Canadian Beaufort Sea Marine Ecosystem Assessment (CBS-MEA)

Science in support of a changing Beaufort Sea ecosystem

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Multidisciplinary science team consisting of DFO, University and Community partners.

Program PIs
Bill Williams: Oceanography
Christine Michel: Primary Productivity, Marine Chemistry
Andrea Niemi: Zooplankton
Andy Majewski: Fishes
Maxime Geoffroy: Hydroacoustics
Ashley Stasko: Food web tracers
Phil Archambault: Benthos

Program developed in consultation with co-management partners: Inuvialuit Game Council, Fisheries Joint Management Committee, and community Hunter and Trapper Committees.

-Consultation
-Participation at sea
-Outreach, annual reporting

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Program Evolution

2012-2014: Beaufort Regional Environmental Assessment (BREA) – Marine Fishes project

- Oil & Gas offshore planning: BREA Tier 1 gap: offshore fishes.

Ecosystem approach, exploratory research.

2017-2019: Canadian Beaufort Sea Marine Ecosystem Assessment (CBS-MEA)

- Climate change/variability; subsistence food security, shipping; Ocean Management & Marine spatial planning; new stressors (e.g., microplastics, harmful algal blooms, invasive & colonizing species)
- Need for integrative science

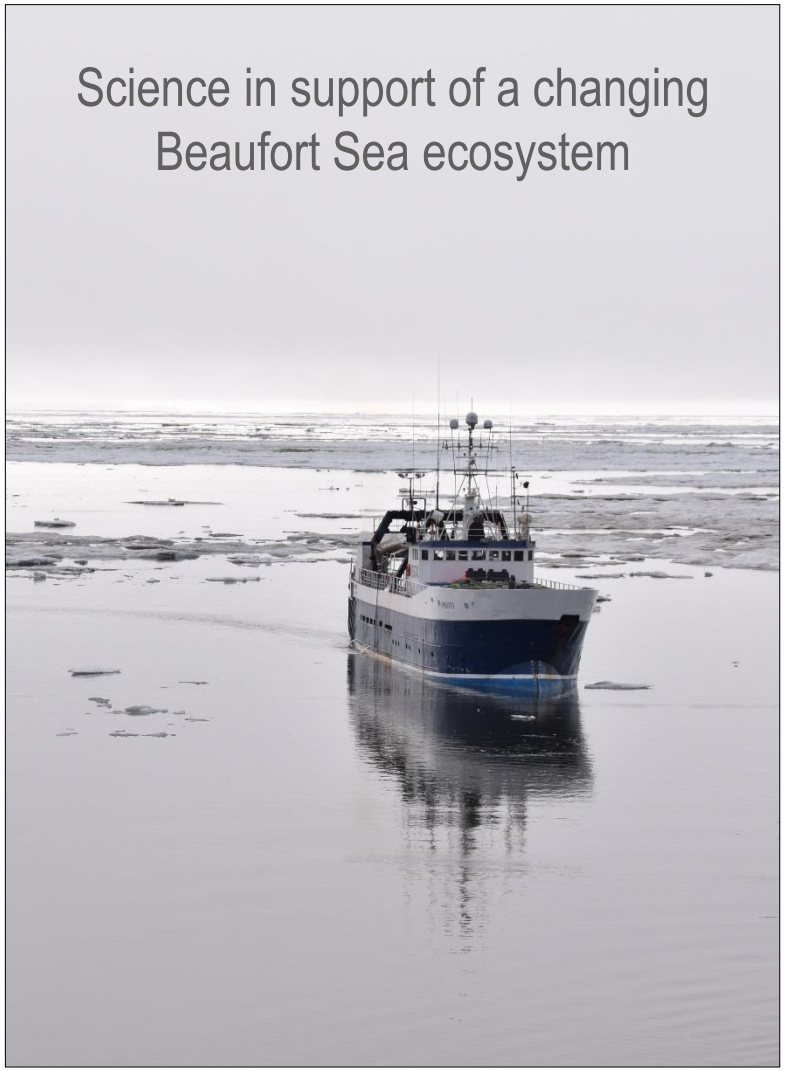
Canadian Beaufort Sea Marine Ecosystem Assessment (CBS-MEA) - Themes

Baseline understanding of the Beaufort Sea is limited. Basic research needed to assess effects of change in key areas.

Natural variability within Arctic ecosystems not known - limits ability to detect and measure change as well as infer causation.

Connectivity
-USA-Canada
-Beaufort-Archipelago-Eastern Arctic
-Offshore-coastal

Understand connectivity to predict & monitor the flow of stressors.



Program Goal

Generate science advice for co-management of the Beaufort Sea to conserve and protect its aquatic ecosystems and species from human impacts and to inform adaptation strategies for a shifting subsistence food base.

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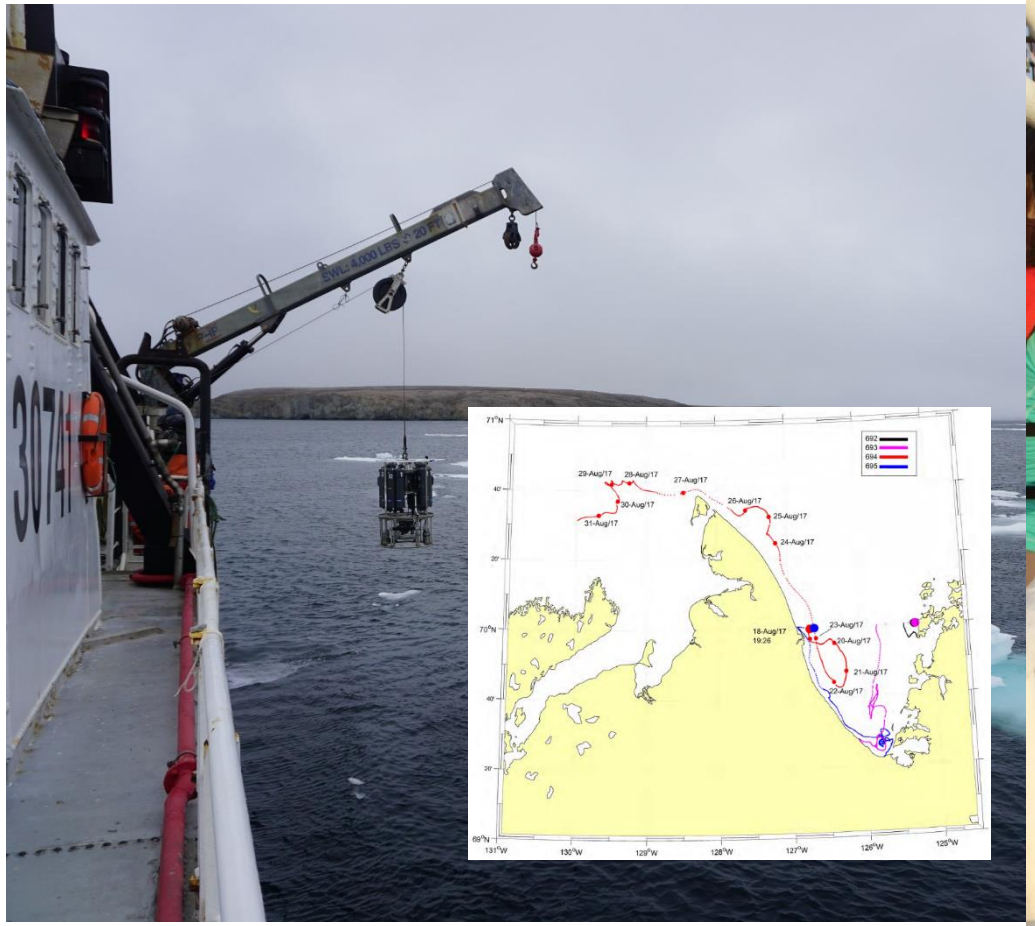

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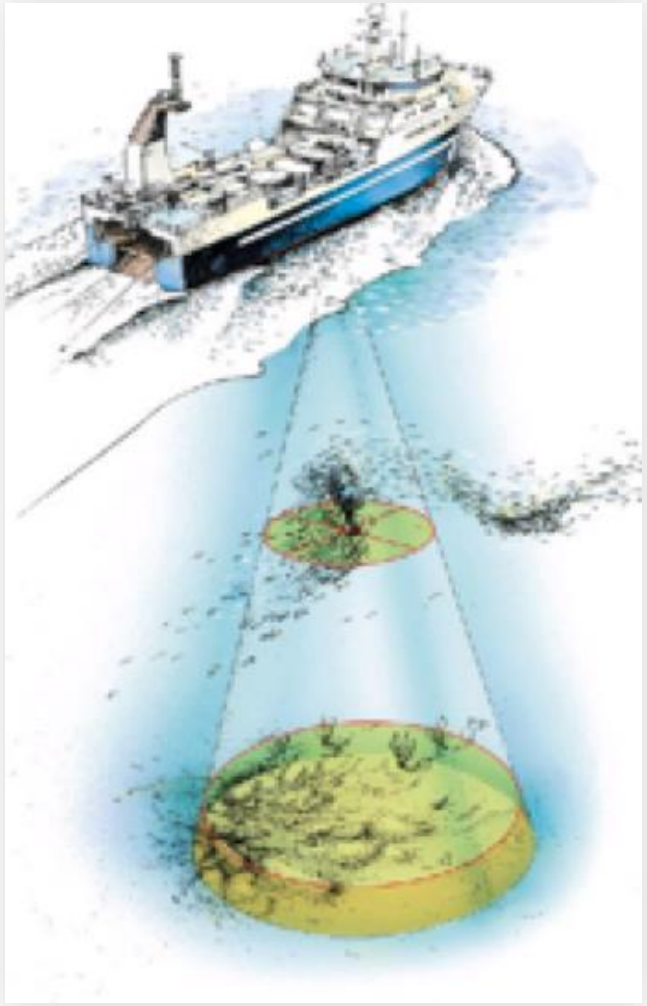

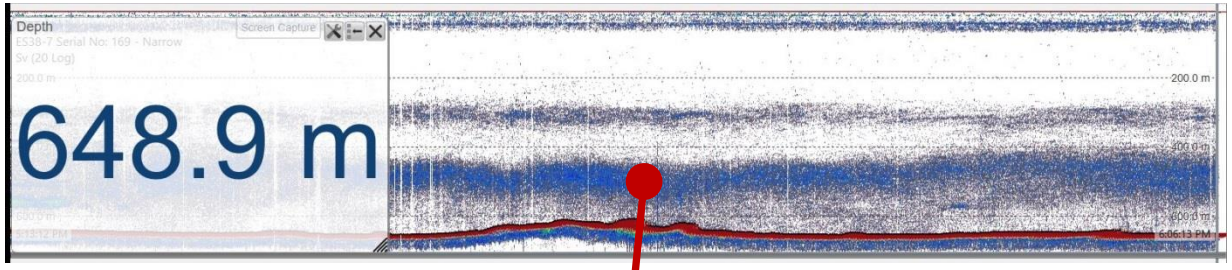

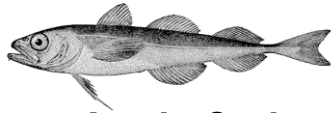

Arctic Cod

Copepods

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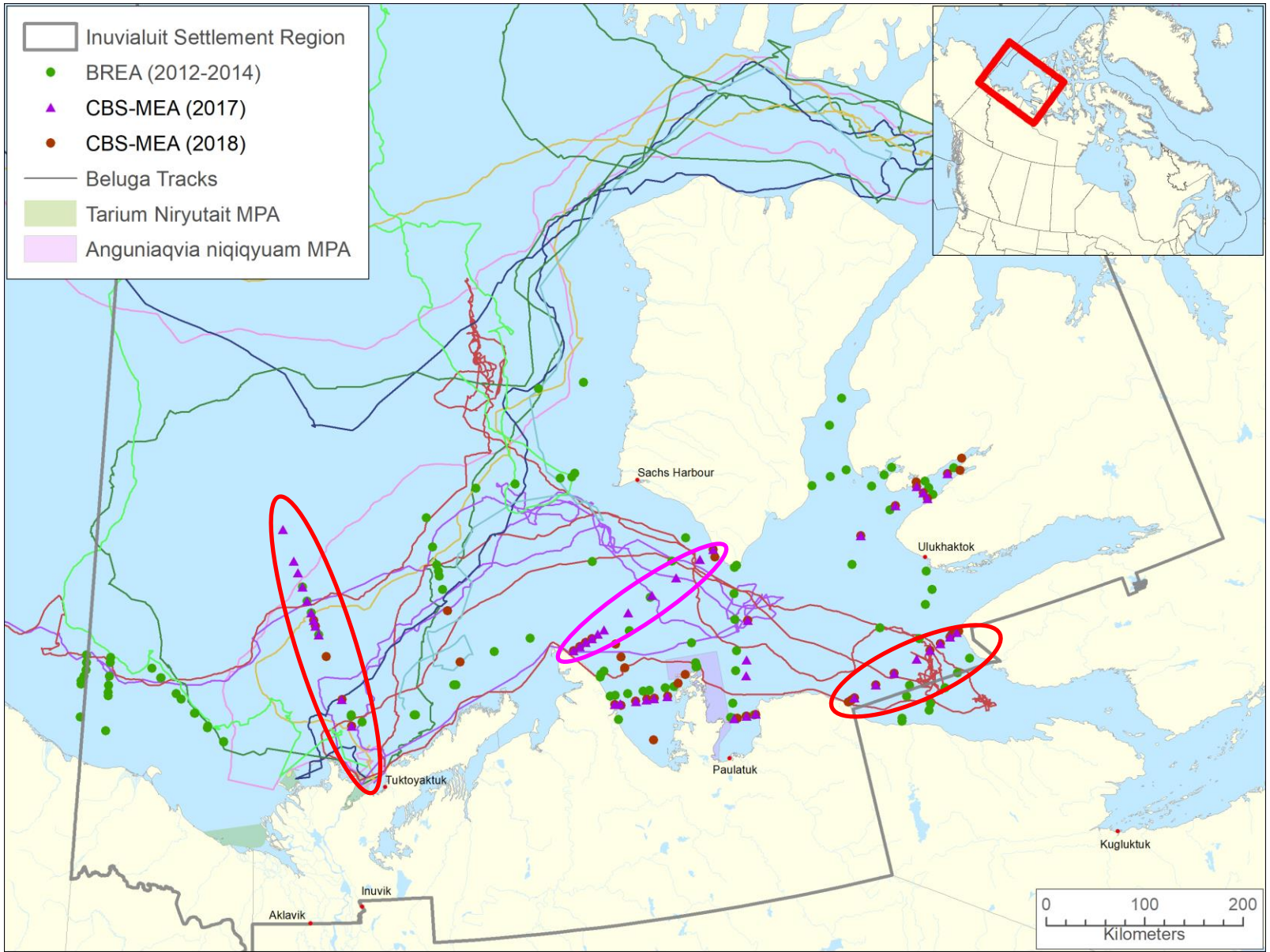
CBS-MEA: Spatial Integration



-Habitats: shelf, slope, basin, ice edge. 20 m to >1000 m depth

-Embayments. High abundance of fish and plankton. Spawning? Nursery? Exchange?

-Multi-year transects: gateways & boundaries

-Distributed Biological Observatory (DBO) – line 8 (Areas of high productivity, biodiversity or rates of change)

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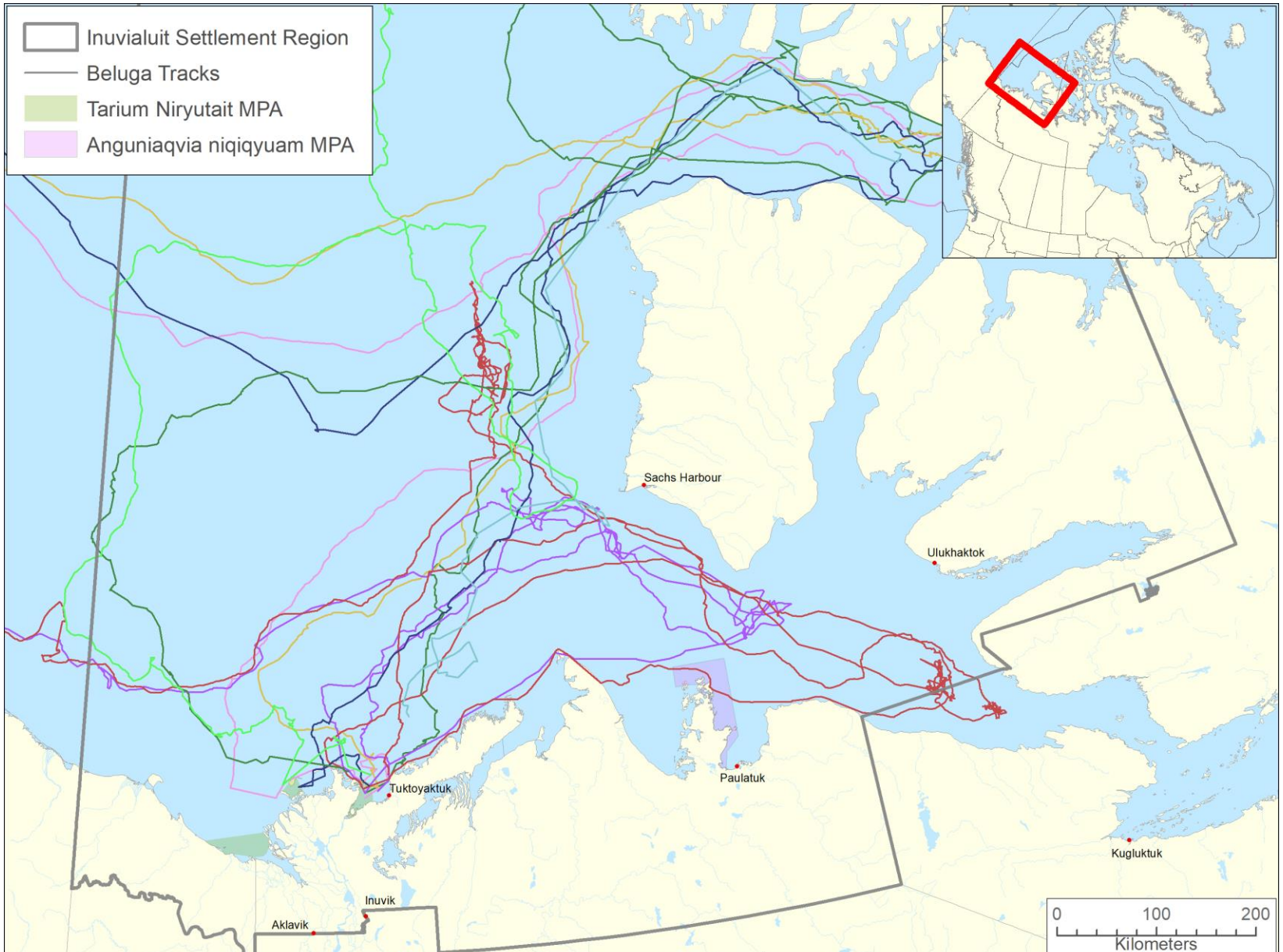
CBS-MEA: Spatial Integration



-Offshore habitat & food webs are critical to assess the security of key subsistence species.

-Integrate information from different programs.

2018 Beluga Tagging → CBS-MEA Dive site sampling

Beluga Community-based monitoring → CBS-MEA Food web biotracers

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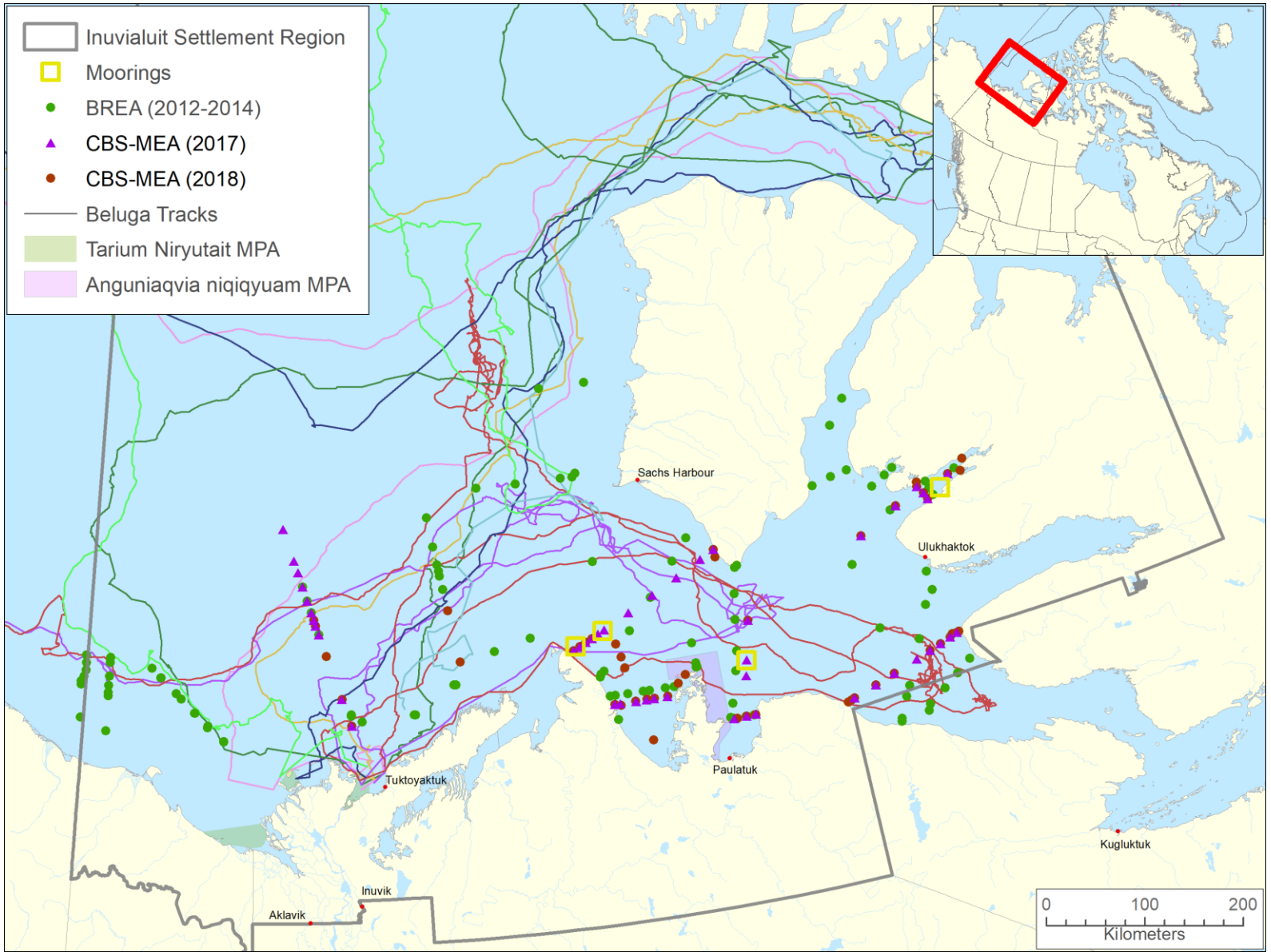
CBS-MEA: Temporal Scales of Integration



-Inter-annual variability.

-Summer snap shot. Need full year data.

“Biological moorings”
-active acoustics: fish and zooplankton (AZFP)
-hydrophones: noise & marine mammals
-receivers (fish tagging)
-temperature/salinity

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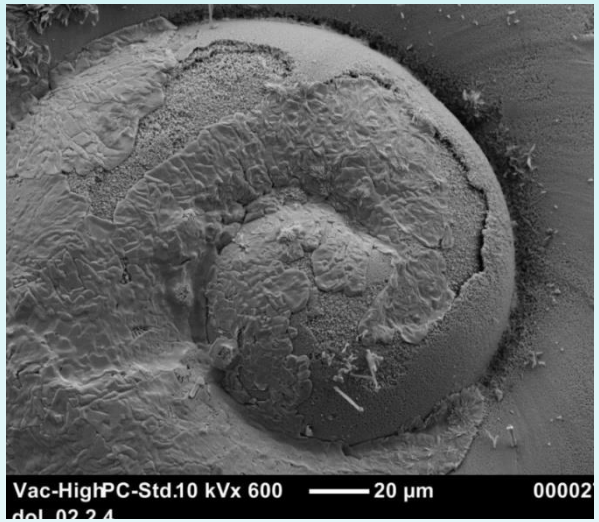
Canadian Beaufort Sea Marine Ecosystem Assessment (CBS-MEA)

- **Science advice [BREA-MFP ⇨ CBS-MEA]:** Comprehensive marine fish assessment for the Canadian Beaufort Sea. >20 DFO advisory processes/documents, >30 primary publications. Integration/synthesis: State of the Arctic Ocean Report, Beaufort Regional Strategic Environmental Assessment.
- **Indicator species, critical habitat**
  - Arctic cod distribution, diets, genetics
  - Pteropods (pelagic sea snails)
  - Beluga prey base, off-shore habitat
  - Location/stability of ecosystem hotspots



- **Climate Change**
  - Ocean acidification affects
  - Ecosystem Structure (biodiversity) and Function (food-web dynamics)
  - Inter-annual system variability
- **Regional/International stressors**
  - Oil & gas leases
  - Shipping corridors
  - Central Arctic Ocean (CAO) Fisheries (Beaufort LME)

Canadian Beaufort Sea Marine Ecosystem Assessment (CBS-MEA)

Provides multidisciplinary data sets that can be used to establish relationships among the biological, chemical and physical variables- support for predictive models. (different scales of space & time)

Provide advice to mangers & co-partners: ocean activities & development, conservation-MPAs, cumulative effects, monitoring activities & methods.

Program Strengths

- Support of co-management partners
  - Ecosystem approach
- Trawling capacity
- Ecosystem integration
- Program integration

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Thank you!

Questions

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