Revision of the International Convention for the Regulation of Whaling. A meeting of a working group in Portugal in July to consider the revised text had to be cancelled but the group will meet later in the year.

Activities of 'pirate' whaling vessels. The commission was given a detailed report on the activities of the catcher-factory vessel *Sierra* (formerly *Run*) which has operated in the Atlantic Ocean since 1968, and of the *Tonna* which commenced operations in 1978 and sank in July of the same year. The establishment of a register of whaling vessels to combat the activities of 'pirate' vessels was agreed. South Africa, which had been a centre of operations, presented a report of attempts to outlaw these vessels. These attempts had been successful in closing down the parent company in South Africa.

MARKING SOUTHERN ELEPHANT SEALS ON ILES KERGUELEN

BY R. J. VAN AARDE* AND M. PASCAL**

Contents

Introduction

Investigations of the population ecology of the Southern Elephant Seal, *Mirounga leonina*, on îles Kerguelen (49°S, 69°E) began in 1970 under the auspices of the Director of Scientific Laboratories of Territoire des Terres Australes et Antarctiques Françaises (TAAF). To assist these studies an intensive pup marking programme was undertaken during 1970, 1971, 1975, 1976 and 1977. In 1977 the work was part of a cooperative research programme between TAAF and the South African Scientific Committee on Antarctic Research (SASCAR).

Marking techniques

Branding

Weaned pups were hot-branded during the austral summers of 1970 and 1971. A combination of letters and numerals were used to distinguish individually branded animals (KA 1–20 and KB 1–40 for 1970 and 1971 respectively). Practical difficulties experienced with transportation of heavy equipment, seal disturbance and immobilization, as well as limited manpower, caused TAAF to abandon this technique in favour of tagging.

Tagging

British manufactured ('Toptag Dalton') coloured plastic tags, consisting of a male and female section, each approximately 2.0 × 4.5 cm in size were used in 1975 (red) and 1976 (yellow). On the male component the word FRANCE was engraved, while the female component carried the letter K (Kerguelen) followed by a letter A, B, C or D, and a four digit number from 0001 to 1000 for each series. These tags were attached a few centimetres from the posterior edge of the interdigital web of the left hind flipper, usually between the fourth and the fifth digits.

In 1977 French manufactured tags ('Axaflex Chevillot',) were used; they were more flexible and the female component differed from that previously used in size (3.5 × 2.5 cm) and shape. These tags carried a three digit number from 001 to 000 in the series KE, KF and KG, and were attached a few centimetres from the posterior edge of the interdigital web of the left hind flipper,

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between the third and the fourth digits (Figure 1). The tags were applied using a specially designed applicator with a hardened steel spike which fitted into the male section of the tag, forming a steel tipped point which pierced the interdigital web. During 1977, 50 seals were also double tagged with size 49 Hasco 1005 monel metal tags (National Band and Tag Co, USA), stamped with the letters KER (Kerguelen), followed by an identification number as described by Condy and Bester (1975). This was done to compare the durabilities of plastic and monel metal tags.

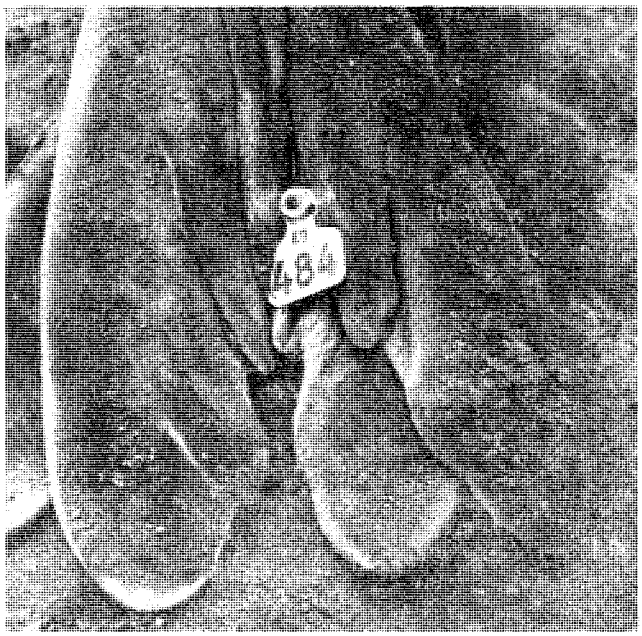

FIG 1. The posterior flipper of a weaned pup illustrating the position of the French manufactured 'Axaflex' tag.

Two people were required to tag seals, one to hold the flipper and the other to apply the tag and record relevant data (date, locality, sex and tag number). This information was transferred on to forms supplied by the Centre de recherches sur les migrations des mammifères et des oiseaux of the Muséum National d'Histoire Naturelle in Paris, where they are stored.

Results

The number of seals branded or tagged during each season is given in Table 1. During the five seasons 10 382 animals, of which 99.7 per cent were pups, were marked, branded or tagged shortly after weaning. Weaned pups tended to congregate in pods on the periphery of breeding beaches, and were easily accessible with minimum disturbance to the harems.

TABLE 1. SOUTHERN ELEPHANT SEALS MARKED AT ÎLES KERGUELEN

	Adults			Sub-adults (sex	Weaned pups				Marking
Year	♂♂	♀♀	??	unknown)	♂♂	♀♀	??	Total	technique
1970	—	—	—	—	—	—	38	38	Branded
1971	—	—	—	—	—	—	40	40	Branded
1975	4	2	3	23	1 472	1 309	2	2 820	Tagged
1976	3	1	—	—	2 229	2 121	17	4 471	Tagged
1977	—	—	—	—	1 540	1 453	—	2 993	Tagged
	7	3	3	23	5 341	4 883	102	10 362	

The number of marked individuals that were resighted during each year is given in Table 2. Most of these resightings were made by scientists, but casual observers from several expeditions made significant contributions. Only 3.61 per cent of the marked seals were resighted at least once (374 individuals); 1.34 per cent were resighted twice.

TABLE 2. THE NUMBER OF MARKED ELEPHANT SEALS RESIGHTED DURING THE BREEDING AND MOULTING HAULOUT SEASONS

Year resighted	Year marked*				Total resighted
	1970	1971	1975	1976	
1974	—	2 (5.00)	—	—	2
1975	3 (7.89)	—	—	—	3
1976	1 (2.63)	1 (2.50)	117 (4.20)	—	119
1977	1 (2.63)	1 (2.50)	75 (2.69)	173 (3.87)	250

*Figures in brackets indicate percentage of total marked population resighted during that year.

A year by year analysis shows that recaptures were low. (Five per cent of the accumulated total marked population was observed in 1974, 3.85 per cent in 1975, 4.11 per cent in 1976 and 3.39 per cent in 1977.) However sufficient information to evaluate various important population parameters should eventually be available. Taking the data obtained so far it is possible to point out some interesting features.

One female pup branded in 1971 was resighted in October 1974 during the breeding haulout, and 12 pups tagged in 1975 were reported to have produced pups during the 1978 breeding season. These observations suggest that mating occurs at the end of the second year, and parturition a year later.

During the 1976–77 summer haulout (December to January), 117 (4.2 per cent) of the 2 783 seals tagged at weaning the previous year were resighted. A year later, during the same period 75 (2.69 per cent) of the original 2 783 tagged animals were resighted, four of which had been recorded in the previous sample of resightings. These data indicate that of the weaned pups tagged in 1975, at least 188 (117 + 71) reached an age of one year, and at least 75 reached an age of two years. Using Caughley's (1977, p 151) equation to estimate mortality rate, 71 per cent of pups died or lost their tags between the ages of 14 and 26 months. However, actual mortality would be lower than this when allowance is made for tag loss and dispersion away from the study area.

None of the 10 362 seals marked at îles Kerguelen have yet been resighted on other breeding grounds. Bajard (1962) observed an adult on Kerguelen during 1960 which had been branded on Heard Island, and six sub-adult males marked at the Vestfold Hills, Antarctica were observed on îles Kerguelen during 1976.

Discussion

The population of Elephant Seals at îles Kerguelen increased in size from 1960 to 1970, and decreased from 1970 to 1977 (Van Aarde, in press). The early attainment of sexual maturity at two years compared with four years for Macquarie Island (Carrick and others, 1962), and its similarity to that observed in the exploited population at South Georgia (Laws, 1956), suggests that the population is in a process of adjusting to its decreased size in relation to available resources, and might be expected to slow and even eventually reverse the present trend.

Mortality in the second year (14–26 months) of life is high compared to estimates for South Georgia (Laws, 1960) and Macquarie Island (Carrick and Ingham, 1962) but adjustment for tag loss and dispersal would lower the estimate. Condy (1977) indicated that at Marion Island 24 per cent of seals double tagged at weaning had lost one tag within 18 months. Since seals at îles Kerguelen were single tagged, it could be assumed that a further 24 per cent would have been resighted in 1977–78 if double tagged. Incorporating this adjustment results in an estimated mortality rate of 67 per cent between the ages of 14 and 26 months. The effect of dispersal on the mortality estimate remains unknown at present. Nicholls (1970) believed that immature Elephant Seals have a strong tendency to return to birth sites, while Condy (1977) disagrees, believing that dispersal occurs to its greatest extent during the immature years.

Conclusions

The long-term aim of this pup marking programme is to provide data on dispersal, and information about age specific fecundity and mortality rates. Iles Kerguelen's Elephant Seal population represents nearly 20 per cent of the global population of this species—600 000 ± 100 000 (Laws, 1960). Having documented fluctuations in numbers since 1952, and recently (1970–77) observed a decrease (Van Aarde, in press), paralleled by decreases in the Marion Island (Condy, 1977) and île de la Possession populations (Barrat and Mougin, 1978), this single large population is likely to reflect the general status of Elephant Seals in the Indian Ocean sector of the Southern Ocean. The tagging effort, which forms an integral part of the research programme on the ecology of this population, would therefore be continued, most likely as a co-operative programme between SASCAR and TAAF.

Acknowledgements

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YUKON SETTLEMENTS: A CRITICAL REVIEW OF DATA

BY F. DUERDEN*

The impact of the proposed Alaska Highway gas pipeline through the Yukon will be manifest in the Territory's various human settlements. Despite acute awareness of this fact and subsequent investigations into pipeline impact, extensive fieldwork conducted by the author during the summer of 1978 indicates that Yukon settlement data is narrow and unreliable, and fails to give a balanced view of the structural, economic and ethnic dimensions of settlements.

From a historical standpoint there is a large amount of material concerned with Yukon settle-

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ment. Many of the works published in the first half of the century were related to the gold rush and, with a few exceptions, tended to be colourful, narrow in theme, and inaccurate (Duerden, 1971, p 133). The early authors fixed in people's minds a direct association between 'Yukon' and 'Klondike', omitted to mention native occupance, and failed to present a balanced view of physical environment. Since 1950, government, business and academic interest in the north has grown, and publications have become more dispassionate and apparently more scientific in their treatment of the Yukon. Impact assessment of future developments are dependent upon the accuracy of research reports and publications written over the past 15 years.

Between 1963 and 1977, 157 publications with some relevance to Yukon settlement were produced; 51 per cent were from government sources and the balance from business, interest groups and academics (Cooke and others, 1973–78). Collectively the works display a strong spatial inbalance. For example, Dawson City, with less than 4 per cent of the Territory's population, is the focus of 33 per cent of all references, while Whitehorse, with 64 per cent of the population, is the concern of 25 per cent of all works. Only 10 works take an overview of settlement, while 147 examine either small groups of settlements or individual settlements, thus reinforcing the conventional view that communities are spatially and functionally isolated from each other, as opposed to constituting components of the most resilient non-native settlement system in the Canadian northland (Duerden, 1971; Green, 1976).

The various publications can be divided into two groups—those which contain raw data (census and community data, maps), and those which, through synthesis, attempt to draw conclusions or make recommendations on settlement. It is obvious that the accuracy of the latter is predicated on the integrity of the former. Population data for the Yukon are available from Statistics Canada, the Economic Research and Planning Unit of the Yukon (ERPU), Department of Indian Affairs, Northern Development (DIAND), the Lysyk Inquiry, and the Council for Yukon Indians (CYI). Although there may be a degree of cross-reference between these sources, there are significant differences in their population figures over similar periods. Overall, the Statistics Canada data for the period 1966–76 are probably accurate, but field work conducted by the author indicates that when they are disaggregated for major communities there may be up to 100 per cent error. This may be a reflection of both data collection technique and the attitude of the population towards data collection. ERPU (Yukon Territory, 1977a) data are generated from medical records, using 1971 census information as a base. Population location is assumed to be the same as mailing address, and ERPU recognizes this as a problem, stating that in some instances the unit relied on guesswork to generate data (Yukon Territory, 1977a, p 2). The Lysyk Report (1977) contains community surveys, but the population figures provided are un-referenced, and although field work indicates that they may be fairly accurate, this is probably as much due to intuition as to scientific data gathering.

The population data problem is further compounded when ethnic breakdown is considered. ERPU (Yukon Territory, 1977b) indicates that in 1976 there were some 3 100 Indians in the Territory, the CYI states that there are 6 000 (Lysyk and others, 1977, p 84), while the Socio-Economic Baseline Data Inventory (Canada, DIAND, 1978) uses a 1971 population figure. The discrepancies may be attributable to confusion over classification of 'status' and 'non status' Indians combined with data collection problems, but manipulation of figures in the light of impending land claims may also be responsible for the differences. The Socio Economic Baseline Data Inventory (Canada, DIAND, 1978) is the major statistical compilation directly related to pipeline impact studies. But much of the data in the work is out of date—using 1971 as a baseline—thus ignoring changes in the Territory in the period 1971–77. Many tables do not balance—due perhaps to the 'rounding' of figures, which is misleading in an area containing small rural communities. The major omission, however, is the failure to give adequate consideration to the native economy. There is ample field evidence on the presence (if not viability) of the native land-based economy, yet according to the inventory, no one is involved in land-based activity within the two settlements where it is most dominant (Old Crow and Pelly Crossing). Only 1.89 per cent of the Yukon's Indian labour force are listed as hunters or trappers; ironically the preface to the study states: 'It is hoped that this inventory will not only provide data useful for impact studies . . . but will be of valuable assistance to researchers of other Yukon studies' (Canada, DIAND, 1978, p 3). Obviously any person using the source would be compounding existing errors.