

Polar Bear Research in Spitsbergen

Thor Larsen

Scientists and conservationists in five circumpolar countries are collaborating in a programme of research on the polar bear so that management plans can be evolved to ensure the survival of this endangered 'Red Book' animal. The author, who is an ecologist in the Institutt for Marin Biologi in Oslo University, describes the work he has been doing on Svalbard (Spitsbergen).

The polar bear *Thalarctos maritimus* occurs in five circumpolar countries: Norway (Svalbard), Canada, Denmark (Greenland), USSR and USA (Alaska). In 1964 the University of Oslo and the Norsk Polarinstitutt jointly initiated a long-term ecological and physiological polar bear research programme, directed by the author (ecology) and cand. real. Nils Are Øritsland (physiology), and the plans were presented at the First International Scientific Meeting on the Polar Bear in Fairbanks, Alaska, in September 1965. (Later it became part of the IBP—International Biological Programme.)* Following the Alaska meeting, at the invitation of IUCN (the International Union for Conservation of Nature), two scientists from each of the five countries concerned with polar bears met in Morges, Switzerland, in February 1968, and formed, under the auspices of the IUCN Survival Service Commission, a Polar Bear Specialist Group to coordinate research and meet regularly. Are the polar bear populations in the Arctic declining or not? We do not know, and without facts it is impossible to develop a proper management and conservation policy. Now that scientists and conservationists are co-operating closely we should be able to achieve this.

Live Trapping

Most of the objectives in the Norwegian research plan demand large-scale trapping and tagging of live animals—in order to get population estimates, and study migration and the effects of hunting. Tagged bears that are recovered are also valuable for appraising age determination methods. For blood and milk sampling, and physiological and other investigations, total immobilisation is necessary. Reliable and safe methods for live trapping of black, brown and grizzly bears had already been developed:† steel traps, snares and culvert traps and various immobilising drugs using a syringe gun; the powder-loaded models have an effective range of 30 to 50 metres. At first the drugs presented difficulties. The commonly used nicotine alkaloids and succinylcholine

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† Craighead *et al.* 1960, Erickson 1957, Troyer *et al.* 1962.

chloride had undesirable side effects and small safety margins; none could be reversed by antagonists.

The first attempts at live trapping were made off Barrow, Alaska, in March 1965 and 1966, with fixed-wing aircraft. Succinylcholine chloride was used, and, of nine bears 'shot', four died; only one was successfully marked (Flyger *et al.* 1967). Since then two new immobilising drugs, Etorphine and Sernylan, have overcome the difficulties. Etorphine (M99) is a very potent, morphine-like drug, with minor side effects if given at adequate dosages; it can be reversed by a specific antagonist Cyprenorphine (M285) or by the morphine antagonist Nalorphine, and has been used in a wide variety of wildlife studies, particularly on African ungulates (Harthoorn & Bligh 1965). Sernylan (Phencyclidine hydrochloride), on the other hand, has few side effects but cannot be reversed by antidotes. However, a slightly increased metabolism makes it particularly valuable for Arctic studies (and undesirable in the tropics). It has been used on both brown and black bears (Pearson *et al.* 1968), and on polar bears (Jonkel 1967, Larsen 1967 & 1969, Lentfer 1968).

Success with New Drugs

The next expedition was a Norwegian one to Svalbard, in the summer of 1966. Our group included two American biologists, Dr. A. W. Erickson (University of Minnesota) and Dr. V. Glycer (University of Maryland). We worked from a sealer or from the Governor's (Sysselmanns) ship in northern and eastern Svalbard waters, where polar bears are fairly abundant in summer. Field work started in Northern Svalbard in the middle of July. With three helicopters and three ships we searched the pack, but saw no bears. We then moved eastwards, and in four effective days' work around Kong Karls Land, saw nine bears and successfully trapped and studied four. The bears were 'shot' from the ships' stern using syringe guns and Etorphine with dosages between 4 and 6 mg; a six-months'-old cub received an initial dose of 2 mg. and after 25 minutes another 2 mg. With adult bears the time taken for the drug to have effect varied between four and 20 minutes; the cub went down 2 minutes after the second injection. All the animals recovered well, although doses in several cases were rather high. Each bear was tagged in both ears with monal metal and aluminium tags, tattooed in the upper lip, and marked with a dark hair dye (Nyanzol A) on both hips. Age was estimated from tooth wear, and each animal was measured.

The following summer, 1967, I returned with Dr. Erickson, J. W. Lentfer, of the Alaska Department of Fish and Game, and N. A. Øritsland, University of Oslo, who was in charge of the physiological investigations. We chartered a small sealer for two months' work in the eastern Svalbard pack. A small laboratory was built on the upper aft deck, a cage for the bears erected on the main deck, and the ship carried various equipment for ecological and physiological investigations; we also had a small boat with outboard motor and a kayak for the hunts.

The ice and weather conditions in July 1967 were difficult, and most of the bears had to be stalked on foot by two men, both dressed in white

camouflage uniform and light shoes. One carried a syringe gun and a 44 magnum revolver, the other a rifle for protection. It was often difficult to spot a bear between the pressure ridges and icebergs, so a third man watched the operation from the crow's nest, from which he could signal with flags or by walkie talkie to those on the ice. The hunters had to be at close range in order to fire the syringe gun, and it was often better to chase bears into the sea where the ship could take over. Sometimes a bear had to be run down, for polar bears, in particular the old males, have little staying power, and can be run down by a trained man under favourable conditions.

In August the ice conditions improved, and it was possible to hunt the bears in the water as we had planned; for this the small 14 ft boat with the outboard motor was very useful. We could chase bears in broken ice, and two men could easily pull the flat-bottomed boat across an icefloe. In the water the boat was easily manoeuvrable, and we could push swimming bears in any direction: usually we drove them up on to a small icepan, where they were 'shot' and immobilised. If there was a family group we always took the female first; her cubs or yearlings would stay with her and could easily be taken afterwards.

In July we spotted 57 bears in the only twelve days suitable for surveying from the crow's nest; 22 were trapped and marked. On the eight satisfactory days in August, we saw 48 bears, of which 29 were taken. The best day was August 15th, when 17 bears were seen and eight trapped after five hours' work. In addition to the 51 successfully marked, one drowned and another died, probably by a mucus block in the bronchial tracts, caused by Sernylan. Twenty were taken with Etorphine and 31 by Sernylan, and both drugs were considered good for the work. The average Etorphine dose was 41.54 microgram/kg body weight (20.51–85.71) on 18 animals. Two cubs received a dose of almost 172 microgram/kg body weight, but still recovered well, indicating the extremely wide safety margin of this drug. The Sernylan doses averaged 3.25 mg/kg body weight (0.86–9.50). We later found that polar bears under laboratory conditions require far less of both drugs; normally about half is enough. This may be partly because the wild bears are in better condition.

Each bear was hoisted on board and weighed before being put in the deck cage, where it was tagged with monal metal and nylon tags in both ears, with the same number on each tag. The tags had the legend 'Reward \$20, Norsk Polarinst. Oslo Norway'. The same numbers were tattooed into the upper lip on right and left sides, and the last two digits were painted on the hips with Nyanzol A. Before applying the dye, the hair was cut away with scissors, and the dye was rubbed into the fur with a toothbrush. A 250 cc. blood sample was drawn from the femoral vein, separated in a serum and a hemoglobin fraction on a centrifuge, and frozen for later electrophoresis. A 100 cc. milk sample was drawn from each lactating sow, and also frozen for electrophoresis.

Attempts to pull an incisor for later sectioning and age determination had to be abandoned. On some animals a reduced premolar was drawn for later sectioning and age determination, and on all of them we made

two independent age estimates, based on tooth wear and growth characters. Finally each bear was measured. They were then watched in the cage during recovery, and after a day or two, the gate was opened and they were allowed to walk down on to the ice. Family groups were kept in the cage and released on a small icepan to keep them together.

The 1968 Expedition

For 1968 we planned a winter expedition in Tjuvfjorden, Edgeøya in the eastern Svalbard region, and preceded it with another summer expedition for which in August we chartered a slightly bigger seal catcher. Dr. Erickson and Dr. C. J. Jonkel of the Canadian Wildlife Service took part, and a Dutch student, E. Flipse, who, with three companions was going to winter on northern Edgeøya studying bears, joined us to learn how to immobilise and handle them. Eugen Schumacher and his assistant came as photographers on behalf of the World Wildlife Fund, who had sponsored the expedition. This time we took 31 bears with Sernylan, and one with Etorphine; none was lost. One marked bear was recovered not far from where it had been taken in 1967, with ear tags intact, although the monal metal ones had caused slight infection. Subsequent reports of other recovered bears have shown the monal tags to be either missing or to have caused infections (Ø. Killi, personal communication), and it is a question whether they should be abandoned in polar bear tagging.

In September the winter group, consisting of the author, N. A. Øritsland, and two assistants T. A. Andersen and K. R. Hovelsrud, was put ashore at Tjuvfjorden. A trap line was built in the Eastern Tjuvfjorden region and on Halvmaneøya further south, the traps consisting of a steel-wire foot snare. This was modelled on Dr. Jonkel's design for use in the Canadian Arctic (Jonkel 1967), although during the winter, owing to the constant drifting snow, they had to be modified. A trap line was also run at the Dutch base at Kap Lee further north. We took six bears in the Tjuvfjorden traps, and another eleven either when they visited the station, or after a chase by snow scooter (a single-track snowmobile). We found that the bears were much faster in winter, and, if the terrain was difficult, it was impossible to run them down with a dog team, or even with a snow-scooter. At the Dutch base, another 12 were taken in the traps (Oosterveld 1969). In the spring, although bears were numerous, we had to concentrate on migration studies and denning biology, so trapping was abandoned.

In 1966 and 1967, we made monthly aerial surveys, from March to October, in Norwegian Air Force Albatross planes over the Eastern Svalbard waters, counting both bears and tracks and studying the ice conditions; whenever possible we also made seal counts and ornithological observations. Our flying height was between 60 and 150 metres, depending on weather conditions; about 100 metres was best. Each survey followed a straight course, ignoring open leads and seal concentrations. The normal route was Norway—Hopen—Kong Karls Land—Barentsøya—Edgeøya and Bjørnøya. Kong Karls Land was studied with particular care, for these small islands are assumed to be

the polar bears' main breeding area in the Svalbard archipelago. The track observations gave valuable information about migration, with indications that bears migrated between the western Soviet Arctic and Svalbard; to confirm this bears in the Soviet Arctic should be marked and studied. The counts, however, were not satisfactory for determining the numbers within a certain area; we got better results from the crow's nest observations on the three summer expeditions. Migration patterns can also be mapped with telemetry.

Since 1966 we have studied both the journals and biological specimens of trappers wintering in Svalbard, mainly on Hopen, Halvameøya, Hornsund and on Ryke Yseøyane. Valuable information has also been obtained from the captains of the trophy hunting vessels, cruising the eastern summer pack. Serum and hemoglobin samples have been collected both in Svalbard and in the Alaskan Arctic through the Alaska Department of Fish and Game.

The biological samples already collected still have to be studied thoroughly, and the marking and sampling programme continued.

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Norway Controls Bear Hunts

The Norwegian Government has banned the free hunting of polar bears from September 1st 1970. A quota for each year will be announced.



A LARGE MALE GOES ABOARD
Thor Larsen **Plate 3**



EXPEDITION VESSEL, 1967, with one bear in the cage on deck. The three on the ice are recovering from the drug. Below, a family group recovering.





Plates 6 & 7
HANGUL STAG HEAD

HANGUL HIND CALF, about
six months old.
Colin Holloway