Burns, J.J.

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SOVIET-AMERICAN MARINE MAMMAL RESEARCH CRUISE ON THE ZRS ZAKHAROVO, BERING SEA, 15 MARCH - 26 APRIL 1985

J. J. Burns, F. H. Fay, K. J. Frost, and R. V. Miller

At the 7th Regular Meeting of the US-USSR Marine Mammal Project in Santa Cruz, California, April 1983, Soviet biologists expressed interest in collecting additional samples of ice-inhabiting seals from the eastern Bering Sea. For that purpose, they proposed a joint Soviet-American research cruise to that region in the spring of 1984 or 1985. The cruise ultimately was scheduled for the latter time. Thus, three American biologists boarded the Soviet ship ZRS ZAKHAROVO at Dutch Harbor, Alaska on 15 March 1985. By American request, the cruise was split into Leg I, from 15 March to 4 April, and Leg II, from 4 April to 26 April. The Americans on the first leg were R. V. Miller of the National Marine Mammal Laboratory, NOAA, Seattle, J. J. Burns of the Alaska Department of Fish and Game, Fairbanks, and F. H. Fay of the Institute of Marine Science, University of Alaska, Fairbanks. Burns remained aboard for the second leg and was joined by K. J. Frost of the Alaska Department of Fish and Game, Fairbanks. The Soviet biologists on the ZAKHAROVO were A. A. Kibal'chich of VNIRO in Moscow, IU. A. Bukhtiyarov of TINRO in Magadan, A. M. Trukhin of TINRO in Vladivostok, and S. P. Duniushkin of Okhotskrybvod in Magadan.

The ZAKHAROVO proceeded due northward from Dutch Harbor on 15 March, reaching the edge of the pack ice in the evening of 16 March (Fig. 1). Penetrating about 55 nm into the loose pack toward Nunivak Island, we found it to be made up mainly of thin, pancake floes, not suitable for use by pinnipeds. Heading westward within the pack, we reached St. Matthew Island 3 days later. Along the way, increasing numbers of seals (among them, two adult male fur seals, Callorhinus ursinus) and two gray whales (Eschrichtius robustus) were sighted as we progressed westward, but almost all of the seals were in the water and inaccessible because of unfavorable ice conditions.

A number of walruses (Odobenus rosmarus), several Steller sea lions (Eumetopias jubatus), and the first bowhead whales (Balaena mysticetus) and belukhas (Delphinapterus leucas) were sighted just south of St. Matthew Island on 19 March, and the first walrus was taken there. Working northwestward into heavier ice on 19 and 20 March, we encountered numerous groups

of walruses, but all were in the water. On the morning of 21 March, however, several small groups were found on the ice, and from 21 to 26 March, 159 walruses were taken. During this time, strong northerly winds were pushing the ice southwestward at about 1 kt, and the leads and polynyas were re-freezing rapidly in the cool temperatures (air -15°C).

Having taken the last of the ship's permitted quota of walruses in American waters on 26 March, we then headed southwestward for the next 2 days, in search of sea lions and seals. Finding none, we then turned eastward in the ice front on 29 March and continued the search. Over the next 4 days (29 March to 1 April) 19 sea lions, 7 bearded seals (Erignathus barbatus), 8 ribbon seals (Phoca fasciata), 2 ringed seals (P. hispida), and 22 spotted seals (P. largha) were taken, principally in the ice to the south of St. Matthew Island. In addition, one bearded seal was found dead, apparently killed by a walrus. Foul weather that set in during the afternoon of 1 April prevented any further collecting, so the ship then headed back toward Dutch Harbor, arriving on the morning of 4 April. Fay and Miller debarked there, and Frost arrived from Fairbanks to replace them.

The ZAKHAROVO departed from Dutch Harbor on Leg II of the cruise during late evening of 4 April, on a heading to intercept the ice margin in the vicinity of the boundary between the Soviet and American economic zones. Killer whales (Orcinus orca) and Dall's porpoises (Phocoenoides dalli) were numerous south and west of the Pribilof Islands. The ice margin was encountered during the evening of 6 April.

The ZAKHAROVO then continued on a course toward Cape Navarin, then turned slightly southward, toward the Koryak Highlands. Two bowhead whales and 3 unidentified large whales were seen on 7 April. Hunting began again on 7 April, and by the morning of 8 April, the ship was well within sight of the Koryak coast. Male walruses were moderately abundant there. The ship operated in that area from 8 to 19 April, in which time 261 bull walruses, 4 Steller sea lions, 4 bearded seals, 1 ribbon seal, 1 ringed seal, and 4 spotted seals were taken. Hunting ceased on the evening of 19 April and the ship proceeded southward, toward the southern tip of Karaginskii Island, arriving there in early afternoon of 21 April. Two boats were lowered to hunt there, and 1 sea lion, 7 bearded, 2 ribbon, 1 ringed, and 4 spotted seals were taken and processed by early evening.

There, during the evening of 21 April, Burns and Frost transferred to the joint venture, BMRT-type trawler, MYS UDINA. On it, they travelled directly back to Dutch Harbor, where they arrived on the morning of 26

April. A marine mammal watch was maintained during the return voyage, though weather conditions were marginal to poor for observation. Dall's porpoises were seen on 22, 24, and 25 April, all of them close to the ship.

RESULTS

Walruses

Of the 160 walruses collected in the American Fishery Zone during Leg I of the cruise, 125 were adult females, 14 were adult males, and the rest were immature animals. The 261 collected during Leg II were all adult and subadult males. From each specimen, the joint scientific party obtained the body weight, body length, tusk length, blubber thickness, reproductive organs, and teeth for age determination. In addition, we collected blood samples for serological analysis from 234 and rectal swabs for virological investigation from 215 individuals. Stomach contents from 60 of them also were analyzed, and a skulls from a few were prepared for museum use.

Age, Size, and Physical Condition

The age of each animal will be determined eventually from counts of cementum layers in thin (0.5 mm) longitudinal sections of the postcanine teeth. Ages also were estimated from general external appearance during Leg I, and most of the females taken then appeared to be rather old, whereas most of the males were comparatively young. The males taken during Leg II were mostly mature adults.

The largest walrus taken was an adult male 359 cm long (standard length) that weighed 1,570 kg. Several other adult males were within a few cm in length and a few kg in weight of that animal. The smallest animal taken was a yearling female, 134 cm in standard length, that weighed only 100 kg. This specimen and another like it were unusually small for their age and would easily have been mistaken for calves, even by experienced observers, had they been seen at some distance. Recent reports of newborn calves in winter probably were sightings of such undersized animals.

Most of the walruses were rather lean. Blubber thickness on the sternum varied from 6 to 49 mm. Females in term pregnancy tended to be the fattest (blubber 19-49 mm thick; mean, 34.4 mm), and adult males were the thinnest (blubber 6-37 mm thick; mean, 23.0 mm). The immature males and all other females were intermediate in fatness between those extremes.

Reproduction

A placental scar indicative of term pregnancy in 1984 was found in the uteri of 34 of the adult female walruses (N=123), 45 others were pregnant with a near-term fetus (to be born in the spring of 1985), and at least three other females had been carrying a fetus earlier but had lost it abortion. Thus, the overall pregnancy rate had been about 28% in 1984 and 39% in 1985, before the abortions took place. One of the 1985 pregnant females contained identical twin male fetuses, developed from a single ovum.

The sex ratio of the 47 walrus fetuses was 20 males:27 females. This is a small sample and its apparent imbalance is not significantly different from unity.

In 37 (29.6%) of the adult female walruses, a new corpus luteum of pregnancy was present, indicating that they had ovulated in the 1985 breeding season and probably had been fertilized successfully. Seven others (5.6%) were still in estrus; 32 more (25.6%) were "barren," some having failed to come into estrus and others having ovulated but failed to be fertilized.

Feeding Habits

Stomach contents were analyzed from 7 adult females taken during Leg I and from 53 males during Leg II. Each of the 7 females was taken 50-65 nm WNW of St. Matthew Island, where the depth of water ranged from about 100 to 115 m. These females had only small amounts of food (up to about 3 kg) in their stomachs. They had been feeding mainly on whelks (Gastropoda: Buccinidae) and tanner crabs (Chionoecetes sp.), which together made up more than 90% of the mass of ingesta. The whelks were the most numerous prey in the stomachs (Table 1). They ranged in size from less than 0.1 to more than 5g. The tanner crabs appeared to be all large adults, ranging in carapace width from 6.5 to 11 cm. In most instances, only the soft-shelled (molting) body of the crab had been eaten; the harder legs apparently had been removed by the walruses and discarded.

The stomachs of walruses examined during Leg II contained much larger quantities of food than in the previous sample. The total weight of ingesta per stomach amounted to 1 to 49 kg. These were all from males taken in the vicinity of Khatyrka on the Koryak coast, about 95 nm WSW of Cape Navarin. There, they had been feeding primarily on bivalve mollusks. The best represented of those mollusks were bivalves, mainly Greenland cockles (Serripes groenlandicus) and soft-shelled clams (Mya spp.). Three of these males and

Table 1. Kinds and quantities of foods found in the stomachs of 7 adult female walruses taken in the central Bering Sea, just west of St. Matthew Island, 21 and 24 March 1985.

Kinds of organisms	Frequency of occurrence	No. of individuals
Polychaeta		
Maldanidae	4	15
Flabelligeridae	3	6
Echiurida	2	3
Priapulida	3	5
Mollusca		
Gastropoda		
Buccinum	7	2065
Neptunea	5	1001
Buccinidae, gen. indet.	3	951
Natica	7	63
Polinices	7	155
Naticadae, gen. indet.	4	17
Margarites	1	1
Snail eggs	1	>100
Bivalvia		
Mya	3	5
Cardiidae, gen. indet.	4	85
Cardita	1	1
Tellinidae, gen. indet.	4	14
Yoldia	2	129
Cephalopoda		
Octopus	3	9
Arthropoda		
Pagurus	3	82
Chionoecetes	7	208
TOTAL		4915

one other that was not fully examined had been feeding on fishes (sand lance, Ammodytes hexapterus), mainly in small amounts (1-12 individuals). In one case, however, about 800 g of those small fishes had been consumed.

Other Pinnipeds

Weights, measurements, teeth for age determination, and stomach contents were obtained also from the sea lions and seals. We also collected serum samples and rectal swabs from all of the sea lions and about half of the seals. The data from these animals have not yet been summarized.

CONCLUDING REMARKS

Ice conditions were somewhat unusual in the winter of 1984-5, in that the pack had been minimal up to February, then expanded rapidly southward in March and April. This evidently resulted in somewhat different distribution of marine mammals than is ordinarily seen. For example, because of the scarcity of suitable ice for haulouts in southeastern Bering Sea, both spotted seals and walruses were scarce there, where they usually abound in years of average to greater ice cover.

Most of the male walruses taken during both legs of the cruise were extremely lean. Their leanness is attributable to the fact that they had just completed a breeding season. Adult male walruses tend not to eat during the rut, hence their blubber becomes depleted and they lose weight at that time. Following the breeding season, they feed intensively. This was reflected in this collection by the greater mass of food in the stomachs of the males than in those of the females. The adult females and young animals, apparently maintain a more constant intake of food year-round than do the adult males. Exceptions to that are the females in pregnancy, who increase their intake, hence become fatter near the end of their term than all other sex/age classes of animals.

Examination of the reproductive organs of the adult female walruses indicated that the proportion giving birth in 1984 (27.6%) was comparable with our findings on the ZRS ZYKOVO in the summer of 1983. In that latter sample, 94 newly pregnant females that would have given birth in the spring of 1984 comprised about 28.6% of the adults examined.

The proportion of female walruses in the present sample that were carrying near-term fetuses (36.8%) was considerably higher than has been found in any other recent samples from this region. It probably does not

indicate a significant change, however, for the proportion judged to be newly pregnant was only 29.6%, which is more in line with the foregoing.

The finding of walruses feeding in waters 100 to 115 m deep was new to science. Although the possibility of their feeding at depths to 100 m or so had been suspected earlier, these new observations confirm it at last and suggest even greater capability.

Of particular interest among the other pinnipeds was the bearded seal found dead on the ice, where it had bled to death internally from a ruptured liver. The damage to the liver had taken place as a result of a sharp blow to the breast, near the posterior end of the sternum, by a blunt-pointed object. That object had penetrated the skin and blubber of the breast but not the bony and muscular body wall beneath, and it had damaged the liver by compression, rather than puncture. In addition, much of the hair over the animal's mid-back, between the shoulders, had been rubbed off by intense friction. We judged that the wound could only have been made by a tusk of a walrus and that the hair had been rubbed off during the seal's efforts to gain freedom from the walrus' grasp.

Also of especial interest were some of the spotted seals obtained by the hunting crews. Of the 30 specimens taken, 28 had typically spotted coats, but the other 2 were patterned dorsally more like P. hispida than like P. largha. In all other respects, however, they were typical spotted seals.

As usual, this cruise provided the American scientists with an unusual opportunity to conduct research that would not have been possible otherwise, and we are very grateful to our Soviet colleagues and to Captain Yagupov and his congenial crew for making this an extremely pleasant and productive trip.