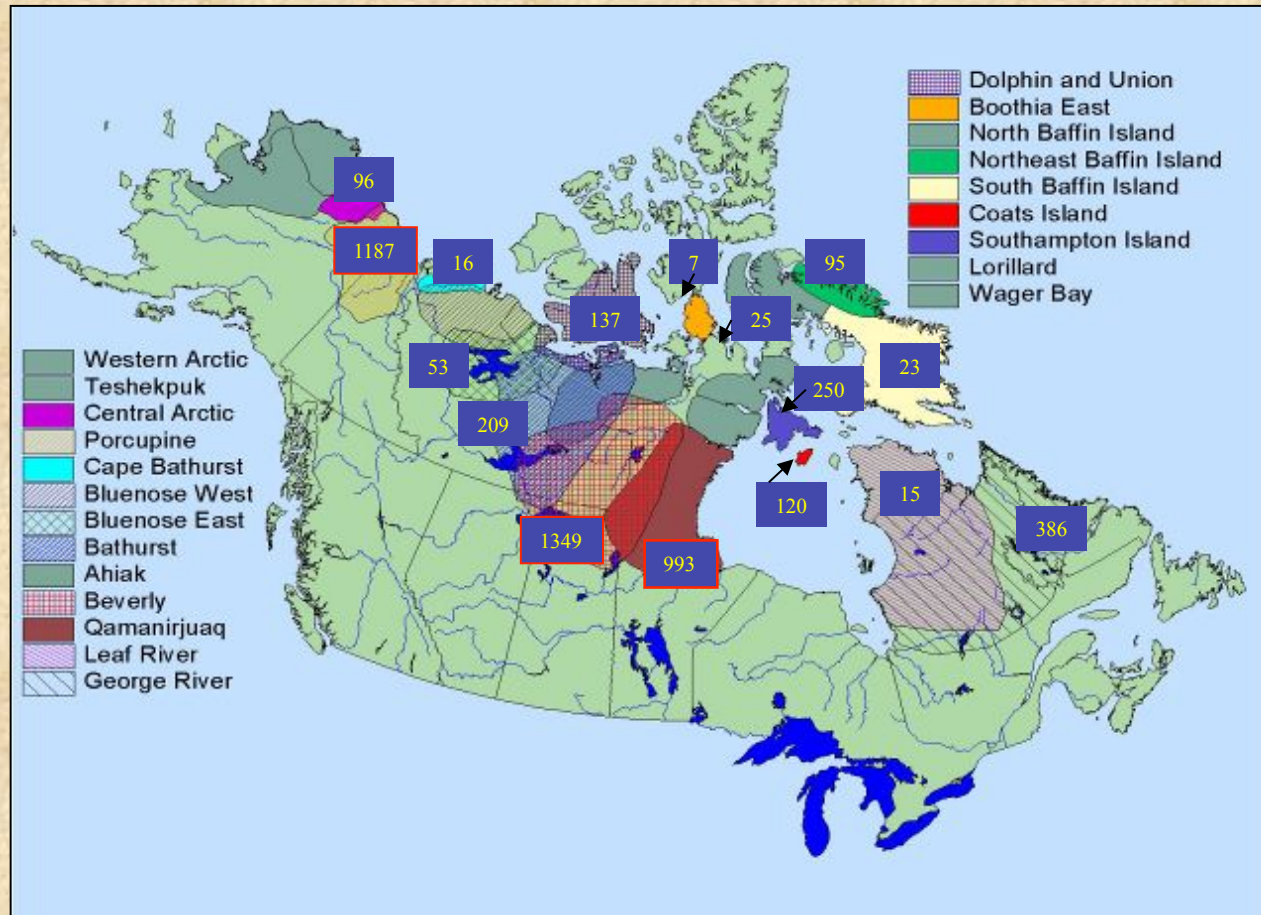
CARMA - Protocol development



CARMA presentation on use of body condition manual in Yakutsk, Russia, August 2007

..and also manuals to monitor habitat trends and population trends

CARMA - Data sharing



The North American body condition database
...internationally we have around 10,000 records

CARMA -Data Collection



...inventorying parasites, disease and food safety

CARMA – Synthesis tools

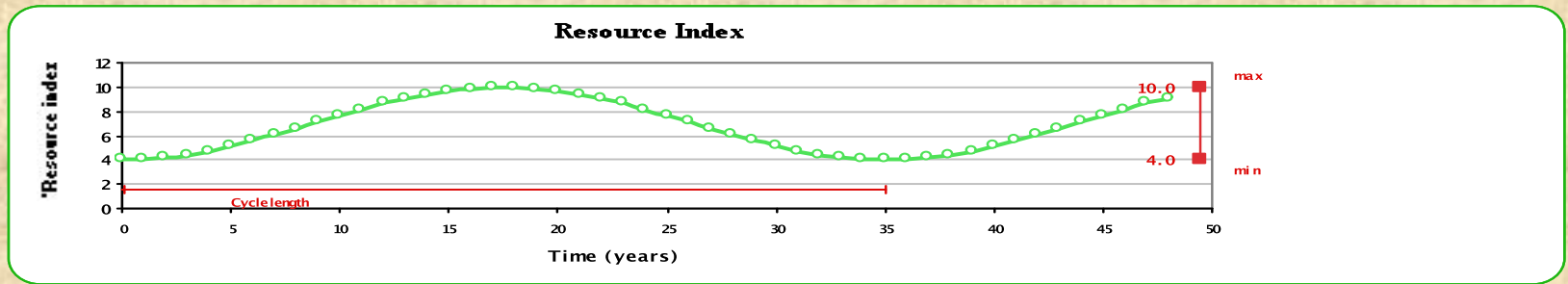
- **Energy-Protein Model** - A complex model that “grows” an individual caribou. Consists of a food intake sub-model and a nutrient (energy and protein) allocation sub-model. Is being used to examine the effect of climate change and development on caribou health and body condition.
- **POP Model** – when linked to the Energy-Protein Model, examines the effect of climate change and development on caribou herd productivity.
- **Caribou Calculator** – A simple population projection model that allows co-management groups to explore the implications of different harvest strategies on their herd.
- **Frame Size model** – A simple Model that is being used to examine the link between body size and caribou cycles. Combined with validation data will be used to develop a monitoring program to track where we are at different phases of the cycle.

CARMA – Frame Size model

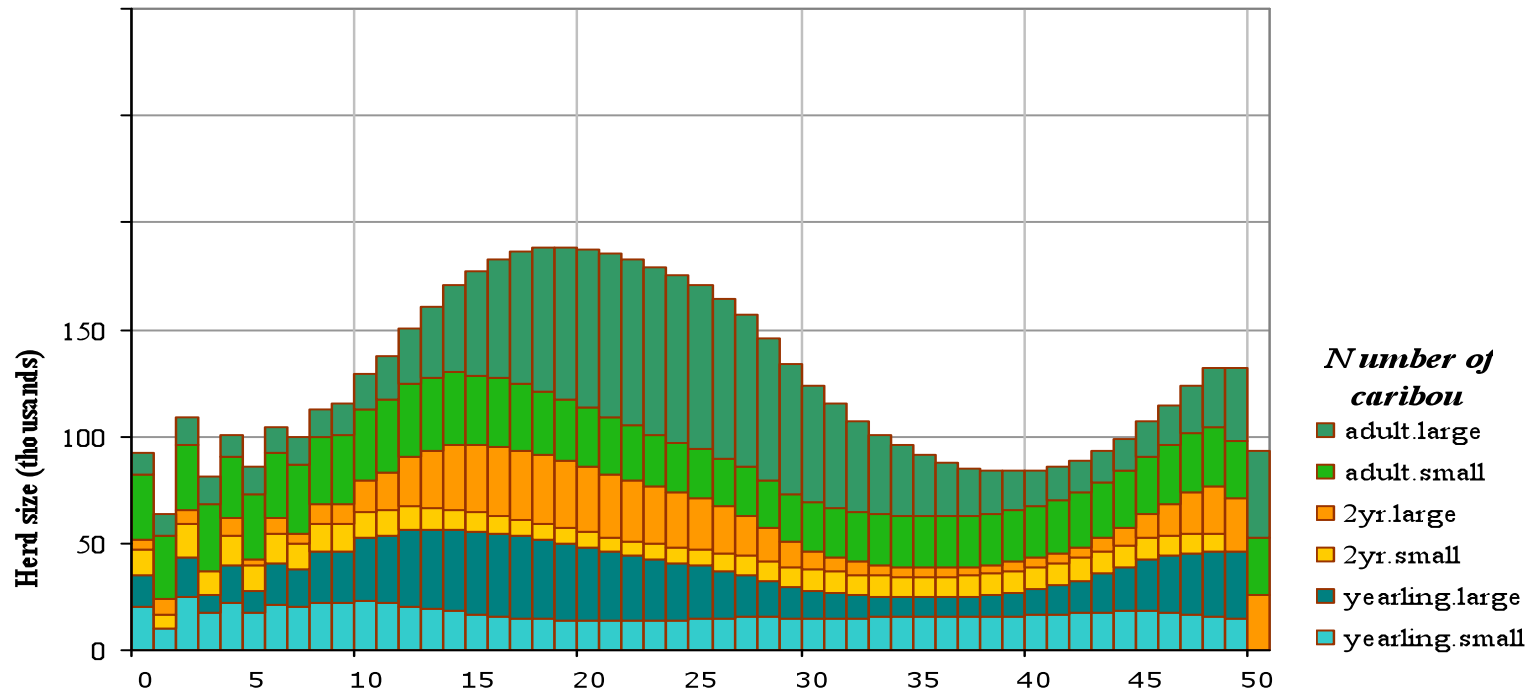
- Build a simple frame size model that incorporates our knowledge of caribou energetics and the links between energetics and productivity
- Explore changes in body condition at different phases of the cycle
- Use existing body condition database to validate model output
- Use the model output and validation to better understand caribou cycles and how to manage throughout the cycle

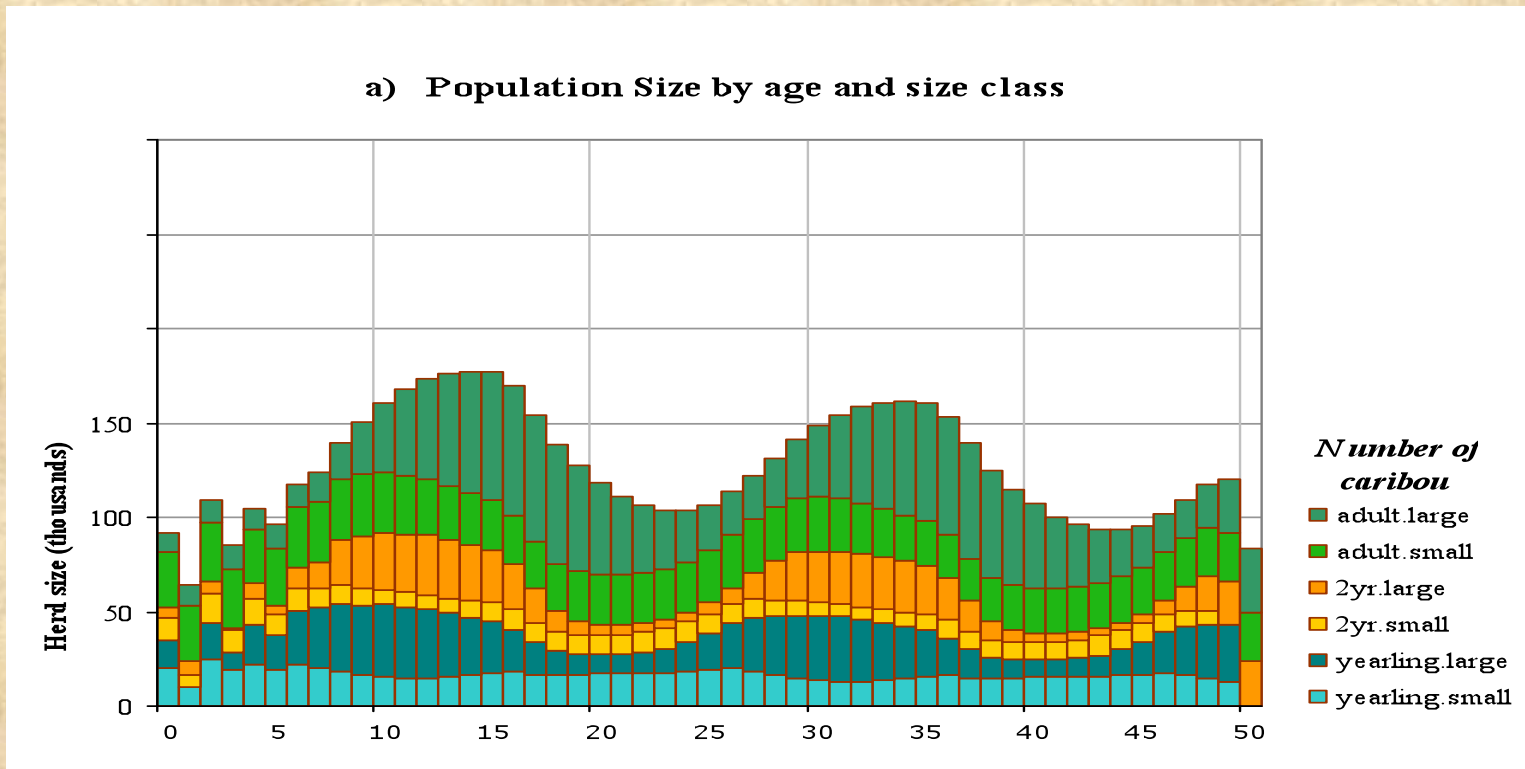
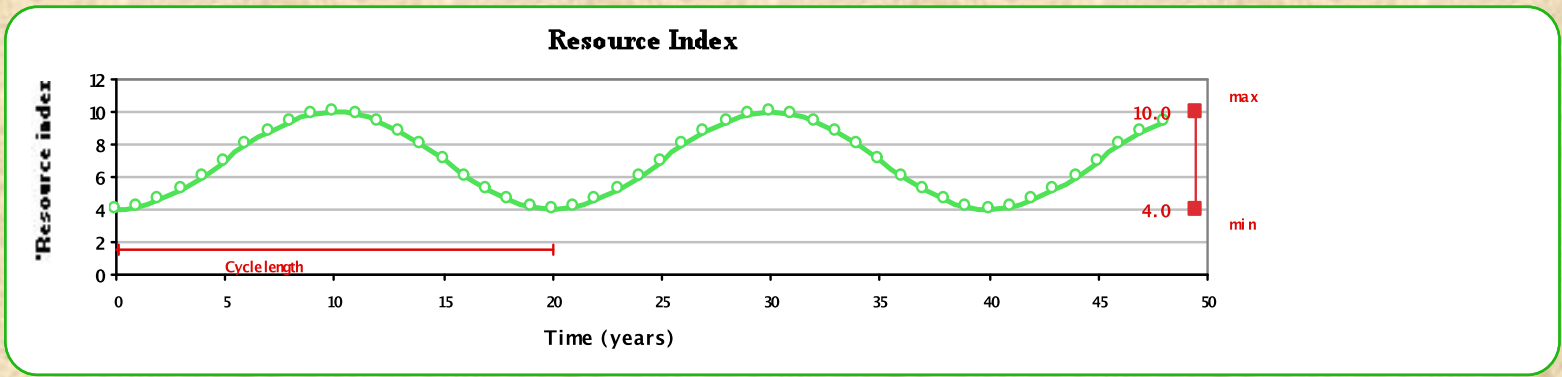
DOES SIZE MATTER?

- Build on the assumption that “size matters”
- (To save an hour) accept that when times are tough (energetically) it is better to be small bodied and when resources are plentiful it is more productive to be large bodied.

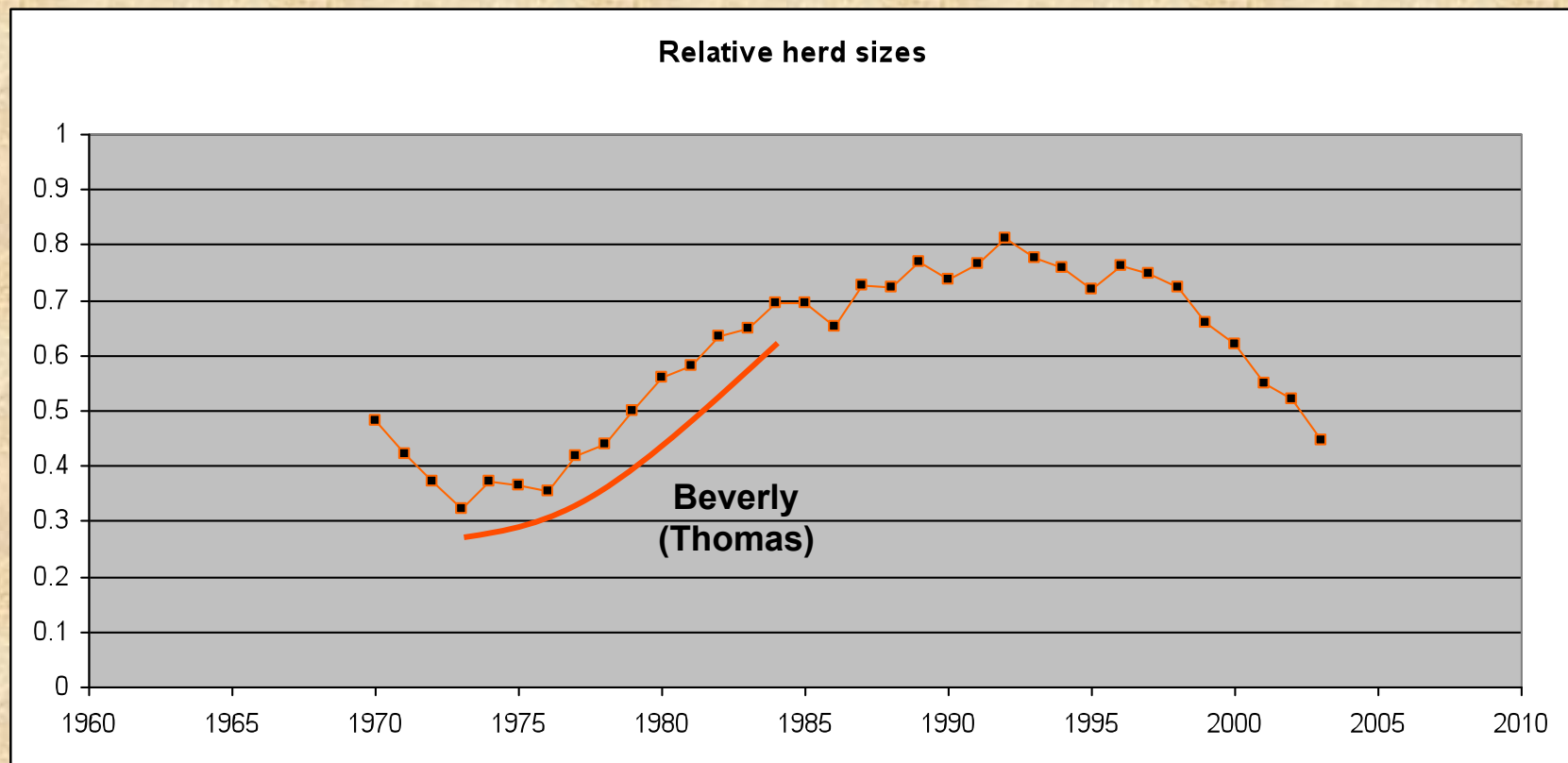


a) Population Size by age and size class

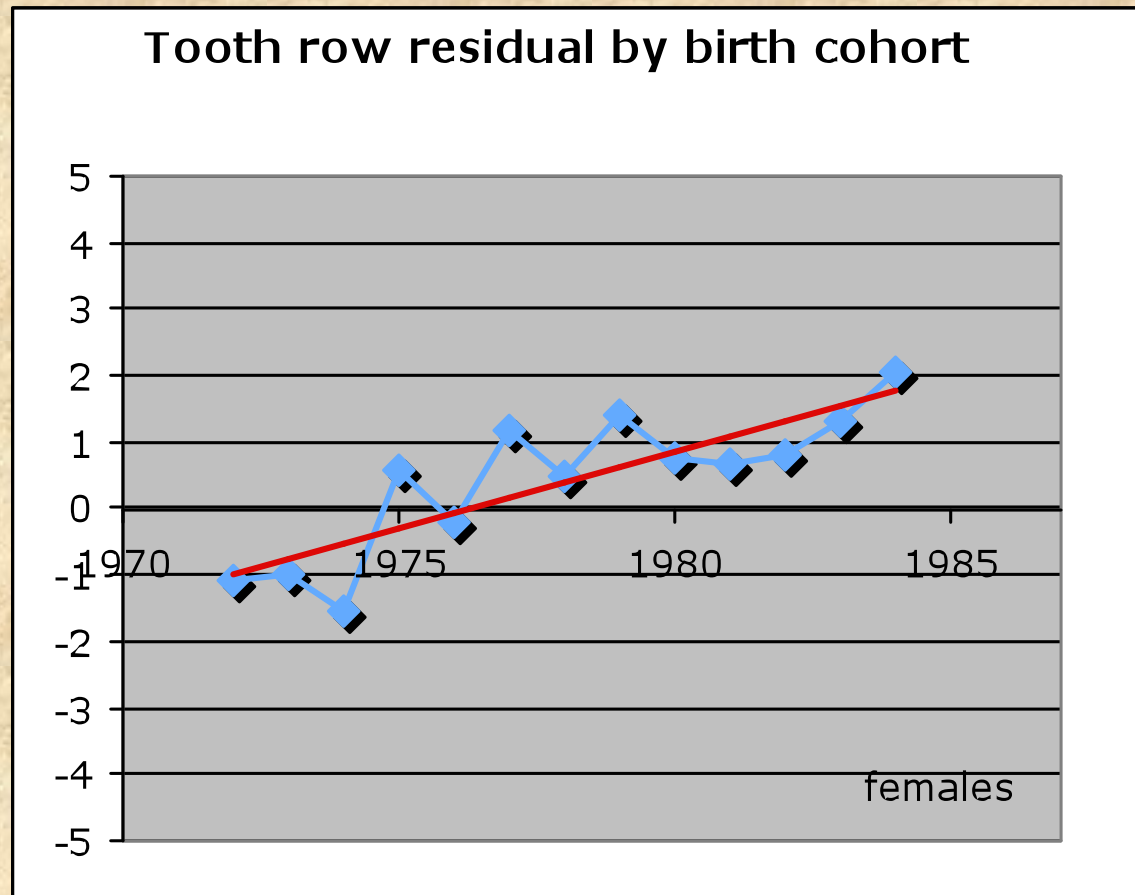




Validation data throughout the cycle



Beverly Herd tooth row residuals (when herd increasing)



??Questions to explore??

- What are the characteristics of frame size through the cycle?
- Can we use frame size monitoring as a predictor of cycle dynamics, ie predict where we are on the cycle?
- Do herds that cycle most dramatically (George River, Western Arctic), exhibit major differences in body size through the cycle, or conversely do herds that don't cycle dramatically (Porcupine) exhibit little variation in frame size?
- At what stage of the cycle does harvest/predation become a major limiting factor
- How does this help us understand the dynamics of caribou cycles, the vulnerability of caribou to global change drivers, and enable us to “manage abundance”?

