STRANDED BELUGAS IN COOK INLET

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C. Garner
NMFS estimates that more than 640 beluga whales have stranded (both individual and mass strandings) in upper Cook Inlet since 1988.

Mass stranding events primarily occurred along Turnagain Arm,

- often coincided with extreme tidal fluctuations ("spring tides")
- and/or killer whale sighting reports.
- both adult and juvenile beluga whales
Total Stranding Events by Year and Month

- 1999 (12)
- 2000 (15)
- 2001 (10)
- 2002 (13)
- 2003 (26)
- 2004 (13)
- 2005 (7)
- 2006 (9)
- 2007 (15)

Month (Total):
- JAN - APR (5)
- MAY (7)
- JUN (12)
- JUL (16)
- AUG (38)
- SEPT (35)
- OCT (16)
- NOV - DEC (4)

NOAA, 2008
GETTING OUT TO ANIMALS

Transport
- Driving on the Road system
- Helicopters
- Boats

Time
- Often Very Limited due to tides, daylight, helicopter time
COOK INLET MUD FLATS
Bore Tides and Other Tidal Extremes

- 2nd biggest in North America (!?)
- 3rd biggest in world (!?)
- 6 – 10 feet tall
- Speeds of 10 to 15 miles per hour.
- Requires a 27-foot tidal differential
Up to now:
- Two -40 freezers
- NMFS equipment
- Scrounged up -80 space

Prescott grant this year
- Necropsy lab at UAA
- -80 freezer
- Training workshops
STANDING NETWORK BELUGA NECROPSY REPORT

ID Number: Location: Lat and Long:

Reported by: Contact info:

Necropsy Date: Time:

Species: Age: Sex:

Prospects: Contact info:

Weather conditions: Chain of custody forms: Level A

BRIEF HISTORY: (Include circumstances of carcass collection and any known history of animal)

GROSS DIAGNOSIS:

MEASUREMENTS (cm unless indicated)

Weight (kg): estimate/actual (where one)

Tooth count: Erupt Total UpL Up R Low L Low R

Diameter/length largest tooth

Cm

EXTERNAL EXAMINATION

CARCASS CLASSIFICATION:

Code 1: Poor

Code 2: Fair

Code 3: Fair decomposed organs (no detection)

Code 4: Poor distance organs (no detection)

CODE 5: Mummified

BODY CONDITION:

1: Robust

2: Good

3: Slight

4: Poor

5: Mummified

GROSS NECROPSY FINDINGS:

Physical Exam: General condition, lesions, demineralization, appearance, color:

SQ: (fat stores, carcass condition, etc.):

Body cavities (fluid?):

Musculoskeletal (color of muscle, appearance of joint fluid:)

Ax blubber depths

Bd fl blubber depth

3 Snout to center of eye 17ax-d Thickness of dorsal A blubber (w/o skin)

4 Snout to center of blowhole (anterior-posterior axis) 17ax-d Thickness of dorsal A blubber (w/o skin)

5 Snout to anterior point of insertion of pectoral fin 17ax-l Thickness of lateral A blubber (w/o skin)

9 Snout to fluke notch 17ax-l Thickness of lateral A blubber (w/o skin)

15 Width of fluke 17ax-v Thickness of ventral A blubber (w/o skin)

17ax ½ Axial circumference 17ax-v Thickness of ventral A blubber (w/o skin)

17mx ½ maximum circumference 18 Blubber depth behind dorsal ridge w/o skin

17am ½ anal circumference 18 Blubber depth behind dorsal ridge w/o skin
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<th>Fixed</th>
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# NMFS Sampling Worksheet

**Carcass CODE 4 - Samples to Collect (if possible)**

**Photos** (with ruler and animal ID in every shot):
- general body condition
- signs of human interaction
- teeth and mouth
- visible lesions
- anything unusual, parasites, hemorrhages, etc
- blubber condition
- lateral shots for photo-id (like Code 2 photo)

**Measurements (cm):**
- snout to center of blowhole cm
- snout to center of eye cm
- snout to fluke notch cm
- snout to fluke cm
- width of fluke cm

**Skin (HIGH priority)**
- % cm size piece; place in DMSO vial

**Stomach (HIGH priority)**
- keep stomach intact and place whole stomach in a large plastic bag

**Kidney**
- whole kidney; in plastic bag
- sample in cryovial - % full

**Liver**
- sample in cryovial - % full
- sample in cryovial - % full

**Reproductive Organs**
- female reproductive organs; large plastic bag (DO NOT FREEZE - ON ICE OK)
- sample in cryovial - uterus or testes - % full

**Heart**
- sample in cryovial - uterus or testes - % full

**Muscle**
- sample in cryovial - % full
- sample in cryovial - % full

**Eye**
- place entire eye in sterile whirlpack

**Tongue**
- place a softball size piece in a Ziploc

**Lung**
- whole lung; plastic bag

**Feces/Urine**
- feces - 4 mL in plastic screw top vial
- urine - 4 mL in plastic screw top vial

**Miscellaneous Lesions/Odorless**
- sample in cryovial - % full

**Lower Jaw (HIGH priority)**
- entire lower jaw; keep teeth intact; large plastic bag

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**Carcass CODE 5 - Samples to Collect (if possible)**

**Photos** (with ruler and animal ID in every shot):
- general body condition
- signs of human interaction
- anything unusual, parasites, hemorrhages, etc

**Measurements (cm):**
- snout to fluke notch cm
- width of fluke cm

**Skin (HIGH priority)**
- % cm size piece; place in DMSO vial

**Lower Jaw (HIGH priority)**
- entire lower jaw; keep teeth intact; large plastic bag
### SAMPLING PROTOCOLS: MORPHS

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Snout to center of eye</td>
<td>Thickness of dorsal Ax blubber</td>
</tr>
<tr>
<td>Snout to center of blowhole</td>
<td>Thickness of lateral Ax blubber</td>
</tr>
<tr>
<td>Snout to fluke notch</td>
<td>Thickness of ventral Ax blubber</td>
</tr>
<tr>
<td>Width of fluke</td>
<td>Blubber depth behind dorsal ridge</td>
</tr>
<tr>
<td>½ Axial circumference</td>
<td>Weight of the L1-L12 epaxial muscle</td>
</tr>
<tr>
<td>½ anal circumference</td>
<td></td>
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</tbody>
</table>

![Whale diagram](image)
GENETICS AND AGING.

- Skin in DMSO x2
  - SWFSC
  - Greg O'Corry-Crowe
- Eye for AA racemization
  - Mote
- Lower jaw and/or skull
  - Aging
**TOXINS**

- **Blubber – POPS**
  - Axillary, ventral
  - In Teflon or cleaned foil
  - Gina Ylitalo - NWFSC

- **Kidney and liver – Heavy metals and Se**
  - T. O’Hara / M. Castellini
  - University of AK - FBKS Whirlpak or Ziplocks

- **Heart and Muscle**
  - Chlorinated fatty acids

- **HABS – Domoic acid and saxitoxins**
  - Urine, stomach content, feces, pericardial fluid, amniotic fluid
  - Min. 5 ml in cryovial
  - Elizabeth Frame - NWFSC
Body condition estimates
- Entire stomach
  - Prey Analysis
  - L. Quakenbush ADF&G
- Liver and kidney
  - Archived in plastic
- Blubber w/ Skin
  - NWFSC – Dave Herman
  - Fatty Acids
  - Stable isotopes
  - In Plastic
  - Long strip Dorsal to Ventral
REPRODUCTIVE TRACTS

- Historically – Dr. Mike Kinsel of Brookfield Zoo
- Currently – ?
- Measurements
- Reproductive HX
**Disease Investigation**

- Tissue suite for histopathology
- Swabs and adrenal
  - Herpes virus
- Examine whole kidneys and quantify *C. giliakiana* lesions.
- Entire lung
  - Lung worm project
- Disease archives
  - Tissues
  - Swabs

- Lymph nodes and repro swabs
  - Brucella sp. culture and PCR
  - Larry Dunn - Mystic
  - Klaus Nielsen – Canada - PCR
ARCHIVING:
Alaska Marine Mammal Tissue Archival Project

Paul R. Becker¹ Kristin Simac² and Geoff York²
¹NI ST, Charleston, SC
²USGS/BRD, Alaska Biological Science Center, Anchorage, AK

Barbara Mahoney and Brad Smith
NMFS, Anchorage, AK

Steven Christopher, John Kucklick, Rebecca Pugh
NIST Charleston
Barbara Porter
NIST Gaithersburg
• Molecular genetics
• Epidemiology
• Isotope analysis
• Changes in prey consumption in relation to declines in species
• Changes in contaminants levels over time.
IF POSSIBLE, SALVAGE OF BLUBBER IN THE NATIVE COMMUNITIES
WHAT DID WE FIND?
DISTRIBUTION OF NECROPSIED BELUGAS.
AGE AND REPRODUCTIVE STATUS

- **UNK SEX**
- **FEMALE - NS**
- **FEMALE - POST PARTUM**
- **MALES**
- **FEMALE - PREG.**

### Mature
- MALES: 8
- FEMALE - NS: 3
- FEMALE - POST PARTUM: 3
- FEMALE - PREG.: 4
- UNK SEX: 3

### Immature
- MALES: 6
- FEMALE - NS: 2
- FEMALE - POST PARTUM: 1
- FEMALE - PREG.: 2

### Fetal
- MALES: 2
- FEMALE - NS: 2
- FEMALE - POST PARTUM: 0
- FEMALE - PREG.: 0
- UNK SEX: 0
CAUSES OF DEATH / PROBABLE CODs

COD  PROB COD

DISEASE 1 1
NUTRITION 3 0
TRAUMA 4 0
PERINATAL 4 0
MS NSF 5 0
SS NSF 4 1
UNKNOWN 11 0
LARGE PROPORTION OF UNKNOWN CODS.
Mass stranding – 5
Single stranding - 5
Areas occupied by belugas in CI in June and July in 1978 (a), 1993-1997 (b) and 1998-2007 (c)
NEONATAL DEATHS / ABORTIONS AND PREGNANT OR LACTATING FEMALES

3 Pregnant Females; - 2006, 08, 09
3 post partum – 2000, 08, 09

4 Aborted fetuses- 2008
NUTRITION (7/34)

- COD (n=3)
  - young males in Jul/Aug
- 4 animals – Contributory
  - 1 fetus, 2 calves
- Thin blubber (0-3 cm)
- Empty stomachs.
- 1 calf with systemic herpesvirus
5 cases
4 COD
1 Incidental
Two were previously reported in Sheldon et al 2003.

Misc. includes: A contributory pulmonary congestion, a mild lymphocytic Meningoencephalitis, pleuropneumonia and an Incidental Sarcocystis cyst in the muscle.
Problems are being seen as a new lesion in Churchill thought to be due to herpesvirus.
- Seen in captive animals
- One case in St. Lawrence
- Positive in a few blowhole swabs in live-capture Bristol Bay animals.
- More an indicator of stress?
SYSTEMIC INFECTIONS

young Voo-089
Bronchopneumonia, Necrotizing hepatitis, liver flukes, necrotizing skin and tongue lesions
CRASSICAUDA GILIAKIANA
Lung worms

Collaborative study
- Dr. Lena Measures
- Entire lung collected
  - Histopathology
  - Parasite ID and enumeration
CONCLUSIONS:

- Many cases have an UNKNOWN COD.
  - Poor carcass condition
  - Use more molecular techniques
  - Are there ways to get out to carcasses more often and more quickly?
  - Consider adding in live-capture / biopsy work in addition to the necropsies.
MS-NSF and SS-NSF / Trauma

- Significant proportion of cases are result of strandings in seemingly otherwise healthy individuals.
- Adults / Pregnant and lactating females
- Killer whale changes?
- Changing distribution of the belugas into the riskier areas?
- Changes in Bathymetry?
Cases have been in the last couple of years 2006, 2007, 2008
What is changing?
Salmon and other fish stocks?
We need better methods of coding body condition
Weight epaxial muscles / Total length

Graph and photos compliments of Dr. S. Lair; St. Lawrence seaway pathologist – Quebec, CANADA
Detected significant disease in 2/5 “fresh” animals
Antibiotic resistant bacteria?
Protozoa?
Herpesvirus
Lungworms
Crassicauda
Brucella
Teri Rowles, NOAA
Jennifer Dushane and Ian Dickson - AVPS
Chris Kaplan - LGL
Chris Garner – US Army
Stranding network volunteers, boat drivers, pilots.