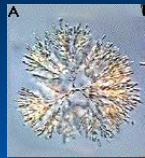


Assemble Biological Data and Traditional Knowledge Needed for Net Environmental Benefit Analysis for Beaufort Sea Oil Spill Response Planning



BREA FORUM
Inuvik, NWT
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Ken Trudel
S.L. Ross Environmental Research

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Introduction

Beaufort Sea NEBA Data Project Tasks

1. **Identify Key Species/Components and Protection Priorities of Beaufort Communities (Today)**
2. **Prepare Oil Spill Vulnerability Databases for Key Ecosystem Components and Community Activities, including Traditional Knowledge (Today)**
3. **Prepare an Example NEBA for a typical Beaufort Sea Spill Scenario**
4. **Summarize new information about spill impact, fate and toxicity of oil, dispersed oil, burn-residue and soot in Beaufort**
5. **Prepare plain-language report and identify knowledge gaps**

Introduction

Approach to Spill Vulnerability Databases:

1. Assemble data on Canadian Beaufort Sea (CBS) ecosystem needed for Net Environmental Benefit Analyses (NEBAs) for oil spill response planning.
2. Identify key components of CBS Ecosystem that must be included in NEBAs.
3. Assemble existing data on oil spill vulnerability of key ecological and harvest components using existing TK and scientific studies.
4. Verify/update data and fill gaps through TK workshops.
5. Prepare one example NEBA based on a realistic CBS spill scenario to illustrate use of NEBA.
6. Prepare plain-language report on database, identifying gaps.

Introduction

Beaufort Sea NEBA Data Project

- Workshop #1 Inuvik, NWT March 18, 2012
- Workshop #2 Inuvik, NWT December 15, 2012
- Workshop #3 – To be determined
- Desk study – Ottawa, December 2011 – March 2013

Identifying Key Components for NEBA

Identify Key Components and Protection Priorities of Beaufort Communities

Identifying Key Components for NEBA

Approach to species selection:

- Species selection criteria and lists discussed in workshops
- Criteria include:
 - Most important harvest species for each community (Harvesting Study 2003)
 - Species critical for ecosystem function (e.g., phytoplankton, cod, ringed seal, etc)
 - Protected species (Species at Risk Acts) (If possible)

Identifying Key Components for NEBA

Species recommended in workshops

Mammals	Birds	Fish	Critical Ecosystem Components
Caribou, Dolphin/Union* Beluga* Seal, Ringed* Seal, Bearded* Polar Bear*	King Eider* Goose, Snow* Scoter, White-winged, Surf* Scaup, Greater/Lesser* Merganser (Red-crested ?)* Tundra Swan* Goose, Canada* Goose, Great White-fronted* Goose, Brant*	Herring, Pacific* Cisco, Least* Cisco, Arctic* Whitefish, Broad* Charr / Dolly Varden* Inconnu* Burbot* Cod (Boreogadus saida)*	Phytoplankton@ Benthic invertebrate@
* Workshop #1 @ Workshop #2			

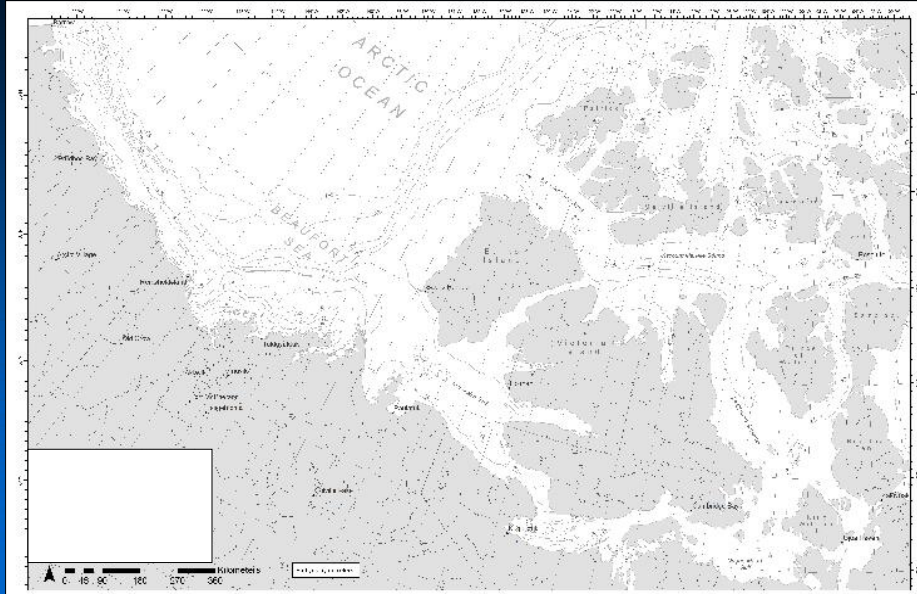
Identifying Key Components for NEBA

Components analysed to present

Mammals	Birds	Fish	Critical Ecosystem Components
Caribou, Dolphin/Union* Beluga* Seal, Ringed* Bearded Sea* Polar bear*	King Eider* Goose, Snow* Goose, Canada* Goose, Great White-fronted* Goose, Brant*	Whitefish, Broad* Charr / Dolly Varden* Cisco, Arctic* Herring, Pacific* Cod (Boreogadus saida)*	Phytoplankton@ Zooplankton (Calanus spp)

Prepare Oil Spill Vulnerability Databases for Key Components and Community Activities

Study Area



Component Spill Vulnerability Databases

□ Background

- **Databases useful in estimating spill impact quantitatively**
 - Helps assessing risk more accurately
 - Useful in choosing spill countermeasures (mechanical, in-situ burning, shoreline cleanup) (NEBA)
 - Include maps of showing seasonal distribution and clumping of species
 - Species maps interacted with spill trajectory to yield impact estimate
- **Very important**
 - While oil spill impact is relatively localized and temporary
 - Many arctic species clump together in small areas at certain times of year making them highly vulnerable to some spills
- **What information needed**
 - Community harvesting and species ecological data
 - Geographic distribution in Beaufort Sea
 - Geographic clumping and locations
 - Seasonal changes in distribution
 - Degree, location and timing of use of marine and coastal areas

Component Spill Vulnerability Profiles

Example: Beluga whales

Sources of Information

- Beaufort Sea Community Conservation Plans
- Inuvialuit Harvest Study (2003)
- Beaufort Sea Management Plan (FJMC 2001)
- COSEWIC Beluga Assessment Report (2004)
- BP Resources Traditional Knowledge Study (2011)
- Many, many scientific publications



Component Spill Vulnerability Profiles

Example: Beluga whales

Reason for inclusion: Harvested by many communities, common whale species in CBS

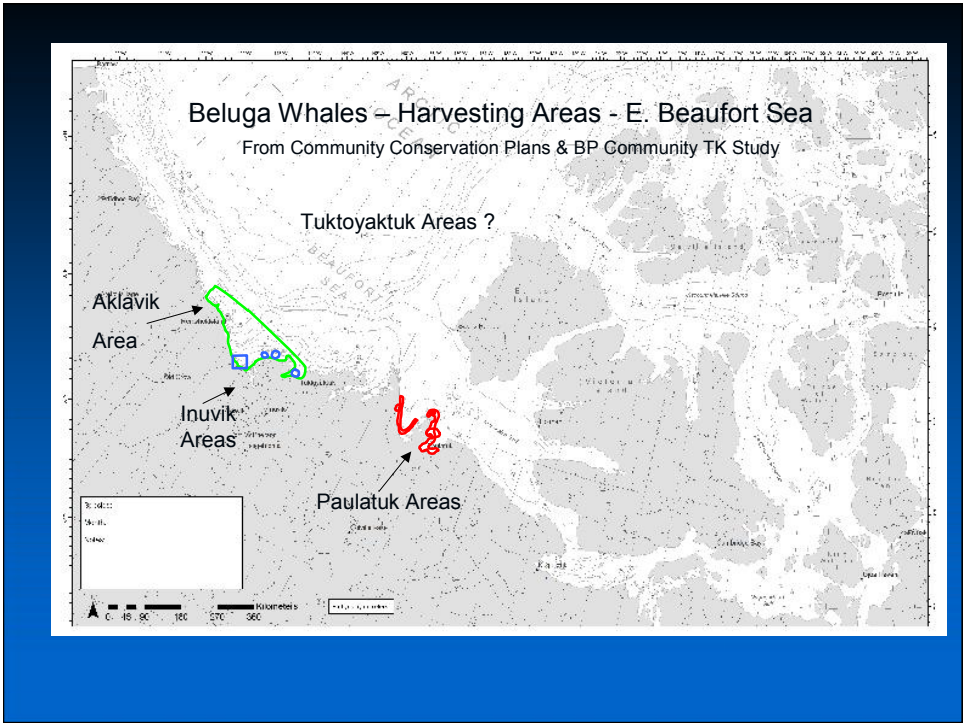
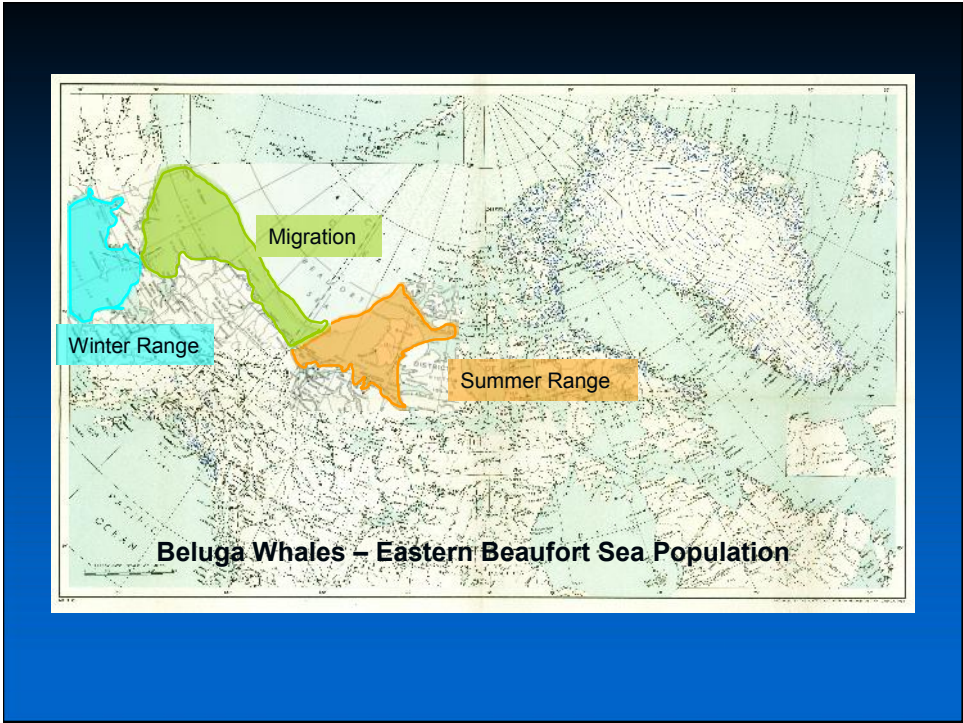
Population(s) Described – East Beaufort Sea Population, genetically distinct (39,000 individuals)

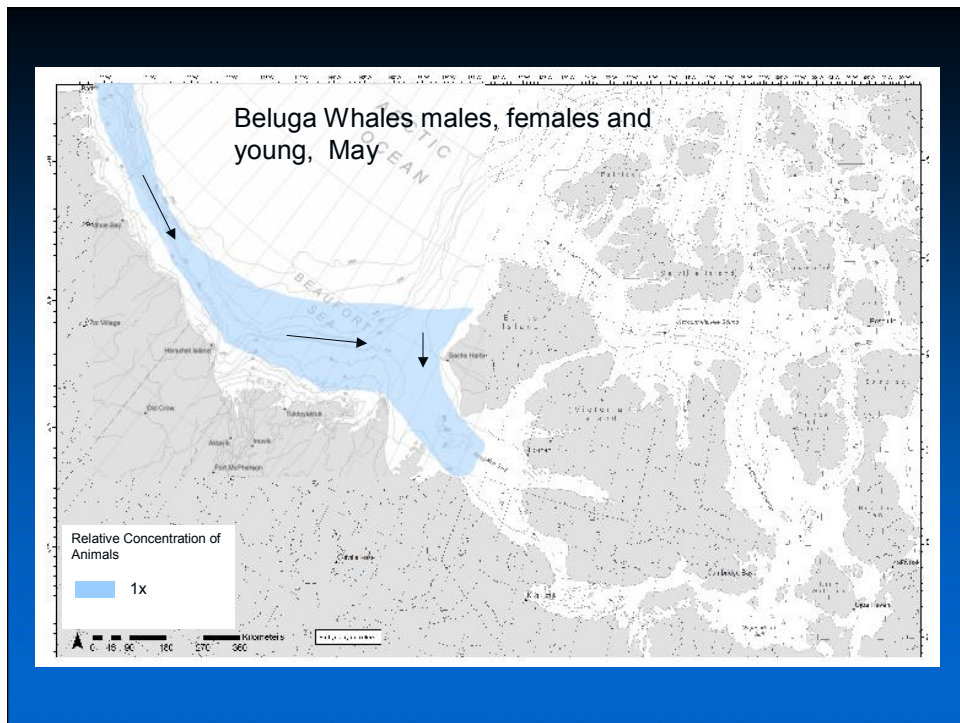
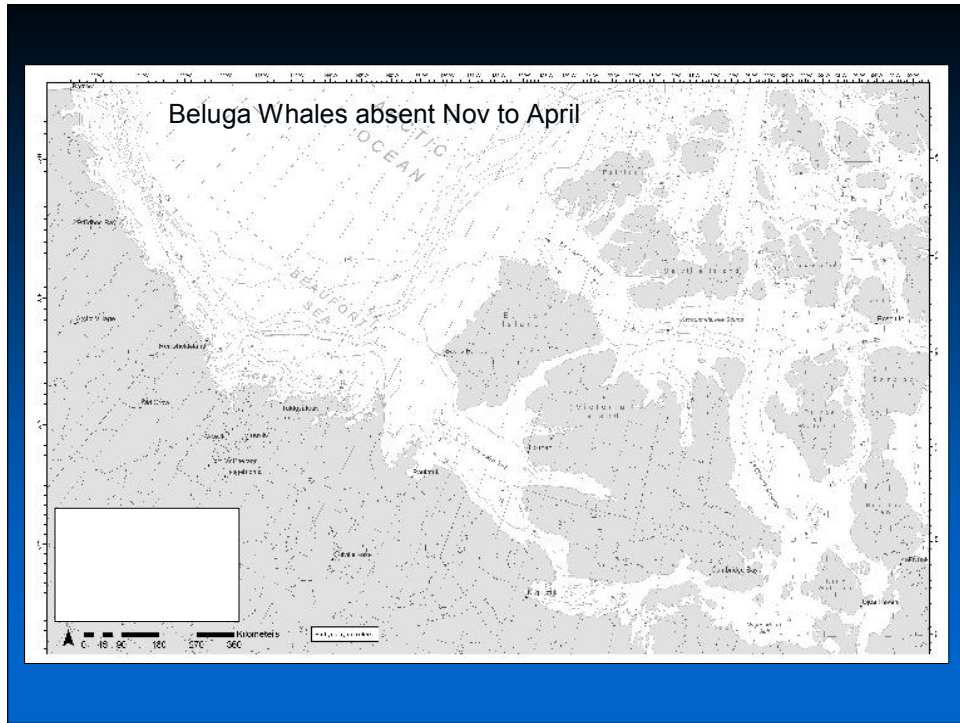
Harvested - Aklavik, Inuvik, Tuktoyaktuk, Paulatuk in Jul, Aug, Sep

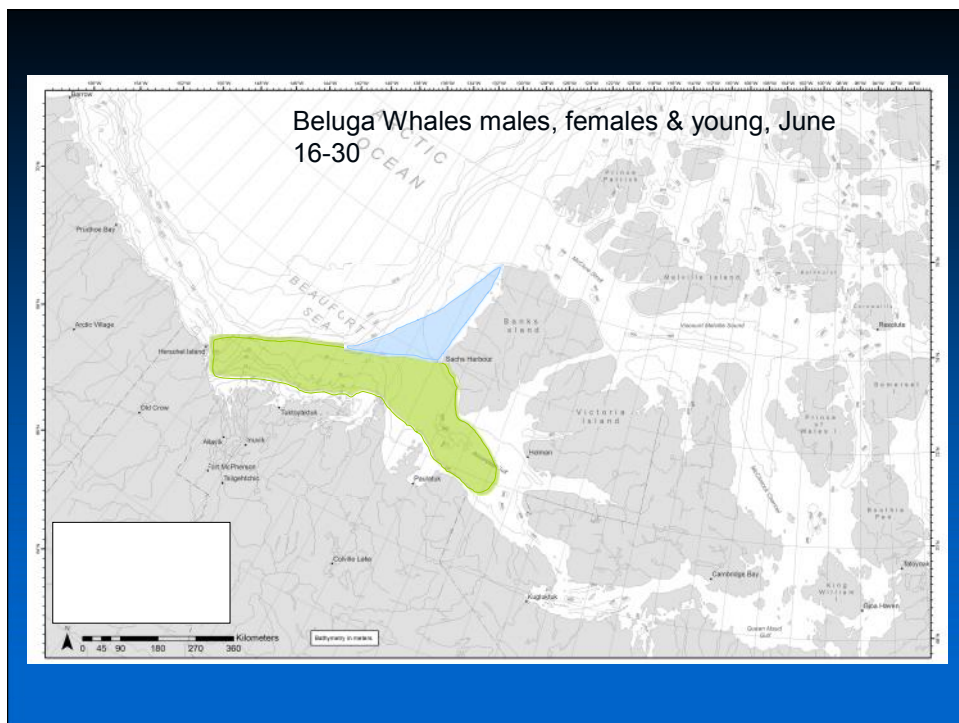
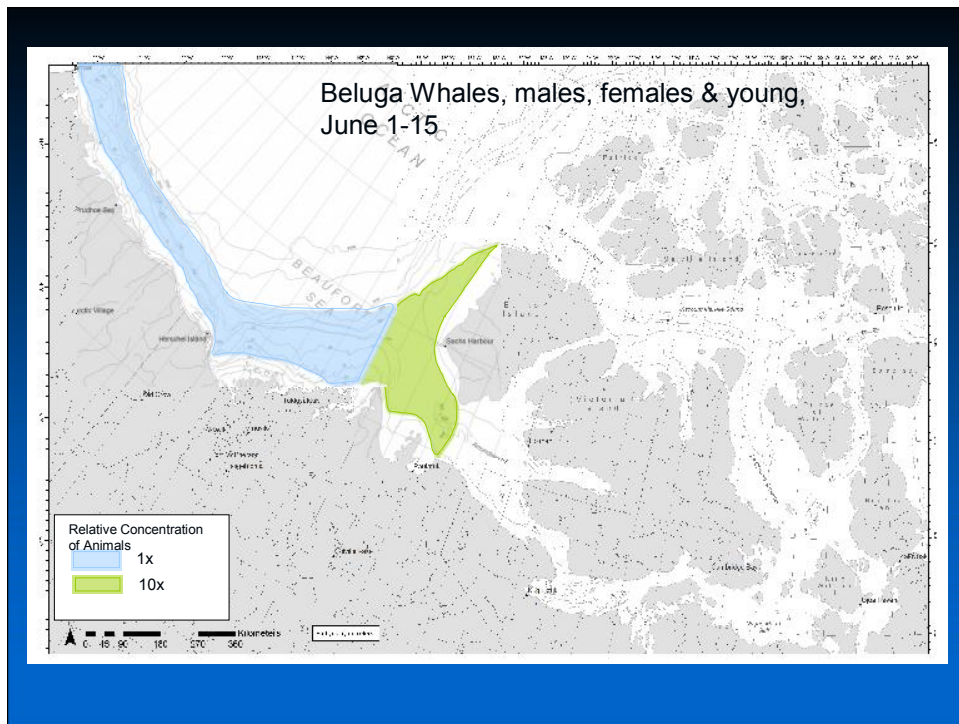
Present in CBS - May to October, winters in Bering and Chukchi Seas

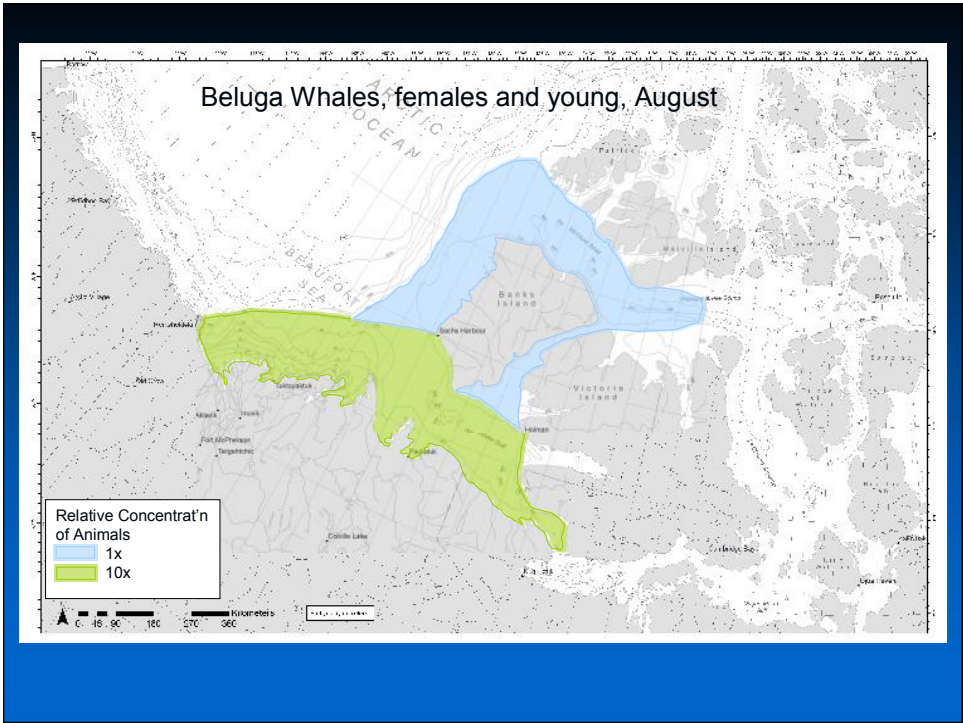
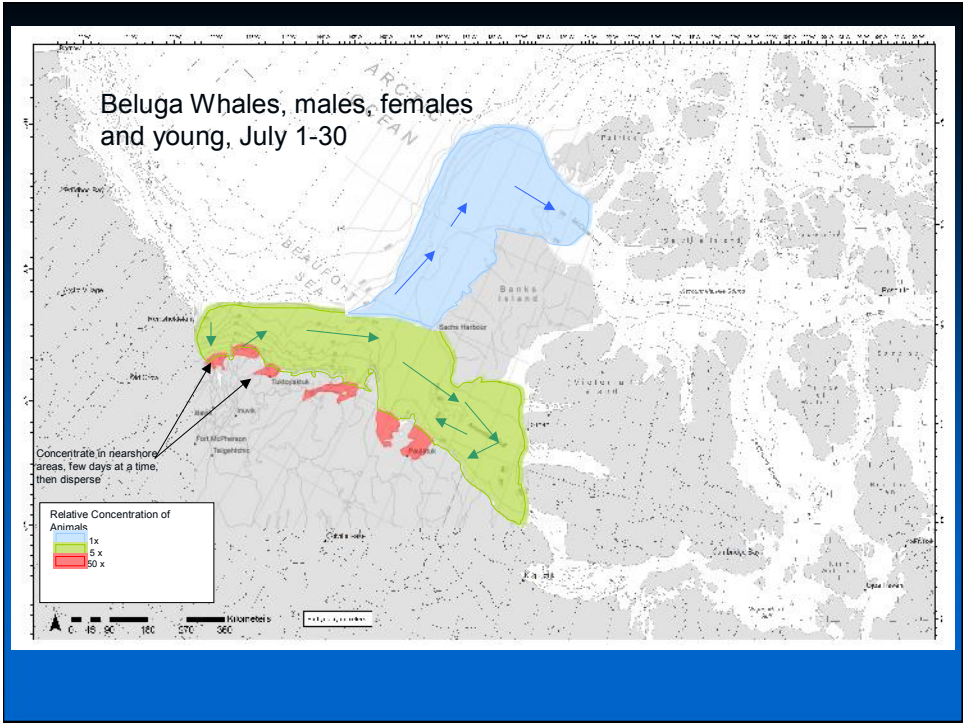
Spatial Distribution (Seasonal)

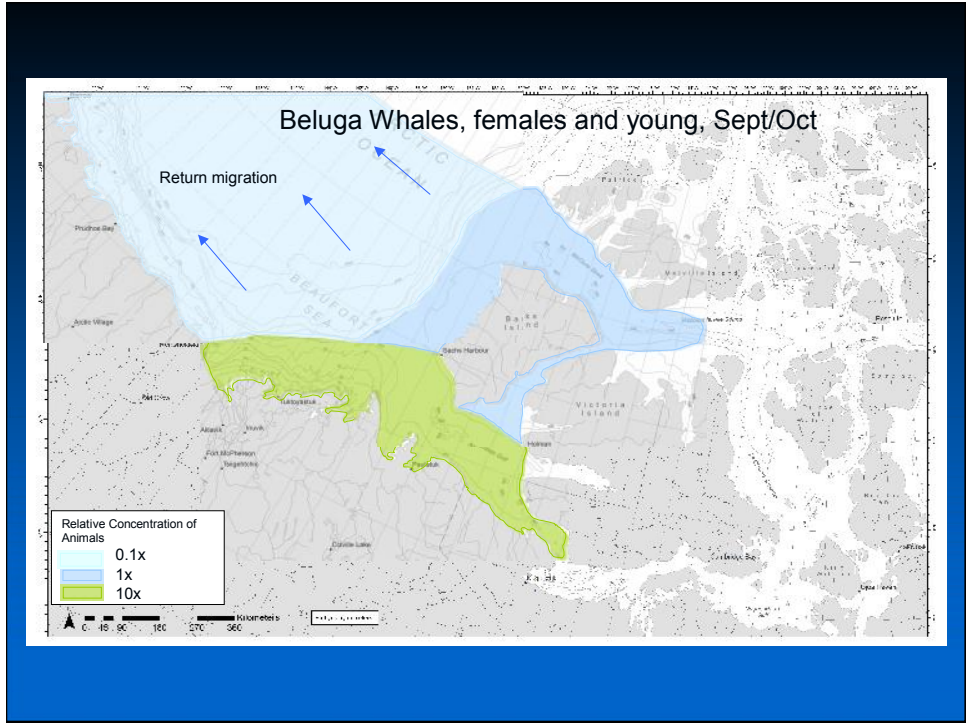
- See Maps
- Concentrations shown are relative concentrations in areas indicated
- Concentrations used with oil spill data to yield estimates of impact











Component Spill Vulnerability Profiles

Example: Beluga whales

Note: The impact of an oil spill is estimated by overlaying the area contaminated by oil versus the distribution of the resource at the time of the spill (i.e., Beluga Whale)

Component Spill Vulnerability Profiles

Example: Phytoplankton

Reason for inclusion: One critically important source of energy for Beaufort Marine Ecosystem, very highly clumped in space and time

Population(s) Described – Beaufort Sea System

Harvested – N/A

Present in CBS – All carbon fixation May to Sept, peaking in July

Spatial Distribution

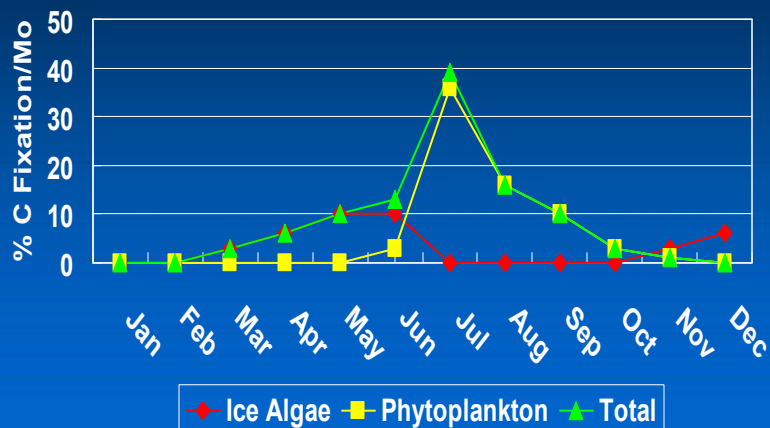
- See Map
- Most Primary Production in Beaufort is on Mackenzie Shelf

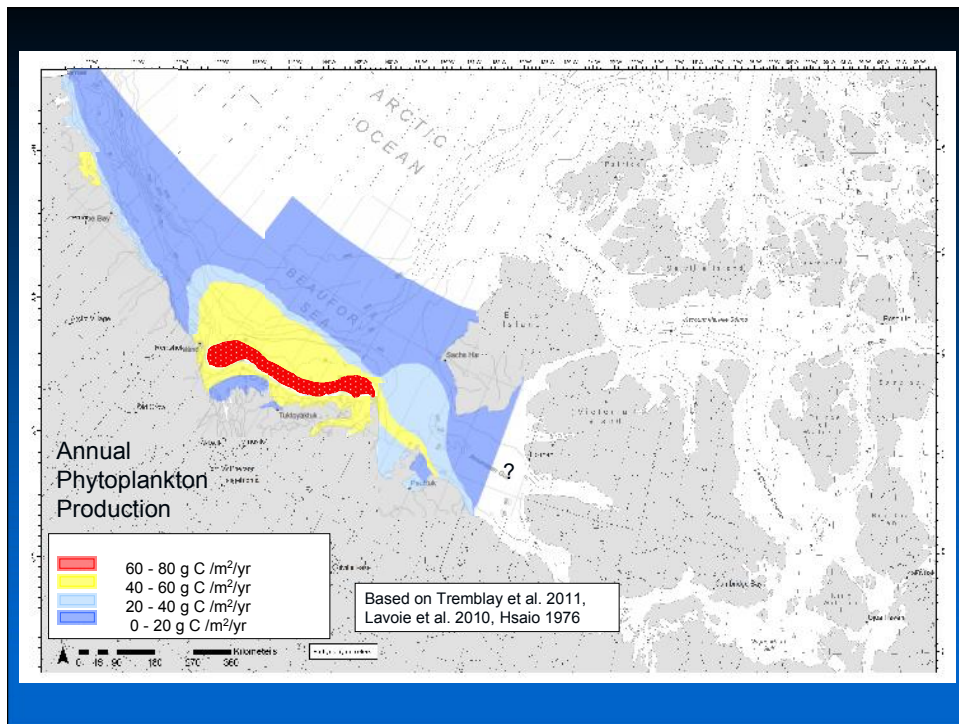
Sources of Information

- Hsiao 1976; Tremblay et al. , 2011; Lavoie et al., 2010
- Many other publications

Component Spill Vulnerability Profiles Phytoplankton

Algal Carbon Fixation Vs Month





Component Spill Vulnerability Profiles Phytoplankton

Example: Phytoplankton

Note: Phytoplankton production appears to be clumped geographically and seasonally and is vulnerable to impact by large spills in mid-summer.

Summary

Today:

1. Identify Key Species and Protection Priorities of Beaufort Communities

2. Prepare Oil Spill Vulnerability Databases for Key VECs and Community Activities, including Traditional Knowledge

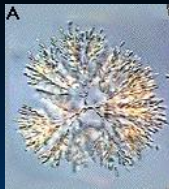
Summary

Components analysed to present

Mammals	Birds	Fish	Critical Ecosystem Components
Caribou, Dolphin/Union* Beluga* Seal, Ringed* Bearded Sea* Polar bear*	King Eider* Goose, Snow* Goose, Canada* Goose, Great White-fronted* Goose, Brant*	Whitefish, Broad* Charr / Dolly Varden* Cisco, Arctic* Herring, Pacific* Cod (Boreogadus saida)*	Phytoplankton@ Zooplankton (Calanus spp)

Summary

- **Spill Vulnerability Databases Useful**
- **Very important**
 - Many arctic species very highly vulnerable to spill impact because they are highly clumped geographically and seasonally
- **What information needed**
 - Harvesting and species ecological data
 - Spatial distribution in Beaufort Sea
 - Degree of spatial clumping and locations
 - Seasonal changes in distribution
 - Degree, location and timing of use of marine and coastal areas
- **Final Steps**
 - Workshop to review species maps, fill gaps
 - Workshop to fill gaps in harvesting maps



Questions?



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