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## EXPLOITATION OF SEALS, WHALES AND PENGUINS IN NEW ZEALAND

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This summary of exploitation and assessment of its effects has been derived from consideration of (a) historical factors, (b) present distribution and population levels, and (c) relevant features of the life history and ecology of the vertebrates concerned as far as this has a bearing on the exploitation results. In marshalling the known facts we end up with a summary which is about two-thirds history and one-third natural history, an imbalance that brings out how little is yet known about the full life cycle and ecology of most marine vertebrates, at least in sufficient critical detail to allow an accurate estimation of exploitability.

### WHALES

Exploitation of whales is considered in relation to (a) the southern right whale, (b) the sperm whale, (c) other whalebone whales, especially the humpback.

#### (a) *Right whale*

The destructive effects of exploitation in the case of right whales were rapid and severe because of the fact that this whale is the only one in the Southern Hemisphere which comes into very shallow coastal waters and bays for calving in mid-winter. The toll was thus taken directly on adult females with consequent loss of a high percentage of calves. Even whaleships normally hunting far at sea found it profitable to anchor inshore during the calving season which extends through May, June and July, and the joint onslaughts of a multi-national

fleet and the resident shore-whalers in the period 1830-1840 brought the species to a point near extinction throughout the Southern Hemisphere. By the time shore whaling in New Zealand became uneconomic and there were alternative substitutes for the flexible baleen, right whale stocks were at a very low ebb. The right whale has never regained its former numbers, its breeding distribution is now more restricted than it was a century ago, but it would appear to be stabilised at a lower level and annual sighting figures from Campbell Island indicate a slight and steady rise in numbers in that area. The species is now totally protected.

#### (b) *Sperm whale*

Exploitation of sperm whales has always been by pelagic hunting and the random drain on stock, especially of segregated groups of males, has never had a permanently disastrous effect. Economic considerations governed the intensity of hunting, and while sperm whales were still plentiful the gradual competition of petroleum products for illuminant oil and candles, and the loss of manpower attracted to gold rushes in California, Australia, and New Zealand in quick succession, caused the sperm whale fishery to dwindle. It was revived on a small scale based on Dunedin in the 1870s, but was more effective in providing an outlet for adventure and some good copy for writers like Frank Bullen than in promoting a business boom or reducing whales appreciably. Commercial interest in sperm whales has fluctuated ever since. Even under present-

day international regulation the species is not regarded as in need of special protection. It is caught regularly at some shore stations, but not in New Zealand where processing plants are small and not geared to deal with the different grade of oil and by-products characteristic of sperm.

They are taken at the present time by many factory ships proceeding south for the Antarctic season for baleen whales. This season by agreed regulation now commences later than formerly, and the vessels fill in time hunting sperm en route. Without much diversion of course the combined fleets may account for up to 5000 sperm whales in a season.

### (c) *Humpback*

This is the only baleen whale of current commercial significance in New Zealand, where it is, and has been, hunted from shore stations for nearly a century. Because of its short baleen it was ignored in the heyday of right whaling, nor was it easy to take with hand harpoon and lance. Migrating from summer feeding grounds in the Antarctic Ocean to calving and pairing grounds in the tropics where they do not feed at all, humpbacks show a regular tendency to skirt coastlines on both journeys. Furthermore, there have been shown to be several migrating groups or populations with little or no interchange between them though they are contiguous at the Antarctic end of their trek.

In the early days of pelagic whaling from floating factory ships which did not commence its modern phase till 1923, they formed a high proportion of the Antarctic catch. This excessive drain caused a rapid decline of numbers especially in the heavily fished Atlantic sector, and international regulation eventually prohibited the taking of humpbacks south of the 40th degree of south latitude. This regulation placed no restriction on shore stations which have continued to operate in South Africa, Australia, and New Zealand, nor on the quaintly anachronistic tropical hunting carried out by a family unit in Tonga. Off the New Zealand coast, of course, the whales are travelling — north-bound from May till late July, and south-bound in October-November. Northern stations — formerly Whangamumu and later Great Barrier Island — found it profitable

to work both seasons, but the Tory Channel whalers considered that not enough south-bound whales ever used Cook Strait to make a spring season worthwhile.

The catch at Tory Channel has been studied and analysed almost every season since 1946, a study that has been practically the single-handed (and self-imposed) task of Mr. W. H. Dawbin, now of Sydney University. After 15 years the annual analysis still fails to disclose any conclusive trends of declining stock though its age and sex composition does show some change. There has been fluctuation of numbers, of course, and none more spectacular than the present season 1961 just concluded. 1959 was a record year with 207 whales in 73 days. 1960 was another new record with 248 whales. 1961, with no diminution of efficiency, has produced a mere 55 and the season has closed. Great Barrier also has closed on a tally of 20 (against an average of 70-80). It is not necessary to postulate a drop in humpback population, which is unlikely. A slight diversion of route is a possibility, or even an unexpectedly early passage, following a slight trend that has been noticed for the past five years. It should be added that there is an untapped regular migration stream of humpbacks via the West Coast, converging on land near the Southern Fiords and Foveaux Strait.

The New Zealand industry is small scale compared with that of Australia or South Africa, but continuation of the annual analysis is likely to make a significant contribution to the solution of the problem of detecting danger points in exploitation.

### (d) *Other baleen whales*

Blue, fin, and sei whales, the main quarry of the great pelagic whaling fleets, do not come within the scope of this paper, but it is in this group that the greatest problems of conservation are now posed. I know of no better simplified summary than W. H. Dawbin's article "Whales and Whaling" in "The Antarctic Today" (1952) which should be consulted for its evaluation of the trends which may indicate over-killing — such trends as change between seasons in the relative numbers of the different species of whale, in the average length of each species,

in the percentage immature, and in the catch per unit of effort.

### SEALS

In our consideration of seals, we come to a group of marine mammals which differ from whales in that they are compelled to make some regular contact with the shore, and this, of course, affects the intensity with which they can be hunted. Distinction must first be made between the kinds of seal involved in exploitation. These are (a) the New Zealand fur seal, and to a lesser extent the southern sea lion, both of which are eared seals, and (b) elephant seals.

#### (a) *New Zealand fur seal*

Singled out for the value of its fur and only secondarily for its oil production, the fur seal was the earliest victim of intensive, and largely indiscriminate, exploitation within the historic period we are considering. The only regulation that ever operated was sharp decline of stocks, for the demand on world markets for fur rarely showed any fluctuation. From declining prospects in Bass Strait, Australian sealers moved to New Zealand at the beginning of the 19th century, working gradually south from the Fiordland and Stewart Island grounds to the relatively unknown sub-Antarctic where, within this period, several new islands were discovered. These discoveries were followed by an intensification of effort and a rapid decline in the number of fur seals. In fact, the profitable flush of hunting was over in a little more than 10 years from the time of discovery of new grounds. Nevertheless, there appeared to have been only two localities in this region where stocks were completely wiped out. Contemporary accounts credited Macquarie Island and Antipodes Island with exclusive possession of what was called the upland seal, and it is probable that the species concerned was, in fact, not the New Zealand fur seal which occupies the rest of the area and still survives in fair numbers. During a notable increase of numbers during recent years, it has appeared as far south as Macquarie Island. For the most part, the shore habitat of the New Zealand fur seal is extremely rugged coastline. Most frequently the animals haul out on tumbles of large

loose rocks at the base of eroding cliffs so that approach from the shore meant negotiation of cliffs and approach from seaward was equally hazardous. The seal herds under these conditions were both well hidden and extremely agile, and a certain number of animals always escaped initial attacks. As fur seals also have a certain amount of pelagic movement which is wide ranging in the case of immature animals, there were always non-breeding rookeries as well as the more regular breeding rookeries. This meant that by the time hunting had become unprofitable because of reduced numbers, there was likely to be still a fair nucleus of stock surviving. With a perceptible revival of numbers of seals in the second half of the 19th century, it was inevitable that poaching should take place. This went on in spite of protection afforded by law from about 1884, but this poaching does not appear to have been significant in its long-term effects. Open seasons between 1890 and 1946 were never regarded as producing profitable returns, however, and the last open season in 1946 was notable for the rather inept and unregulated hunting technique based largely on the traditional indiscriminate approach. There has never been any enlightened policy which would permit exploitation and at the same time ensure the preservation of stock. There has been a very marked increase in the number of fur seals since 1946 and a considerable extension northward of their regular range. Theoretically, enough is now known of fur seal biology from studies in the Alaska and Pribilof region of the North Pacific to permit rational exploitation. This is done in the case of northern fur seals by estimating the number of immature male animals of certain age groups (usually 3 and 4 years) that can be taken safely. In this northern region, however, the animals conveniently segregated themselves on flat and accessible islands and can be rounded up and penned almost like farm herds. Under these conditions, the selective exploitation results as is well known in a steady build up in the numbers of the exploited herds. It would not be at all easy to apply this system to New Zealand. Here the breeding season when pups are born, commences in December and at this time mainly old bulls, cows, and the growing pups are present on the breeding rookeries. Here they remain until a partial dispersal commences in

March and the pups are finally weaned and independent about August. Still wider dispersal then commences and in the meantime, older age groups of the immature seals are widely scattered forming semi-permanent rookeries which may, or may not, ultimately become breeding places. Even if a survey disclosed a definite pattern of distribution for the age groups, it is unlikely that the total numbers that could be secured from any one age group would be sufficient for many years to maintain a financially profitable industry. Nevertheless, if it is to be established it must start in an experimental and subsidised way and with rational conservation in view; the only condition under which it should be contemplated at all.

(b) *Elephant seals*

The range of these large earless seals is now much further south than that of the fur seal, although overlapping. Breeding adults haul out about August, much earlier than the fur seals, and they do so on much easier coastal terrain. It is unnecessary in this paper to describe the well-documented life cycle and breeding habits. From the beginning of the historic sealing period, these seals also were indiscriminately hunted for their oil which has maintained a high market value up to the present day. Inevitably, since 1810, they have suffered extreme depletion of breeding stock (for example, at Macquarie Island) to a point where hunting became unprofitable and the industry temporarily stopped. In spite of their greater vulnerability, elephant seals have shown remarkable capacity to re-establish. Possibly the long pelagic life of the young animals and their wandering propensities have been the main factors in promoting rapid build up of new populations in the old localities as soon as these were abandoned for a period by the sealers or placed under conditions of total protection. This is the condition now obtaining in the whole of the New Zealand area, and in Macquarie Island, which is under Australian jurisdiction, as well. There are well-tested techniques worked out from long experience in the Falkland Island Dependency region of the Atlantic Antarctic and elsewhere, and there is no doubt that at Macquarie Island consideration could be given to controlled or experimental exploitation. This is not to say that it should be

recommended for there are many factors to consider, but merely to state that the proposition is practicable on the basis of present population numbers and structure.

### PENGUINS

Allowing for some differences in biology and behaviour between mammals and birds it is permissible to group at least one section of the order of penguins with seals as essentially pelagic vertebrates using the land only for reproduction and moult. This section is exemplified by the sub-antarctic crested penguins which are represented in the New Zealand region by five species, whereas every other sector of the circumpolar zone has but two.

In prehistoric times it is probable that one population of crested penguins at the Chatham Islands was exterminated by ruthless predation of hunger-threatened Morioris in the same inexorable fashion that sealed the fate of the great auk in the northern hemisphere. However, there is no real evidence except of the fact that they became extinct there. In early European sealing times there was sporadic depredation on eggs and birds elsewhere in the sub-antarctic, but it was never sustained enough to have any lasting effect on the stock. Nor was the short period in which passing fashion took a toll to provide skins for ladies' muffs. Of much more significance for our study was the sustained effort of the late Joseph Hatch who sought to buffer the fluctuating fortunes of elephant sealing with a much more dependable exploitation of penguins for oil at Macquarie Island. He did so with some success for more than 25 years, weathering financial depression, loss of ships, and frequent litigation, but finally succumbing to organised public opposition, backed by resolutions of scientific societies. The last straw, in contemporary opinion, was Hatch's public statement that there were more royal penguins in the Nuggets rookery after 25 years of exploitation than when he started, and he was branded a liar as well as a rogue. The ascertainable data from reliable sources over 40 years show that in fact he was right.

Hatch commenced his operations on king penguins, the largest but least numerous of the four species on Macquarie. They were al-

ready much reduced by earlier sealer depredation, being more sedentary and vulnerable. Luckily for the king penguins he found it difficult to extract the oil uncontaminated with blood, and turned his attention to the more plentiful royal penguins, working only one convenient rookery at the Nuggets.

"When the hunters commenced work in the spring they were engaged in procuring sea elephant oil, and did not molest the penguins coming ashore to breed. The penguin 'season' began in February when the year-old young or "fats" came out of the sea to moult. It was from these birds that the first toll was taken. Adults returning to the sea after nesting were allowed to do so, as they also fattened before coming out to moult in March, when a number of them were taken. The whole season was thus continuous for about six weeks, and fat yearlings followed by fat adults were the victims. Whether by accident or design there was thus evolved a system of killing that inflicted a minimum of damage on the stock. So long as the number taken in a season did not exceed the potential annual increase, such a system could continue indefinitely."

The above paragraph is a quotation from notes by E. R. Waite made in 1912 (Falla 1937, p. 111). Since then, as a result of a short field study of the Nuggets rookery in December 1930 (ten years after the closing of Hatch's operations) and a further visit in December 1957, I would go further than Waite in considering that there is evidence that the breeding colony was actually expanding in size at that time in spite of the fact that the industry's toll was up to 150,000 birds per season.

Some of the relevant records of the size of Nuggets rookery given chronologically are:—

- (a) J. I. Thomson in 1879 "made a rough estimate of the acreage, and of the number of penguins to the square yard, and concluded that there were in sight no less than 180,000."
- (b) Ainsworth in 1912 estimated the total area covered by the breeding groups as approximately ten acres and secured a valuable photograph which shows maximum extension of area (greater than any recorded since) and a density consistent with a population of 500,000 birds (estimate by Blake). He also records the independent conclusion that

"the yearly increase in numbers in the only rookeries that are being worked is certainly greater than the depredations due to the sealers."

- (c) In December 1930 the cleared areas still totalled about 10 acres, but the density seemed less than in Ainsworth's photograph and our (B.A.N.Z.A.R.E.) estimate was of 338,800 breeding birds.
- (d) By December 1957 the breeding population seemed stabilised at a lower level, vegetation has re-covered perhaps three acres of the former cleared areas. On the basis of earlier estimation methods the breeding total would be about 250,000 birds, half the number present in 1912.

No far-reaching conclusions need be claimed to follow this record of fluctuations, for other factors were no doubt involved. At present, while Nuggets now declines, other new colonies of royals elsewhere on Macquarie are increasing. The relevant point is that Nuggets reached its peak late in a period of 25 years of exploitation, and doubtless for reasons comparable with those that stimulate population growth in the scientifically exploited populations of Alaska fur seals.

#### GENERAL CONCLUSIONS

- (a) All pelagic vertebrates (whales, seals, or birds) are vulnerable if exploitation interferes regularly with critical periods in the breeding cycle. The near-extinction of right whales in both hemispheres is a reflection of this fact.
- (b) Selective culling of age groups which have been found by study and calculation to be "expendable" may stimulate an actual rise in total breeding stock, as exemplified in the controlled exploitation of some seals and penguins.
- (c) The only sure scientific check on the effects of exploitation is a combination of full biological data with an analysis of statistical data aimed at revealing the population dynamics of the stock. On an international scale this is now being attempted with baleen whales.

#### REFERENCES

- DAWBIN, W. H., 1960. The composition of the New Zealand whale catch in 1959. *Norsk Hvalfangst-Tidende* 9:401-409.
- FALLA, R. A., 1937. Birds. *B.A.N.Z.A.R.E. Rep. Ser. B* 2:1-304.