SCIENCE AND RESEARCH INTERNAL REPORT NO. 64

RESEARCH INVOLVEMENT IN THE MANAGEMENTOF TAKAHE

A CASE STUDY

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January 1990

ISSN 0114-2798

ISBN 0-478-01160-1

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PREAMBLE

(A personal comment by the Director, Science & Research.)

Because of the pressures for quick answers from scientists to the immediate problems of managers, the importance of longer term strategic research investigations is often queried. It is my opinion that a major reason for this response is that the value of such longer studies can only be realised after the research has been concluded and incorporated into management changes. The history of such research-management interactions is rarely recorded so managers not involved, or those of a later generation, are not properly informed of the results of such long term projects.

I asked Jim Mills, therefore, to document the history of research and management of the takahe. This paper describes a 12 year field study involving an investment of scientific and management staff of approximately 30 person years. It took a long time to discover by persistent investigation the biological reasons for the ongoing decline of takahe numbers. It required dedication to work for season after season under difficult field conditions to obtain the research data to reach complete conclusions. It then required a full understanding of perceptive managers with the courage to accept the scientists findings and then implement them into often unpalatable actions in the face of considerable pressures.

The takahe story is one of success. It clearly shows the value of strategic, management driven, research investigation. Ecological processes take time to unravel and understand and long investigation is often absolutely necessary so that scientists can correctly advise managers.

From time to time, the Science & Research Division will report on subsequent case studies such as this.

Richard Sadleir
Director, Science and Research

RESEARCH INVOLVEMENT IN THE MANAGEMENT OF TAKAHE

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SUMMARY

This report shows the role that research has played in the conservation of takahe (*Notornis mantelli*) by establishing the reasons for the decline in takahe numbers. These results led to the development of management techniques which were targeted for maximum effect resulting in a considerable increase in numbers of the birds.

1. TAKAHE DECLINE

Soon after the rediscovery of takahe in 1948 a research programme was initiated by the New Zealand Wildlife Service to: (a) obtain basic data on the food, breeding and mortality of the bird; (b) establish the distribution, and (c) monitor population changes.

The regular monitoring of the Takahe Valley-Point Burn population detected the start of a decline in numbers in 1967 and by 1971 it became evident that unless this decline was halted the takahe would become extinct.

The problem that confronted both researchers and managers was that the reason for the decline was not known. There were a number of hypothesis put forward which included:

- ergot poisoning during tussock flowering years
- DDT contamination of the environment
- stoat predation
- competition from deer
- natural senescence of a remnant population
- inbreeding problems
- disease
- high mortality during severe winters
- the possibility the birds were living in marginal habitat

Effective management of the wild populations could not proceed because management could not be targeted at the causes. The only immediate procedure which could be undertaken was to intensify efforts at captive breeding as a precautionary measure in case the wild population declined to extinction.

2. INTENSIFIED RESEARCH PROGRAMME

In 1972 an integrated research programme was initiated with the aims of establishing the causes of the decline and developing management techniques. The programme adopted a task force approach involving experts in different disciplines, most of the field work was carried out between 1972 and 1984, and concurrently during this period various management procedures were introduced and evaluated. Throughout the programme two scientists and a science technician were full-time, and were assisted by scientists from Botany Division, DSIR; Department of Botany, University of Otago, Remote Sensing Unit, PEL, DSIR; and Biochemistry Division, DSIR.

The time spent in the field by two scientists and the technician over the first four years totalled 4 ¼ person/years. Between 1976 and 1984 the same number of permanent scientific staff were employed in the investigation and further 2% person years were spent in the field. In addition there was a major field commitment from management trainees. From 1972 to 1976 seven trainees were involved for five six-week periods each year giving a total of 16 ½ person/years. Management contributed another 4 person/years in management assessment. Scientists from Botany Division, Remote Sensing Section, and Applied Biochemistry Division, DSIR and the Botany Department of the University of Otago contributed approximately another ¾ of a year to field work from 1972 to 1984. Four Special Project Employment Scheme graduates were also employed for six months (2 person/years). In total approximately 30 person years were spent in field work between 1972 and 1984.

Initially the study concentrated on aspects of breeding but consistent differences in breeding success between pairs on particular territories led to a need to look more closely at the habitat and food requirements of takahe. This developed into a detailed study of the nutrient requirements and digestibility of food by the bird. Studies were also undertaken on stoat populations, the diet of deer and the impact of deer grazing on the nutrient quality and productivity of the tussock species preferred by takahe as food.

3. MAIN RESEARCH FINDINGS

Insufficient chicks were being produced to offset the death rate of adult birds. Seventy-five percent of chicks were found to be dying within three months of hatching. Initially we believed that stoat predation was responsible for these high losses, but there was no real evidence to support this view and subsequent research findings changed our opinions. For example, in 1976 when stoats were found to be at peak numbers, chick losses were not high and in some parts of the bird's range losses were negligible. Similarly between May 1981 and January 1983, 20 takahe with radio transmitters were tracked for a total of 5343 bird/days (an average of 267 days/bird) and none died through stoat predation.

After a series of pilot investigations it was detected that the major problem was poor nutrition. Many takahe territories consistently failed to produce young which survived to independence. Nutritional studies revealed that birds required food high in nitrogen and phosphorus for an adequate diet and the nutrient content of the tussocks was being affected by deer grazing. As a result representations were made to the Fiordland National Park Board and to the New Zealand Forest Service (who were responsible for noxious animal control within the National Park), recommending deer control be increased by intensified foot-hunting and the introduction of shooting from helicopters. This was agreed to with the result that deer numbers decreased by 60% between 1974 and 1976 (Fig. 1a). Detailed investigations showed that browsing by deer lowered the nutrient content of tussocks and caused a serious decline in productivity of the plants which took from 15 to 20 years to recover.

As a temporary measure to increase the nutrient content of tussocks trial applications of fertilizers were undertaken. It was thought that if the nutrient content of the favoured food of could be artificially increased, breeding success of the bird would correspondingly increase. At the time the fertilizer experiment was undertaken (1981) takahe numbers in the Murchison Mountains had dropped to an all time low of 114, a 40% decline in ten years. The application of fertilizers to an area of two hectares per showed that takahe preferred to eat tussocks which had been fertilized and territories which had been fertilized had a higher occupancy rate from year-to-year than territories which had received no fertilizer. For the first two years of the takahe experiment there was an indication that the breeding success in fertilized territories was higher but over a five year period there was little difference in breeding success between fertilized and control territories and consequently continued application of fertilizers was not a management option.

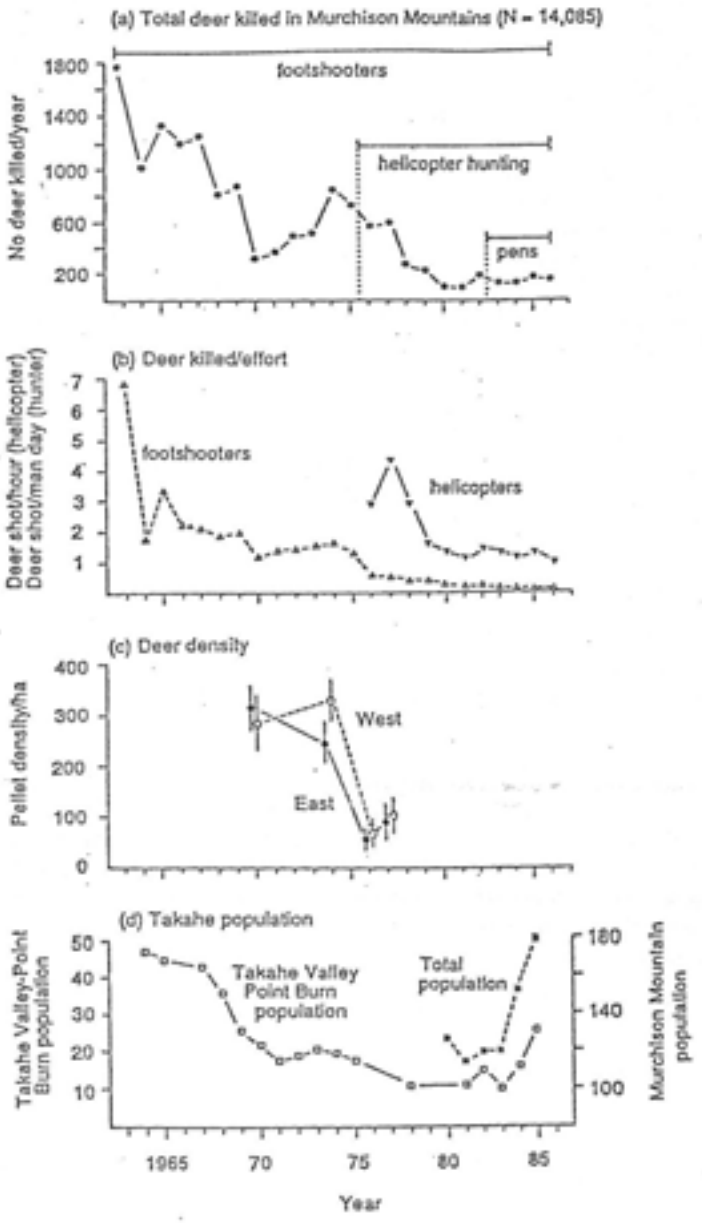

Figure 1.
(a) The number of red deer killed in the Murchison Mountains (650 km^2 area). Three techniques have been used, foot hunting, shooting from helicopters, and deer capture pens. Between 1962 and 1985 14,085 deer have been killed or removed.

(b) The number red deer killed per man day Δ --- Δ --- Δ, the number of red deer shot from helicopters per hour ▼-▼-▼

(c) Reduction in deer numbers between 1974 and 1976 as expressed by density of deer pellets/hectare ± 95% confidence interval (data redrawn from Parkes *et al.* 1978). Western section of Murchison Mountains ○----○. Eastern section of Murchison Mountains ●----●

d) The takahe population in the Takahe Valley-Point burn study area □-□-□, total takahe population in the Murchison Mountains ■--■--■.

However, increasing deer control in 1974 began to have a dramatic effect. Between 1981 and 1983 takahe numbers increased from 114 to 181 (Fig. 1 d). The increase in numbers was linked to the improvement of the grasslands, through the reduction in deer grazing pressure. The long lag of approximately 10 years between the reduction in deer numbers and the increase in takahe numbers was due to long time needed for the tussocks to improve after being severely browsed (Fig.1). These results could not have been determined without a long-term research programme.

Competition between deer and takahe occurs because both feed selectively on the most nutritious plants growing in areas where local enrichment occurs. These highly nutritious plants are very important to takahe because the bird has a relatively inefficient digestive system which depends on a rapid and high throughput of high quality food. The bird digests very little fibre and absorbs only the soluble components of plant material ingested. Thus, changes in the nutrient status of the plants the bird eats have important consequences. If takahe are to be conserved there must be continued deer control.

Another finding having important implications for management was that few takahe pairs raised more than one chick/season. This meant that one egg from the usual two-egg clutch could be removed for artificial incubation without affecting the overall productivity of the wild population. Trials carried out, showed that chicks could be raised by artificially incubating eggs taken from the wild, and a captive-rearing facility was established at Burwood Bush, 20 miles from Te Anau. The aim of this facility was to raise chicks for liberation back to the wild and for the creation of populations on predator-free islands.

It was recognised there was a need to establish additional takahe populations over a much greater area of Fiordland as a precaution against losses in localised areas. At present the takahe population is confined to a 250 square mile area and as such, is vulnerable. A minimum population of 500 birds was considered necessary to ensure the species' long-term survival. Habitat surveys revealed that only buds could be accommodated within the Murchison Mountains and so other parts of Fiordland were surveyed for suitable takahe habitat. Over a three year period 28,256 hectares of and northern Fiordland were assessed. In Fiordland 40% of the area had the required food species and accessibility to winter habitat for takahe and in southern Fiordland only 21%. The potential habitat in northern Fiordland was more concentrated than in southern Fiordland and was of greater value for takahe management because deer would be able to be more efficiently and economically controlled than over a wide area where small pockets of suitable habitat exists. A recommendation to the National Parks Board and the Fiordland National Park Board that takahe be liberated in the Stuart Mountains of northern Fiordland, resulted in a conflict with the New Zealand Deerstalkers' Association who wanted this area managed specifically for wapiti. After prolonged debate and representations to Parliamentary Select Committees and a Cabinet Committee, the Fiordland National Park Board removed the wilderness status of the Glaisnock-Edith area of the Stuart Mountains enabling 19 captive-reared takahe to be liberated there between 1987 and 1988.

4. CONCLUSIONS

Features of the takahe research programme that have important implications for the management of other endangered species:

- Detailed monitoring of takahe numbers in the Takahe Valley-Point Burn area from 1949 to 1972 enabled the downturn in bud numbers to be recognised enabling time to thoroughly research the causes of the decline and to devise effective management that could be targeted for maximum effect.

- Concurrent with monitoring basic research on the biology of takahe was carried out which provided important background data for the intensive research effort initiated when it was recognised that takahe numbers had declined.

- The multidisciplinary task force approach which brought together people with a wide range of scientific disciplines was the key to the success of the takahe research programme. It enabled results to be obtained over a much shorter period than if only one or two scientific staff had been assigned to the project. As a result, targeted management was able to be instigated with a minimum of delay.

- The research findings that resulted gave clear indications for management action and enhanced the cooperation of researchers and managers.

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