

2008 Shallow Hazards Survey Program in the Chukchi Sea

ConocoPhillips Alaska, Inc

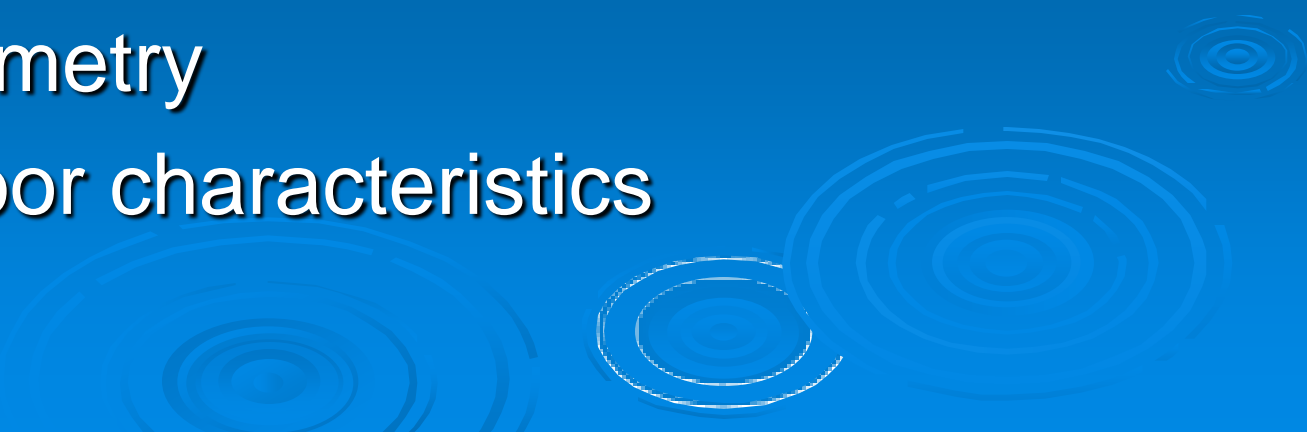


Field Team

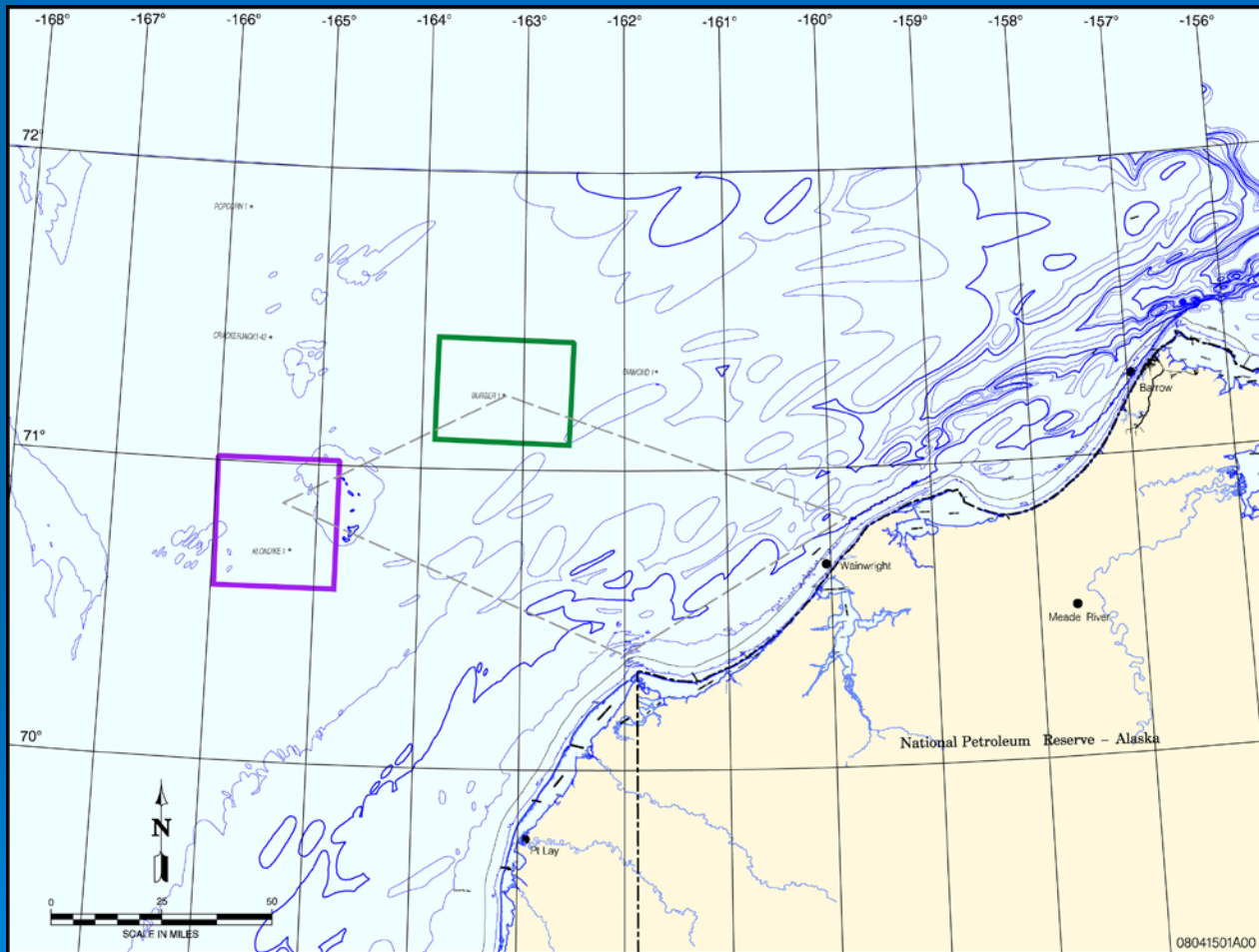
- Andrew Cry
- Sasha McFarland
- Inger Marie Laursen
- Kate Lomac-MacNair



Purpose of Seismic Program

- Conduct shallow hazards survey at the Klondike Prospect for potential oil and gas drilling
 - Collect core samples along two potential pipeline routes to define substrate characteristics
 - Map bathymetry
 - Map seafloor characteristics
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Study Area



Seismic Program

- Time period: September 7 – October 31
- Vessel: Norseman 1
- Seismic source: 6 kilojoules sparker
- Coring equipment: drop core system
- Bathymetry equipment: echosounder
- Seafloor imagery: sidescan sonar



Marine Mammal Monitoring Program

- Determine species and number in safety zones (≥ 180 dB)
- Determine species and number in behavior disturbance zone (≥ 160 dB) to estimate take
- Determine number of seismic survey shutdowns
- Record behavior and natural history

Methods



- Two observers
- Four hour shifts
- All daylight hours, start ups
- Line-transect
- Standard data protocol for seismic and marine mammals

Total marine mammals

Species	Klondike		Total	
	Sightings	Number	Sightings	Number
<i>Pinnipeds</i>	48	79 (1)	214	267 (10)
<i>Cetaceans</i>	0	0	7	11(1)
Polar Bear	0	0	1	1
Total	48	79 (1)	222	279 (11)

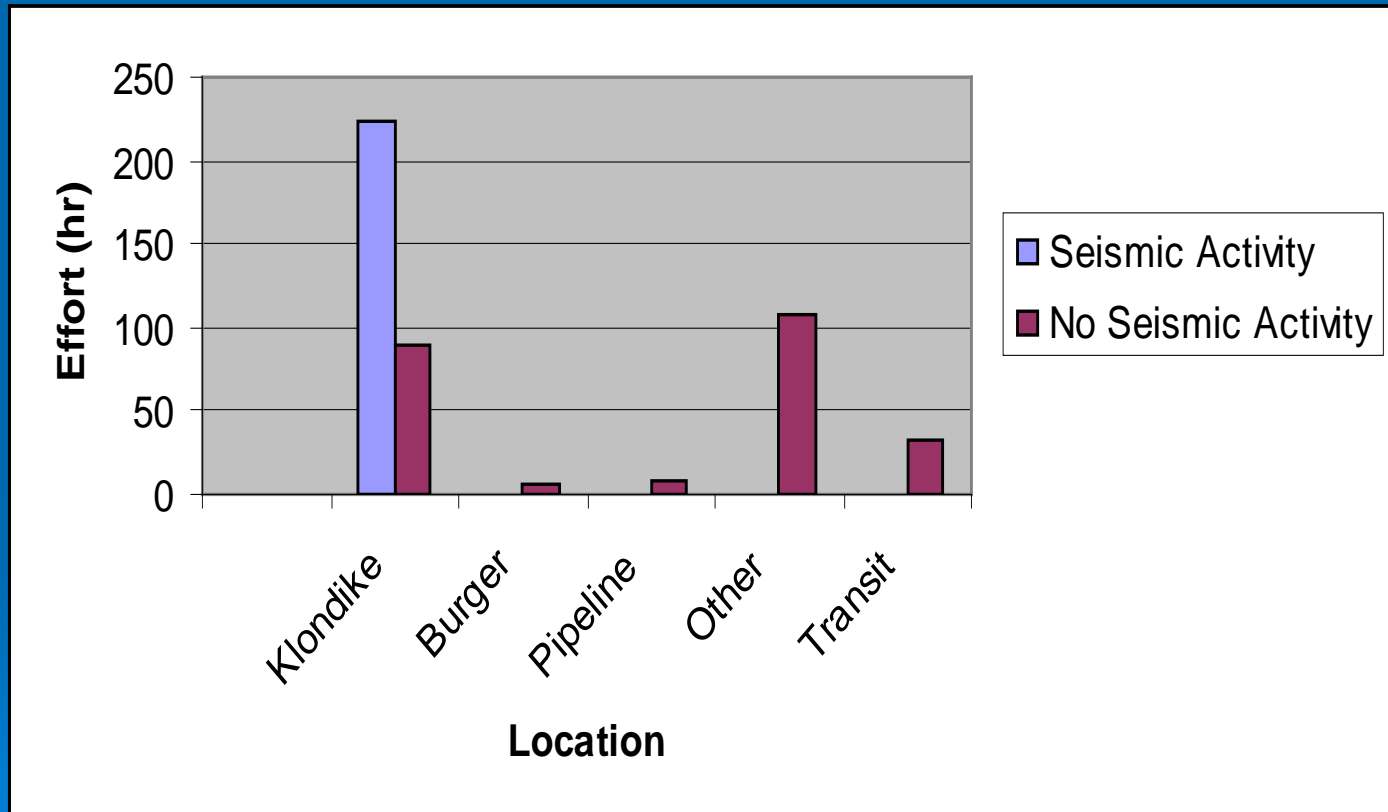
Species composition/number

Species	Klondike		Total	
	Sightings	Number	Sightings	Number
Ringed/Spotted	7	7	48	53
Ringed Seal	1	1	6	6
Spotted Seal	10	12	27	31
Bearded Seal	6	6	35	39
Ribbon Seal	0	0	1	1
Pacific Walrus	14	43	16	50
Unident Seal	10	10	78	84
Unident Pinniped	0	0	3	3
<i>Subtotal</i>	48	79	214	267

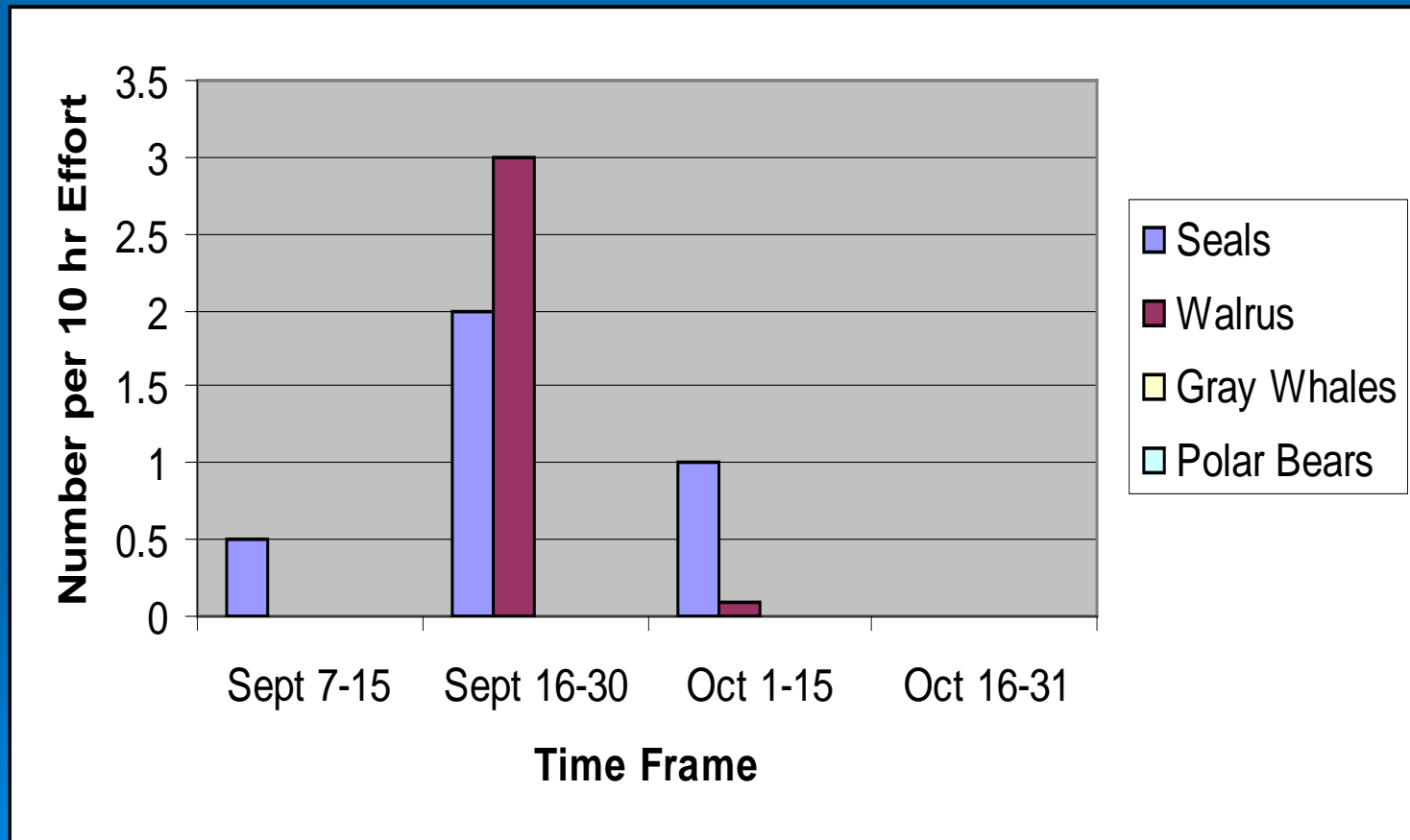
Species composition/number

Species	Klondike		Total	
	Sightings	Number	Sightings	Number
Gray Whale	0	0	5	9
Minke Whale	0	0	1	1
Unident Whale	0	0	1	1
<i>Subtotal</i>	0	0	7	11
Polar Bear	0	0	1	1
Total	48	79	222	279

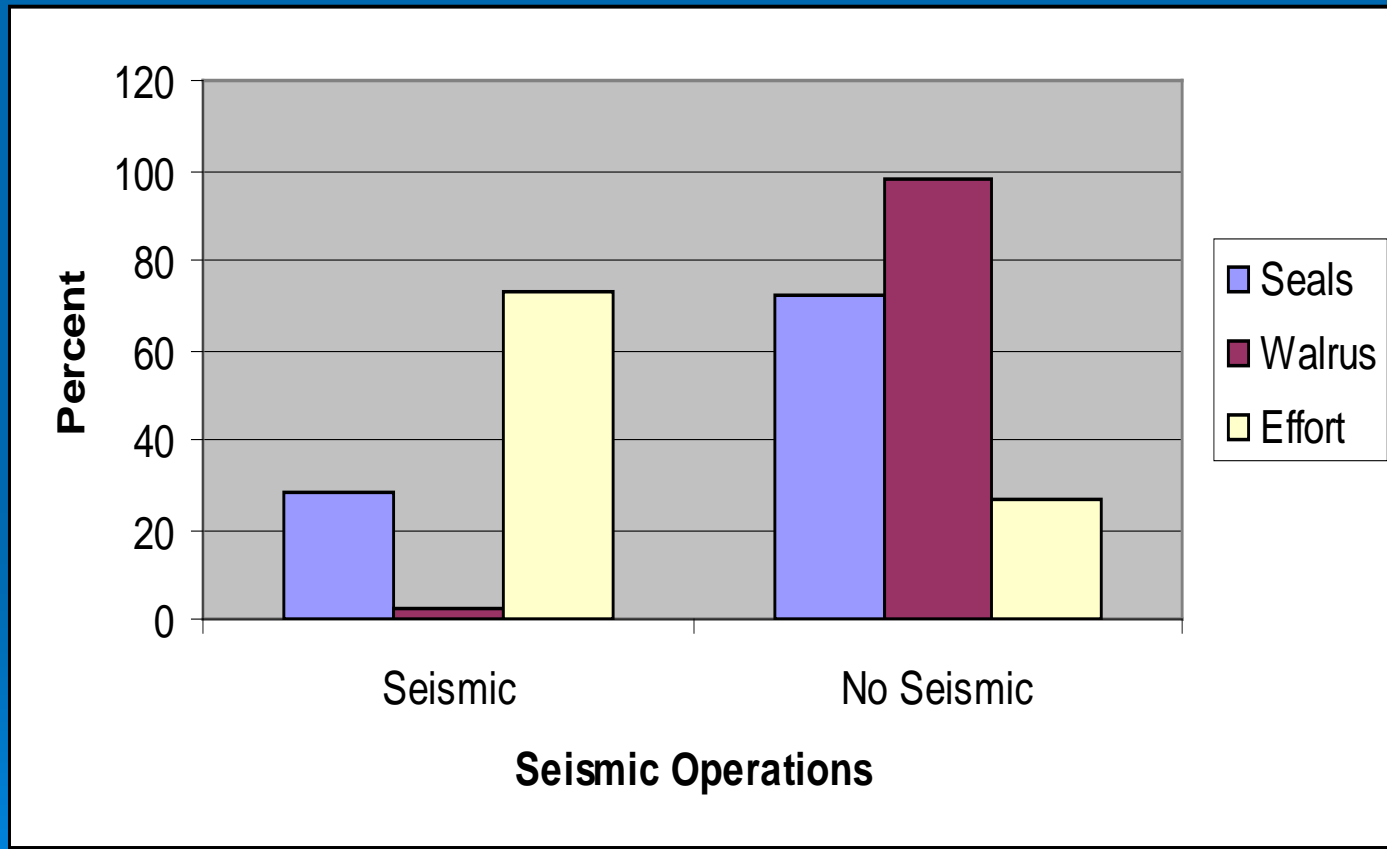
Monitoring effort



Temporal distribution at Klondike



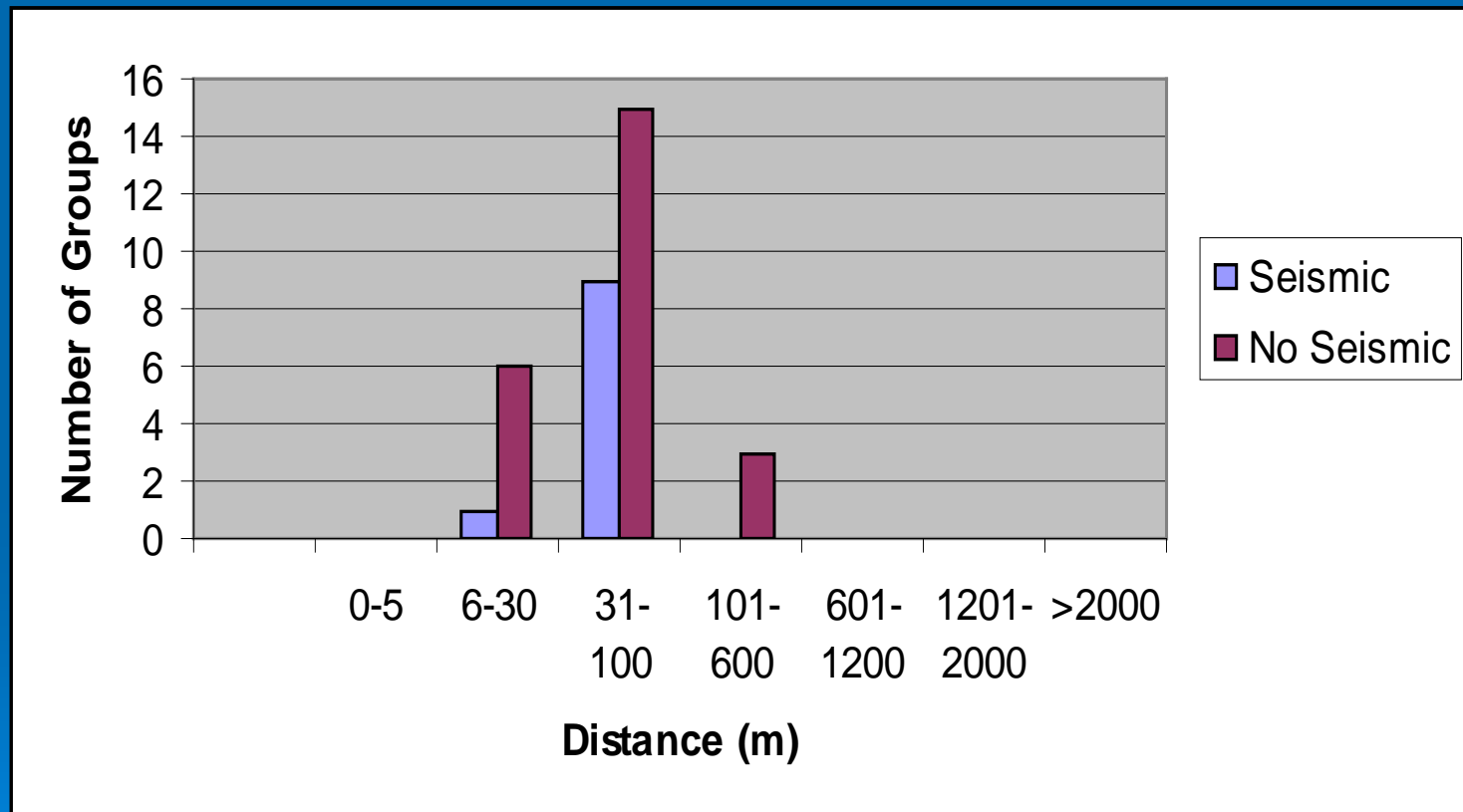
Percent of sightings at Klondike



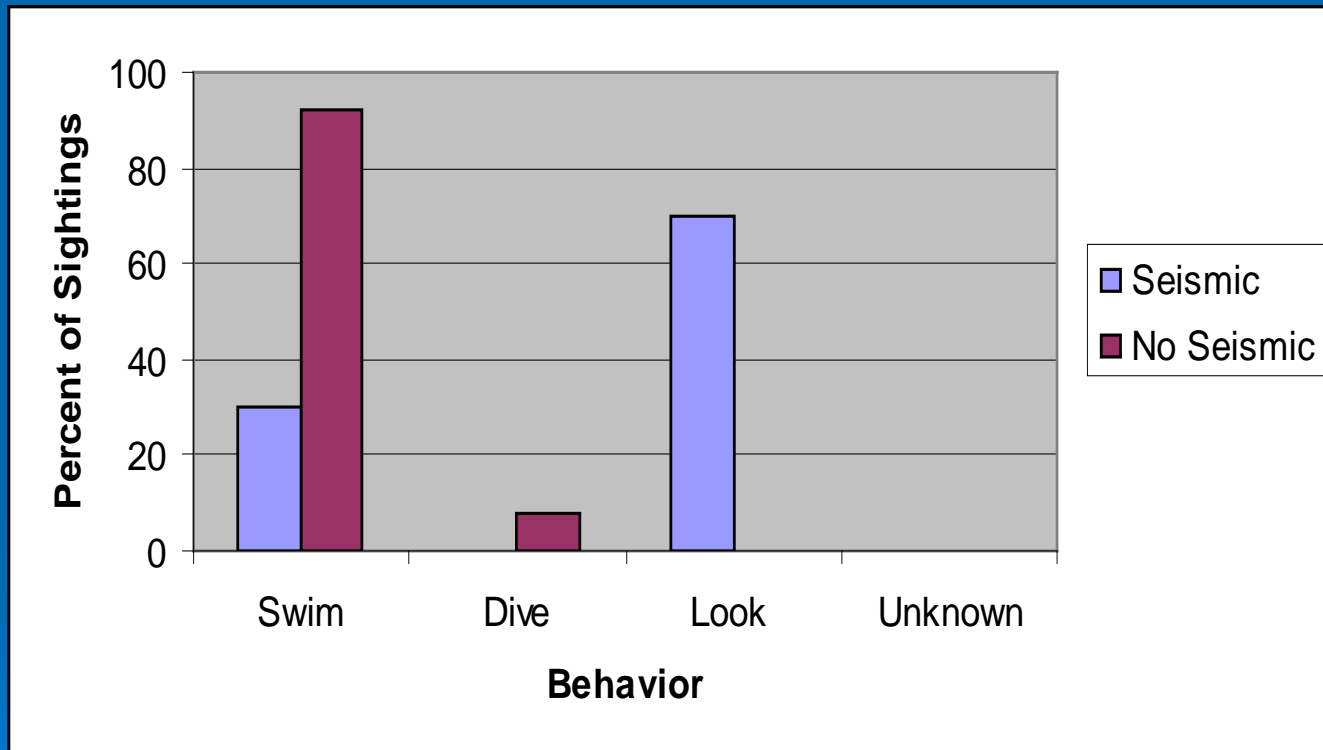
Seal density

Location	Activity	No Sightings	F(0)	G(0)	Density (no./ km ²)
Klondike	Seismic	10	11.45	1	0.038
Klondike	No seismic	24	11.45	1	0.284
Other	No seismic	152	11.45	1	0.920

Seal distances from vessel at Klondike



Seal behavior at Klondike



Take estimates

Safety radii	Distance (m) from source	Seals	Whales	Walrus	Bears
≥ 190 dB	13	0	0	0	0
≥ 180 dB	41	0	0	1	0
≥ 160 dB	368	10-42	0-10	0-50	0-1

Conclusions

- Life history
 - Species composition typical for the region
 - Most belugas and bowheads passed through the region before and after program
 - Most bowheads appear to migrate north of the program area in the fall
- Seismic effects
 - Considerably fewer seals observed during seismic vs no-seismic activity and within Klondike than other survey areas suggesting possible localized effects
 - Seismic effects not corroborated by behavior/distance
 - Other factors could have caused difference between seismic and no-seismic activity on marine mammals
- Shallow hazards survey had no more than a negligible effect on individual marine mammals and no population level effects