STATE
of ALASKA

MEMORANDUM

Ringed Seals

8533

TO: J. Scott Grundy, Regional Supervisor
Habitat Protection Section
Fairbanks

DATE: February 15, 1979

FILE NO:

TELEPHONE NO:

THRU: Richard H. Bishop, Regional Supervisor
Division of Game
Fairbanks

SUBJECT: Effect of Seismic Operations on Ringed Seal Density

THRU: John J. Burns, Marine Mammals Coordinator
Fairbanks

FROM: Kathryn J. Frost, Marine Mammals Biologist
Division of Game
Department of Fish and Game - Fairbanks

As you are aware, the marine mammal staff of the Game Division has been working intensively in the Beaufort Sea since 1975. Ringed seals are the most abundant species in this region and are important to coastal human residents and as a significant prey species for polar bears and white foxes. The fast ice zone is very important to these seals, as the stability of this zone provides the most favorable habitat for breeding animals. Pups are born in late March-early April, mainly in snow caves on the fast ice. In view of the importance of the nearshore zone to ringed seals, we have made an annual effort to assess abundance of these seals along the Beaufort Sea coast.

You foresaw the natural extension of our survey efforts--an evaluation of the possible effects of late winter-spring activity by humans in this ice zone.

At your urging we have reanalyzed our 1975-1977 Beaufort Sea aerial ringed seal survey data in light of the information on seismic surveys that you have provided us. Data from 778 nm^2 of our survey trackline were examined. Densities of ringed seals were determined for areas in which seismic operations had occurred (i.e. areas for which we had maps of the as-shot seismic lines) and for adjacent control areas where no seismic operations had taken place. We found densities in control areas (no seismic surveys) to be greater than densities in seismic survey areas for all comparisons examined.

Densities in the control areas were two to four times greater than in the seismic areas. On the average, there were only one-half as many seals in the areas of seismic operation. We consider these differences significant.

Our surveys were designed to cover prime ringed seal habitat and determine seal densities in these areas, not to make a comparison between control areas and seismic survey areas. However, the high coincidence of prime seal habitat and areas of seismic operation, as shown by the number of miles of our tracklines that went through these areas, made it possible to do the above analysis. Our data do show a marked effect of seismic operations. Results are presented in Table 1.

Table 1. Comparison of ringed seal densities within areas of seismic operations and in adjacent control areas.

	Lonely-Oliktok		Oliktok-~~Barter~~ Flaxman Is.		Total	
	Seismic	Control	Seismic	Control	Seismic	Control
1975						
No. aerial survey miles	51	119	115	162	166	287
No. observed seals	18	117	61	189	79	306
Density/nm^2	0.35	0.98	0.44	1.13	0.48	1.07
1976						
No. aerial survey miles	96	43	30	60	126	103
No. observed seals	81	89	31	77	112	166
Density/nm^2	0.84	2.07	1.15	1.30	0.89	1.61
1977						
No. aerial survey miles	17	27	37	15	54	42
No. observed seals	7	17	18	34	25	51
Density/nm^2	0.41	0.60	0.50	2.30	0.46	1.21
1975-1977						
No. aerial survey miles	164	189	182	237 ~~245~~	346	432 ~~432~~ ✓
No. observed seals	106	223	110	300	216	523
Density/nm^2	0.64	1.18	0.60	1.27	0.62	1.21

Tests could be done on a more rigorous basis to refine this analysis if someone were to design and fund such a study.

The potential extent of this displacement or mortality can be partially assessed by examining the areal extent of seismic activity in relation to the total available ringed seal habitat in the nearshore zone. This partial assessment is presented in Table 2 below.

use Wilcoxon signed rank test.

Table 2. Proportion of nearshore ringed seal habitat (within 15 miles of shore) in which seismic exploration occurred in 1975-1978.

Year	Area of Seismic Exploration (nm^2)	Percent of the Area Extending from Barrow to Demarcation Point	Percent of the Area Extending from Lonely to Flaxman Island
1975	775	15	37
1976	1640	32	78
1977	1295	25	62
1978	590	12	28

Note: 1) Total area within 15 miles of the beach between Barrow and Demarcation Point = 5100 nm^2.
2) Total area within 15 miles of the beach between Lonely and Flaxman Island = 2100 nm^2.

Our major concerns are as follows: 1) because of the high density of lines in some areas of operation there are essentially no unaffected "refuge" areas for the seals; and 2) seismic operations in recent years have been allowed during the spring months when ringed seal pups are being born and nursed and mother-pup bonds are created. From the industry data provided to us it was impossible to compare areas shot before seal pupping begins with those shot later in the spring. There was, nonetheless, an overall decreased density in areas of seismic operations. This decrease is probably due to displacement, although mortality cannot be ruled out. Displacement from prime habitat at this time of year is a very important factor to consider. Seals in the moving pack ice are more susceptible to polar bear predation, and pups born on moving ice tend to be smaller, are weaned earlier and may have reduced survival. Moreover, displacement constitutes harassment which under the Marine Mammal Protection Act of 1972 is illegal.

For several years the State has been concerned with the regulation of seismic operations in the Beaufort Sea. This concern has surfaced in the formulation of regulations to protect marine life, especially ringed seals, in areas where such operations occur. Among the proposed regulations were: 1) a prohibition on the use of explosives, 2) a minimum spacing of 2 miles between shot lines, and 3) a mid-March cut-off date for all activities conducted on the ice outside the barrier islands. Only the first of these has been adhered to. As lease sales draw near, the intensity of seismic operations is increasing. Other exploratory and development activities on the fast ice will undoubtedly occur. The areas in which these intense operations take place are prime ringed seal habitat where breeding and pupping occur in the spring.

In light of the above, we make the following recommendations:

1. All forms of on-ice exploration and development activity outside the barrier islands, including but not restricted to seismic operations,

should be as limited as possible. Vehicular traffic should be restricted to the immediate area of operations.

2. Overlapping or duplicate programs of the various companies conducting operations should be prohibited. Such overlap intensifies and prolongs the disturbance in an area.

3. Seismic shot lines should be spaced at intervals of no less than 2 miles in any one year, or the areas of seismic exploration should be as restricted as possible.

4. Because displacement of seals is likely to be most significant in mother-pup pairs, we request a March 20 cut-off date for on-ice operations in areas outside of the barrier islands.

cc: Somerville