



# Beluga Whale Body Condition Indicators: Application for Use in a Marine Protected Area

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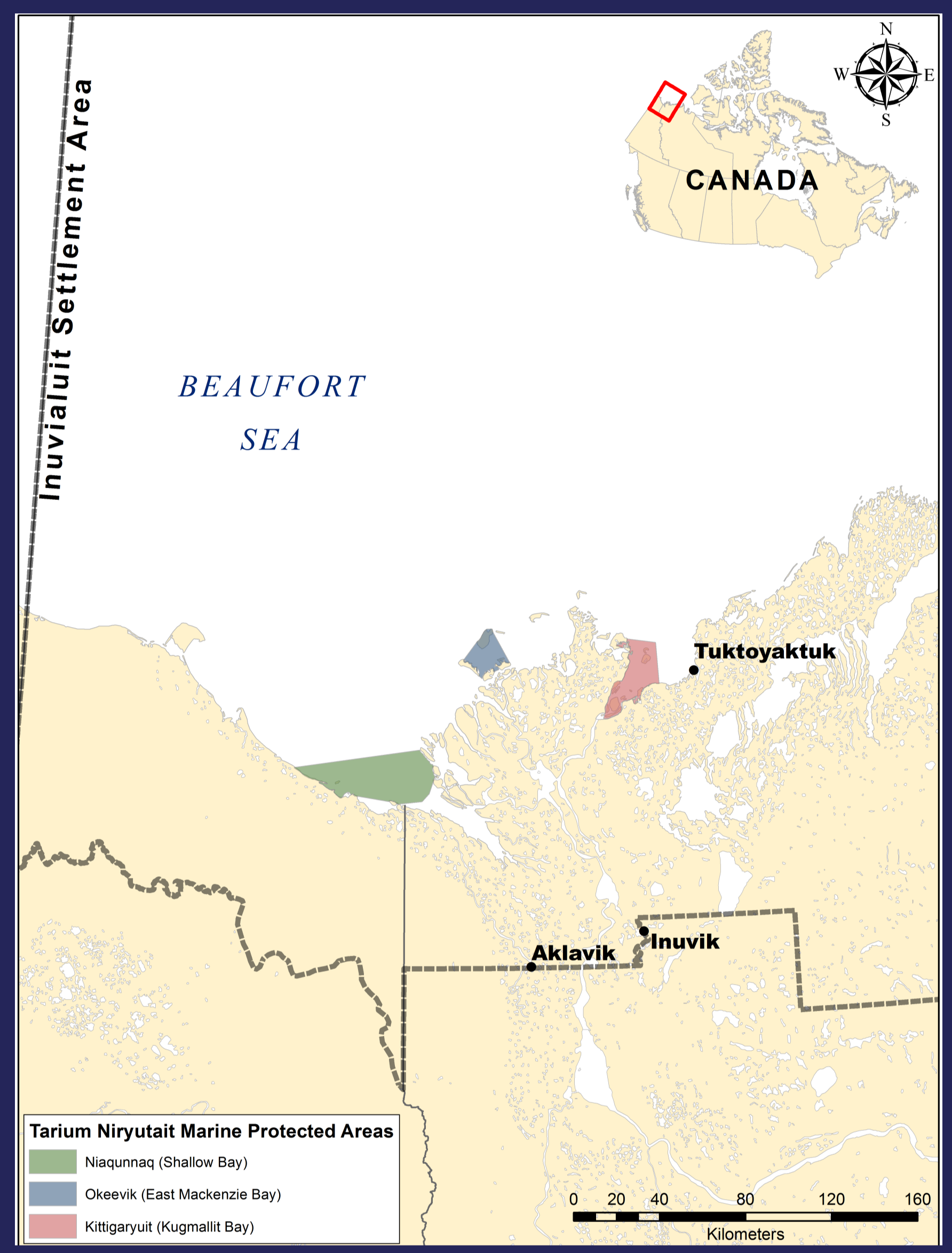
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## Canada's First Arctic MPA

The Tarium Niruyutait MPA (TN MPA) was established in 2010 within the Inuvialuit Settlement Region (ISR)<sup>1,2</sup>. Each summer, the Eastern Beaufort Sea beluga whale (*Delphinapterus leucas*) migrate to the waters of the TN MPA in the Mackenzie Delta<sup>2,3</sup>. This research project evaluates one of the proposed indicators used to monitor the TN MPA: beluga whale body condition, used to monitor beluga health<sup>1,2</sup>. Condition indices communicate shifts in the environment which affect the availability and quality of prey<sup>4</sup>.

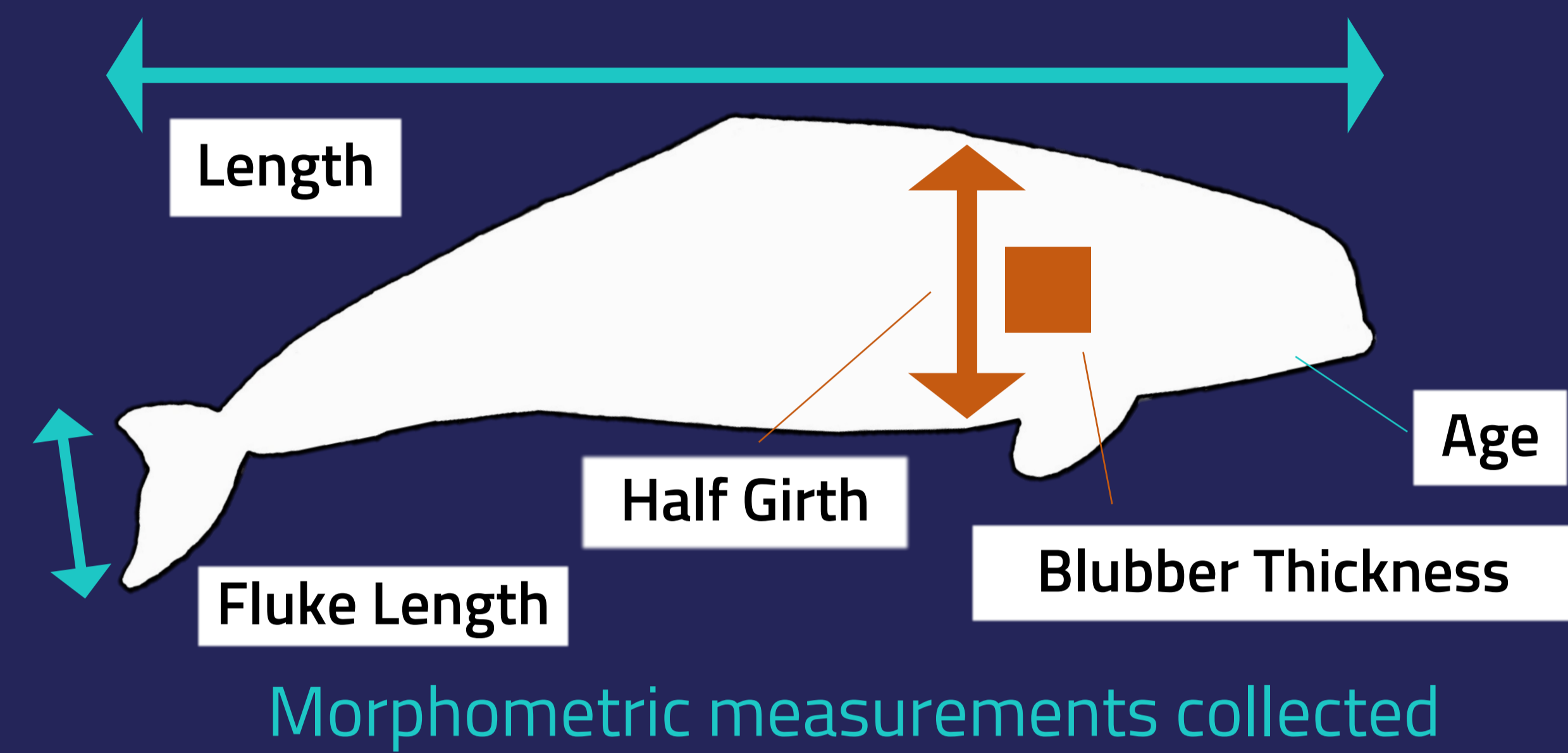


## Research Objectives

- Develop two beluga body condition indices (BCI) utilizing blubber thickness and half-girth metrics collected from harvested whales in the ISR.
- Quantify spatial trends in BCIs:
  - Is there variation in either BCI between the regions of the TN MPA?
  - Is there variation in either BCI of whales landed within and outside of the TN MPA boundaries?

## 1. Body Condition Indices

BCIs were developed using harvested whales from 2000-2015 (n=745). Linear models were selected using a stepwise approach based on Aikaikes information criteria and removal of correlated morphometric measurements.

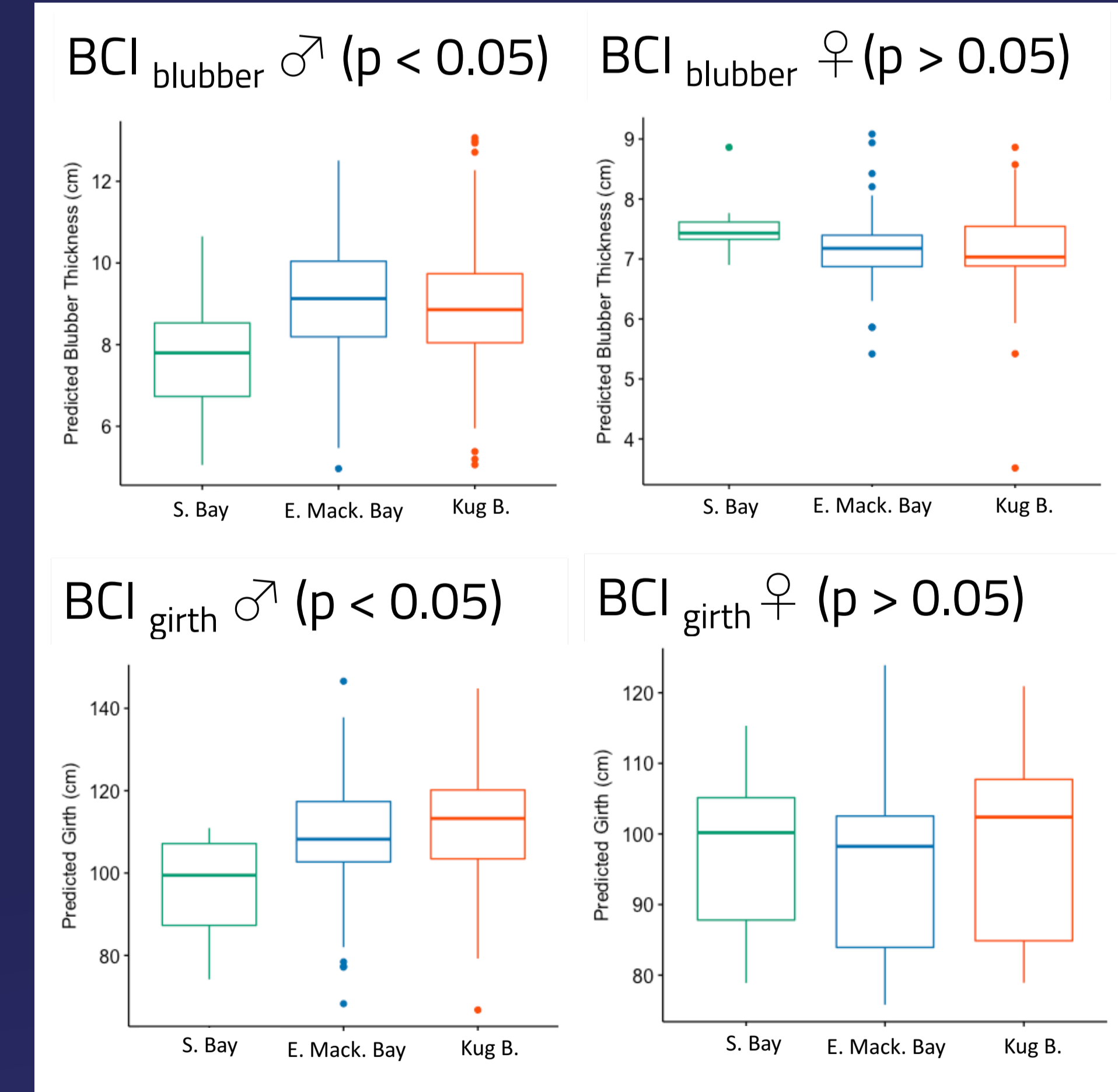


	♂	♀
BCI <sub>blubber</sub>	= YEAR + DAY OF YEAR + CAMP + LENGTH	= FLUKE LENGTH
BCI <sub>girth</sub>	= YEAR + CAMP + AGE + LENGTH	= YEAR + CAMP + LENGTH

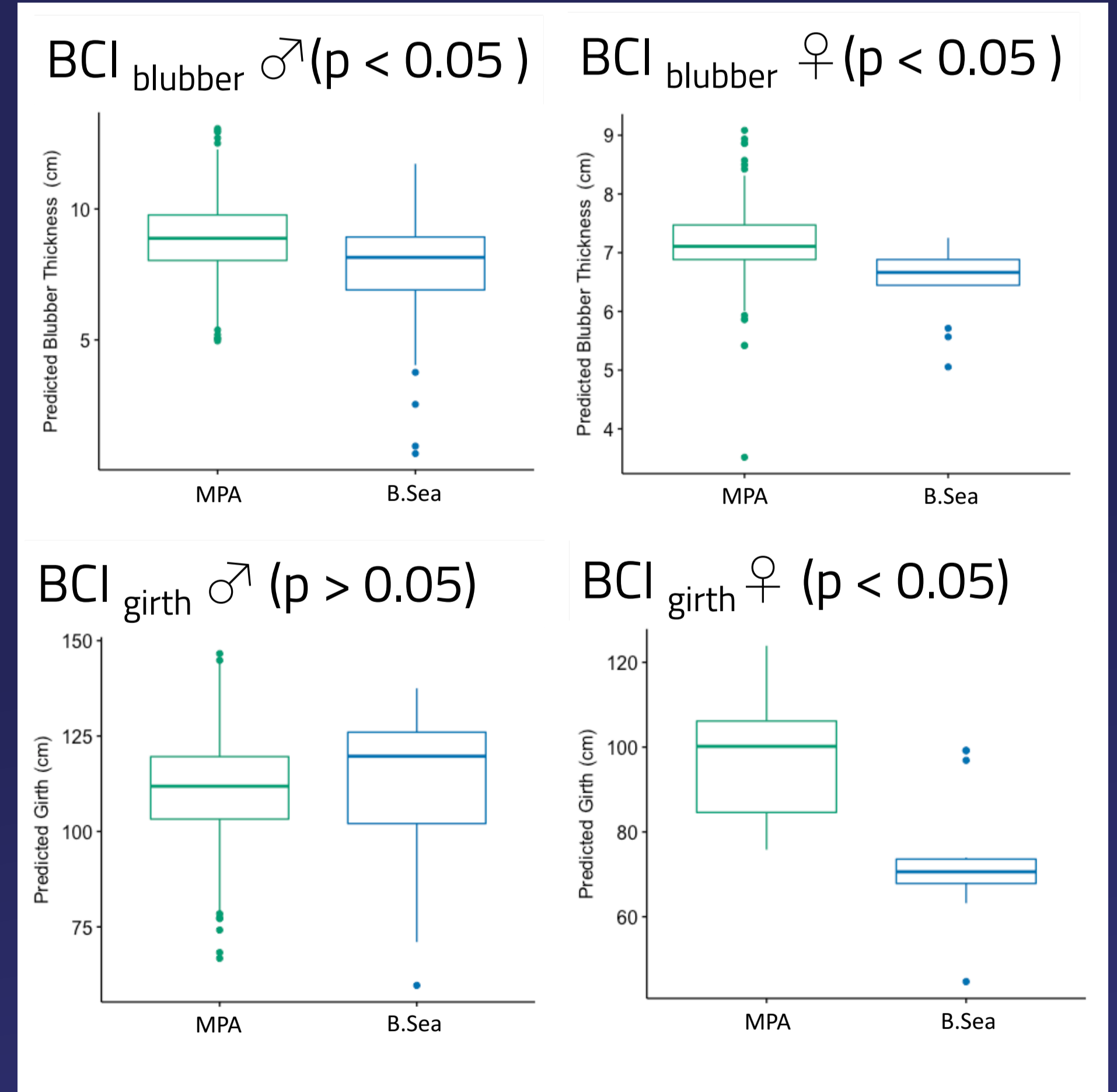
BCIs to be used in spatial and temporal analyses

## 2. Spatial Variation Results

A) Regions of the TN MPA



B) TN MPA and Beaufort Sea



- Differences in BCIs between locations (A & B) were tested using 1-way analysis of variance (ANOVA).
- Male whales harvested in the western TN MPA have significantly smaller BCI<sub>blubber</sub> and BCI<sub>girth</sub> compared to other two regions.
- Female whales harvested within the TN MPA have significantly larger BCI<sub>blubber</sub> and BCI<sub>girth</sub> compared to those harvested outside the TN MPA.

## Significance

There is spatial variation in whales harvested in the ISR for both BCIs. This is an important consideration in the next steps when quantifying temporal trends in BCIs and evaluating environmental drivers. Recommendations will be shared with managing agencies on use and application of BCIs for monitoring the TN MPA.

1) DFO and FJMC. 2013. Monitoring plan in support of Tarium Niruyutait Marine Protected Area Management Plan.  
 2) Loseto, L., et al. 2010. DFO Can. Sci. Advis. Sec. Res. Doc. 2010/094. vi + 47  
 3) Frost, K.J., and Lowery, L.F. 1990. Can. Bull. Fish. Aquat. Sci. 224,39-57.  
 4) Harwood, L. A., et al. 2015. Prog. in Ocean. 136, 263-273



## Thank you!

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