15 January 1988

Memorandum

To: Chief, Branch of Permits
Fish and Wildlife Permit Office
Office of Management Authority
P.O. Box 27329, Central Station
Washington D.C. 20038-7329

From: Chief, Mammals Section
Alaska Fish and Wildlife Research Center

Subject: Report for Marine Mammal Permit PRT-690715-Pacific Walrus

In Fiscal Year (FY) 87, immobilization and satellite tagging studies were conducted at Round Island, Alaska under permit PRT-690715-Pacific Walrus. Seven walruses were given the immobilizing agent Telezol: two animals had a VHF radio attached to a tusk, one animal had a VHF radio on one tusk and a satellite transmitter attached to the other tusk, one animal was trampled by other walruses and subsequently died, two animals died of drug-related problems, and one animal was given a very light dose and was insufficiently immobilized to attach a radio transmitter. The first VHF transmitter remained attached from 21 June 1987 through 16 August; it was found on the beach 21 August. The second transmitter was attached 24 June and seen still attached 23 September but with the end of the housing smashed and the antenna gone. Data was last received from the satellite transmitter 28 December.

Reports previously submitted on the mortalities are attached as is the Marine Mammal report from Togiak National Wildlife Refuge.

Larry F. Pank

Attachments
Memorandum

To: Chief, Branch of Permits, Federal Wildlife Permit Office

From: Chief, Mammals Section, Alaska Fish and Wildlife Research Center

Subject: Notification of Mortality Under Marine Mammal Permit PRT-690715-Pacific Walrus

Summary: One of three Pacific walruses drugged with Telezol died while further evaluating immobilization techniques on Round Island, Alaska, although animal selection, drug dosage and life support procedures had been modified in consultation with veterinarians and the permit office after the two previous mortalities. A veterinarian was present at the time of the mortality.

Possible contributing factors identified for the first mortalities were 1) trampling by other animals, 2) drug from a different manufacturer, 3) heat stress, 4) misjudgment of weight and resulting overdose of drug, or 5) unobservable abnormality or pathology of that particular animal. The immobilization which resulted in the present mortality was conducted in accordance with the revised protocol and was not trampled, drug from the French manufacturer was used, its internal temperature was within the normal range, the target dose was low, and a gross necropsy did not reveal any abnormalities.
Description of Immobilizations

The drug delivery technique was the same as that used in the previous immobilizations because it gives the most control and was not implicated in previous mortalities. The drug used was Zoletil, the telezol formulation manufactured in France.

<table>
<thead>
<tr>
<th>Date</th>
<th>Status</th>
<th>Est. Wt. (kg)</th>
<th>Telezol cc</th>
<th>mg</th>
<th>mg/kg</th>
<th>Time to immobility</th>
<th>Sex/Est. Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walrus 87-5</td>
<td>14 August</td>
<td>1000</td>
<td>8+1.5</td>
<td>2000+375</td>
<td>2+ supplemental dose</td>
<td>35 min.</td>
<td>M/ 16-18 yrs.</td>
</tr>
<tr>
<td>Walrus 87-6</td>
<td>15 August</td>
<td>900</td>
<td>7</td>
<td>1750</td>
<td>1.9</td>
<td>14 min.</td>
<td>M/ 12-15 yrs.</td>
</tr>
<tr>
<td>Walrus87-7</td>
<td>17 August</td>
<td>800-1000</td>
<td>4.5</td>
<td>1125</td>
<td>1.4-1.1</td>
<td>17 min.</td>
<td>M/ 16-25</td>
</tr>
</tbody>
</table>

Walrus 87-5:

The cloud cover was 100%, air temperature was about 52 F, the winds were light and variable, with intermittent light precipitation. This animal was given the reduced target dosage of 2.0 mg/kg estimated body weight via jab stick to the hip. After 25 min, his hindquarters were immobile but he still had too much head movement to allow attachment of the transmitter. The needle was still in his hip, so an additional 1.5 cc (375 mg) was injected. After 10 more minutes, he was workable. His breathing rate before injection and during induction was 5-6 deep, regular breaths/min, his heart rate during induction was 60-72 beats/min, and his skin color, which did not change during the procedure, was a moderate reddish brown. As soon as he was workable, a catheter was put in the extradural vein in case a respiratory stimulant was needed. A rectal thermometer was inserted; internal temperature throughout the procedure ranged from 97.4 F to 98.1 F. Approximately 24 min after we began working, both a satellite transmitter and a conventional VHF transmitter had been attached, one to each tusk. His heart rate then was 80/min, breath rate 3-4/min, temperature 98.1 F. One hour and 28 min...
after the first injection, he showed good head and neck movement, the heart rate was 72/min, breath rate was 3/min, and the temperature was 97.6°F. When we left the beach, 2 hr 50 min after the first injection, his head and forebody movements were stronger and coordinated but he had made no attempt to move his hindquarters; heart rate was 72/min, breath rate was 4-5/min, temperature was 97.6°F. Two hours later, he had left the beach. Data is being received from the satellite transmitter to date.

Walrus 87-6 (Mortality):

The weather was partly sunny with a cloud cover of about 30%, air temperature of 50°F, very light winds mostly out of the NW and no precipitation. This animal had been disturbed before injection as other animals were carefully moved from his vicinity to remove the threat of trampling. After he settled down from the disturbance and before injection, his breathing was deep and regular at 4/min, his heart rate was 60-72/min and his skin color was medium pink brown. The weight of this walrus was estimated to be about 900 kg. He was injected with 7cc of drug via the jab stick to the hip, resulting in a dose of 1.9 mg Telezol/kg estimated weight. He moved a bit as the needle was inserted, then settled back down. About 5 min after injection, his breath rate was 3/min, heart rate was 72/min. Seven minutes after injection, small contractions were visible in his lower back, he lifted his head slightly, his eyes were open and he blinked slowly. The animal next to him moved away 9 min after the injection; the target animal then got up on his foreflippers and moved slowly but did not move his hindquarters. At 12 min post injection, his eyes were open and staring and somewhat glazed, he continued to make small head movements, the breath rate was 4/min, heart rate was 72/min. At 14 minutes post injection, he was prodded to determine the depth of immobilization and was workable. The rest of the surrounding animals were slowly moved out of the area to keep them from stampeding as we worked. When we approached the animal, the veterinarian inserted the temperature probe and began to establish an IV pathway, but due to the somewhat twisted position of the animal, had a great deal of difficulty in locating the extradural vein; an IV was never established while the animal was alive and in that position. We moved his head slightly to a better position to attach the radio; he did not resist at all. At 22 min post injection, his body temperature was 99.2°F, the heart rate was 80/min and the breathing was irregular. By 26 minutes post injection, the animal was not breathing and its body temperature was 99.1°F. Seven minutes later it exhaled one long slow breath then inhaled weakly and closed its nostrils; then another similar breath two minutes later. When it was clear that the animal was in trouble and that the spinal IV would not be established in time, one vial of the respiratory stimulant Dopram was given sublingually with no results. An endotracheal tube was then inserted and
artificial ventilation began also with no results. During the next 1-2 minutes, the nostrils opened and closed rhythmically every 10 sec or so and the moustacial pad twitched. There were no further attempts at respiration. Gum color which had been pink with good capillary refilling rate, turned grayish blue about then, skin color was the same pinkish brown and the body temperature was 99.4 F. The animal was pronounced dead 45 min after the injection. Individual accounts of the events leading up to the death were then written by the three participants. A gross necropsy was conducted on the animal. No signs of disease or gross abnormalities were found; all organs appeared to be normal and healthy and no abnormally heavy parasite load was present.

**Walrus 87-7:**

After the death of walrus 87-6, the drug dosage protocol was further modified. The day was sunny, about 60 F air temperature and moderate northwest winds. The beach on which we worked was in the shade and in the lee of the island. An animal in the 16-25 year age category was chosen, based on aging charts from Dr. F.H. Fay. From the age-weight graph in Dr. Fay's 1982 monograph, the range of weights for an animal in that age group is 800-1600 kg. Its weight was estimated at between 800 and 1000 kg, the more conservative weight estimate was taken, and he was given a little less than .75 of the target dose of 2.0 mg/kg or 4.5 cc. Before injection, its breath rate was 4-5/min and its heart rate was 60/min. Five minutes after injection, the breath rate was 5/min, heart rate was 70/min and he showed small muzzle twitches. Three minutes later, he lifted his head, moved his flippers and rolled toward the needle. Two minutes later (ten min post injection) he was prodded and could still move his hindquarters. The animals hauled out in the same area began to move toward the water and 12 min post injection, he began to move with them and the needle was pulled out. The tide was out and the animal had been fairly high on the beach so he had a long way to go to the water. He slowly moved about 30 m then stopped with his head propped up on his tusks and his neck muscles relaxed. By 17 min post injection, he could no longer move his hindquarters although he had too much head movement to allow attachment of a radio. His breath rate had slowed to 2 breaths/min by 22 min post injection and his eyes looked unfocused although not glazed. Because of the slow breath rate and the unexpected depth of the immobilization with such a light dose, no supplemental drug was given to allow attachment of the radio. The breath rate continued to be 2-3/min with a heart rate of 72/min; by 34 min post injection the muscles seemed even more relaxed although he still could move his head and flippers slowly. A rectal thermometer was inserted; the body temperature was 99.7 F, then increased to 100.2 F where it remained as long as it was monitored. His eyes were open, he continued to blink and could follow movements as the researchers moved about him. At 55 min
post injection, he went 80 sec without a breath, the next one followed 20 sec later, then one 50 sec later; the heart rate was 80/min and the temperature was 100.2 F. A catheter was inserted in the extradural vein to test the effects of the respiratory stimulant Dopram. Intervals between breaths immediately before the Dopram was given were 40, 30, 40, 30, 25, and 45 sec. One vial of Dopram was then given IV. The intervals between the next breaths were 45, 40, 40, 20, 13, 18, 21, 30, 26, 32, 60, and 21 sec; the heart rate was then 100/min. The breath rate returned to a steady 2/min and the heart rate to 72/min about 30 min after the Dopram was administered. Two hr after injection, the animal still had no hindbody movement although its forebody movements were strong and well coordinated.

Possible Reasons for the Mortality and Proposed Solutions

Of the four possibilities identified for the first two mortalities, trauma, drug differences, possible misjudgment of weight and subsequent overdose, and heat stress, only overdose would have been a possibility in the last mortality. The animal clearly was not trampled, drug from the French manufacturer was used, and the animal’s temperature was not high. Photographs of all the animals immobilized this summer will be shown to Dr. Fay for his estimate of age and weight.

The veterinarian present for the mortality suggested that the ratio of zolazepam to tiletamine might have been too high (it is 1:1 in Telezol). In his experience with the related drugs, ketamine and valium, less than a 1:1 ratio is needed to control convulsions and the higher amount might cause the respiratory depression seen.

Plan of Action

1. Estimates of Weight. On the advice of Dr. F. H. Fay, the weight of each target animal was estimated using the age chart and age-weight graph developed by Dr. Fay. The range of weights for a given age category is large and it was not possible to weigh animals on Round Island. Sue Hills will spend 40 days on a Soviet walrus harvesting ship in September and October 1987 where she will visually estimate ages and weights and compare those estimates with ages from tooth annuli and weights from the scale to attempt to develop a more accurate technique for weight estimation.

2. Drug Formulation/Drug Choice. The idea of the need for and efficacy of a different ratio of the components of telezol or the advisability of changing to a different drug altogether will be explored after further review of the data and consultation with veterinarians, other walrus researchers, and drug manufacturers.
3. Protocol Modification. After a better weight estimation procedure is established and drug type and formulation have been chosen, the immobilization procedure will be modified and tested. A veterinarian will continue to be present until a workable technique has been developed. As before, if two additional mortalities occur, drugging activities will be suspended and reviewed.