BOEM
Bureau of Ocean Energy Management

OCS Scientific Committee Meeting
May 2013

Page Number	Discipline	Ranking	Study Title
41	SE	1	Subsistence Mapping of Wainwright, Point Lay, and Point Hope
43	FE	2	Physical and Chemical Analyses of Crude and Refined Oils: Laboratory and Mesoscale Oil Weathering
45	MM	3	Data Interface Tools to Support Environmental Analyses: Interpretation of Existing Marine Mammal Data
47	**HE**	**4**	**Genomics of Arctic Cod: A Sentinel Species in a Changing Environment**
49	PO	5	Cook Inlet Circulation Model Calculations
51	PO/HE	6	Ecological Processes in Lower Cook Inlet and Kachemak Bay: A Partnership in Monitoring
53	HE	7	Benthic Invertebrate Habitats in Cook Inlet
55	MM	8	Polar Bear Habitat Use, Ecology, and Population Status in the Chukchi Sea
57	PO/SE	9	Integrated Seabed Surveys in the Arctic Ocean: Bathymetry, Archaeological Resources, and Ice Gouge Magnitude and Recurrence Rates
61	MM	10	Baleen Whale Distribution, Abundance, and Ecology in Cook Inlet and Shelikof Strait

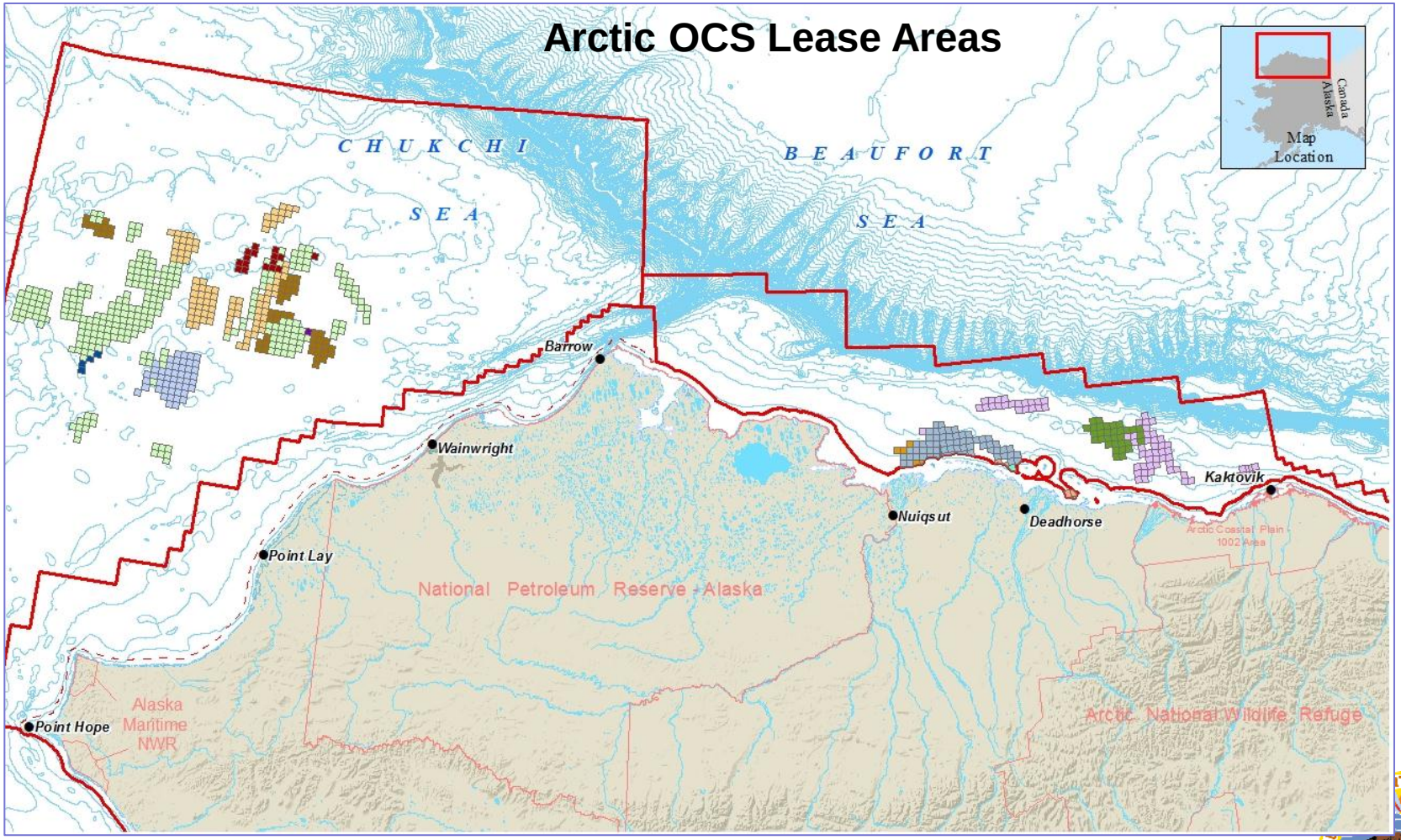
AQ = Air Quality
FE = Fates & Effects
HE = Habitat & Ecology
IM = Information Management
MM = Marine Mammals & Protected Species
PO = Physical Oceanography
SE = Social & Economic Sciences

Alaska OCS Region

Tentative Ranking: 4

BOEM
Bureau of Ocean Energy Management

Genomics of Arctic Cod: A Sentinel Species in a Changing Environment



Alaska OCS Region

Tentative Ranking: 4

BOEM
Bureau of Ocean Energy Management

Genomics of Arctic Cod: A Sentinel Species in a Changing Environment

BOEM Information Need:

- NEPA analyses
- Essential Fish Habitat Analyses
- Prey information for MMPA and ESA analyses

Because 93% of Lower Trophic energy is funneled to upper trophic levels by Arctic cod”

Date Information is required:

- 2016, 2017 Arctic Lease Sales, EIS analyses start in 2013
- Exploration, G&G, Development Permits, annually

Alaska OCS Region

Tentative Ranking: 4

BOEM
Bureau of Ocean Energy Management

Genomics of Arctic Cod: A Sentinel Species in a Changing Environment

Background:

A) Relationship with Previous Work/Efforts

- This is an EXTENSION of a very successful 2012 pilot study by cutting edge USGS polar bear genetics lab

Pilot study results fundamentally change NEPA analyses:

NOT a single pan-mictic population

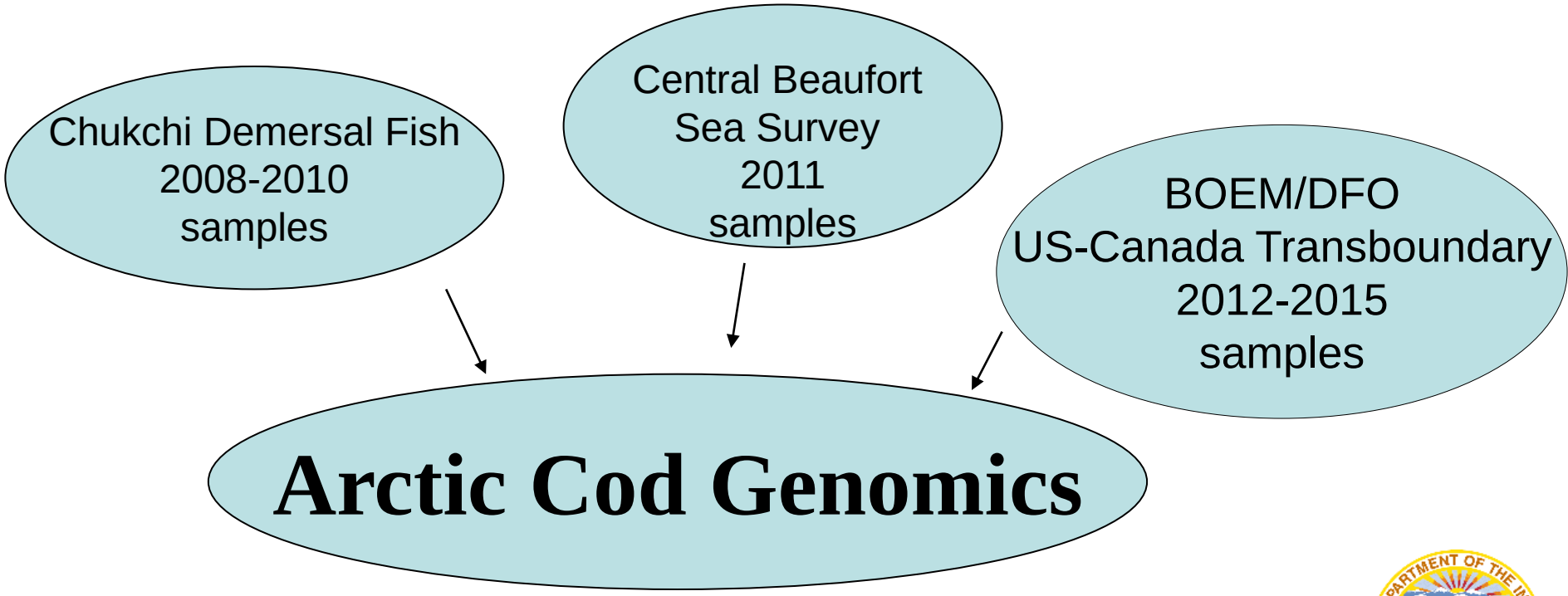
but more vulnerable sub-populations

BOEM
Bureau of Ocean Energy Management

Genomics of Arctic Cod: A Sentinel Species in a Changing Environment

Background:
Relationship with PREVIOUS/CURRENT Work (cont)

Samples for lab analyses are collected in BOEM field studies:



BOEM
Bureau of Ocean Energy Management

Genomics of Arctic Cod: A Sentinel Species in a Changing Environment

Background:

A) Relationship with FUTURE Work/Efforts

Arctic Cod Genomics
2014-2016

↓

Arctic Cod Spawning
2015-2017

↓

Under-ice Oilspill Risk Analyses
(OSRA)

Alaska OCS Region

Tentative Ranking: 4

BOEM
Bureau of Ocean Energy Management

Genomics of Arctic Cod: A Sentinel Species in a Changing Environment

Study Objectives:

- Assess Arctic Cod vulnerability, adaptability, stability:

  Genetic sub-populations.

  Hypothesized dichotomies:

  coastal vs. deeper continental slope populations
  eastern vs. western populations
  warm ‘freshwater’ vs. cold saline waters spawners

  Differential expression of ‘anti-freeze gene’

  Additional genes that could be adaptive to climate change.

- Archive samples for analysis with future technologies

Alaska OCS Region

Tentative Ranking: 4

BOEM
Bureau of Ocean Energy Management

Genomics of Arctic Cod: A Sentinel Species in a Changing Environment

Methods:

- Test additional samples for genetic differences (mitochondrial and microsatellite DNA)
- Update/Advise optimal spacing for current field sampling
- Analyze ‘antifreeze’ gene for variations in expression (transcriptomes)
- Sequence genome of a single Arctic cod to locate other possible adaptive genes (genomics)
- Collaborate with a parallel Canadian genetic studies

Alaska OCS Region

Tentative Ranking: 4

BOEM
Bureau of Ocean Energy Management

Genomics of Arctic Cod: A Sentinel Species in a Changing Environment

Arctic cod drives the Arctic Ecosystem:

Key species

Tipping point

SENTINEL

Wasp-waist

bell weather

Polar Bears are repackaged Arctic cod

fills a vital niche

indicator

Alaska OCS Region

Tentative Ranking: 4