



RESEARCH

The hunting-assisted demise of Campbell Island cattle

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Abstract: Cattle (*Bos taurus*) were introduced to 11 268 ha Campbell Island/Motu Ihupuku in 1902 as part of a short-lived farming venture that was abandoned by 1931. The cattle were left to fend for themselves and a small feral population of 10–20 animals persisted for 53 years. The population was largely limited to a small area (c. 440 ha) of the island noted for its limestone geology. Ecological damage was pronounced with churning of the soil, damage to vegetation and probable impact on seabird nesting. Eradication was proposed for 1984 as a precursor to the fencing subdivision of the island for subsequent sheep eradication. Three cattle were shot in January 1984 and although 1–2 animals were known to have survived the cull, for unknown reasons these survivors died out shortly after, and no cattle were seen after winter 1984. Extreme weather events, poor recruitment, and competition with an increasing sheep population may have been partly responsible for the decline to local extinction. The ecological response has been significant but cannot be fully differentiated from the response to subsequent sheep and rat removal.

Keywords: Campbell Island, cattle, conservation, eradication, restoration, subantarctic

Introduction

Campbell Island/Motu Ihupuku is an 11 268 ha National Reserve and Nature Reserve that is part of the Campbell Island group (52.54°S, 169.15°E), situated 660 km south of the South Island, in New Zealand's subantarctic region. It is significant as a breeding site for seabirds, particularly albatrosses, petrels and penguins, containing the majority of the total world breeding population for some species, including the southern royal albatross (*Diomedea epomophora*) and Campbell Island albatross (*Thalassarche impavida*). Several terrestrial bird taxa, including the endangered Campbell Island teal (*Anas nesiotis*) and Campbell Island snipe (*Coenocorypha aucklandica perserverance*), are endemic to the island. Most of its plants are endemic to New Zealand's subantarctic islands, and 40% of the invertebrates are unique to Campbell Island. It was also classified in 1997 as part of a UNESCO World Heritage Site, a further indication of its global conservation value. Before its official classification as a Flora and Fauna Reserve in 1954, it had been used as a base for farming, whaling and sealing ventures. The reserve classification was amended to Nature Reserve status in 1977 and an overlying classification as a National Reserve (New Zealand's highest protected land status) was subsequently added in 1986. Previously inhabited at times by small numbers of sealers and whalers (early 19th to early 20th centuries), farmhands (1895–1931), WWII coastwatchers (1941–45) and New Zealand Meteorological Service staff (1946–1995), the island is now uninhabited except for occasional visiting scientific parties.

Norway rats (*Rattus norvegicus*) arrived on the island in the mid-1800s, goats (*Capra aegagrus hircus*) and sheep (*Ovis aries*) were liberated unsuccessfully in 1865 for potential castaway use, and sheep were re-introduced in 1895 as part of the first farming lease issued in that year. As part of this lease, eight cattle were reportedly taken to Campbell Island in 1902 (Wilson & Orwin 1964). A few cattle were killed for meat supplies (about 1 per year from 1909 to 1916) by resident farmhands or shore-based whalers, with about 13 animals on average being reported present in that period (Kerr & Judd 1978). By 1931, farming on Campbell Island was abandoned and the estimated 4500 sheep and 20 head of cattle were left to fend for themselves. These cattle were of 'dairy stock' (Taylor 1990), variously described as a 'short-horn type' (Spence 1968) and an 'Ayrshire-Shorthorn cross' (Sorensen 1951). Known counts of cattle on the island are summarised in Table 1.

From 1909–1916 the cattle were reported as generally living above Northwest Bay and only wandering away from this area if disturbed (Kerr & Judd 1978). Later, their feral descendants were found in the same location and with encounters frequently on the slopes of Menhir and the lower slopes of Mt Paris (Dilks & Wilson 1979). Their range was restricted to around 440 ha in one corner of the island (Fig. 1), feeding mainly on the tussock grassland and sheltering in tall *Dracophyllum* scrub (*Dracophyllum* spp.) (Taylor 1990). Coincidentally, this area around Northwest Bay and Cattle Bay was also the only major area of limestone, as illustrated in Beggs (1978; see also Fig. 2).

Most calves were born from early October through to early

Table 1. Known counts of cattle on Campbell Island.

Date	Cattle Numbers	Reference
1902	8 (farm establishment)	Wilson & Orwin 1964
1909–16	13 on average (officially ‘farmed’ but untended stock)	Kerr & Judd 1978
1927	27	Oliver 1927
1931	20 (farm abandonment)	
1941–45	c.12	
1961	18	
1966	16	Taylor et al. 1970
1967	18	
1969	22 (5 bulls, 10 cows, 6 young animals and 1 calf)	
1970–71	20 (7 bulls, 12 cows and 1 calf)	Taylor 1976
1975	22	
1976	12 (2 bulls, 8 cows and 2 calves)	
1976–77	11 (no calves)	
1979–80	11 (2 bulls, 8 cows, 1 calf)	Wilson & Rudge 1982
1980–81	10 (no calves)	
1981	8	Penniket 1981
1981–82	6 (including 1 calf)	Peacock 1982
1983	11	Department of Lands and Survey unpubl. data
1984	c.5 (including 1 bull, 1 cow, 1 calf)	Peacock 1984 and G. Taylor pers. comm.

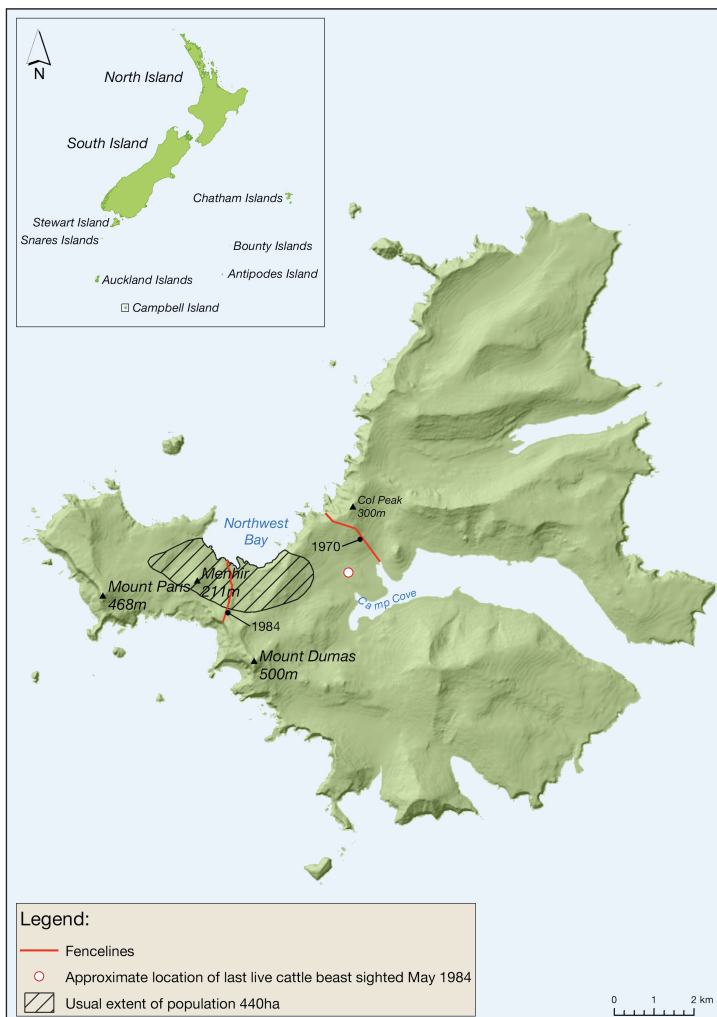


Figure 1. Campbell Island, illustrating the restricted usual range of feral cattle, the locations of sheep fences and the last cattle beast seen in 1984.

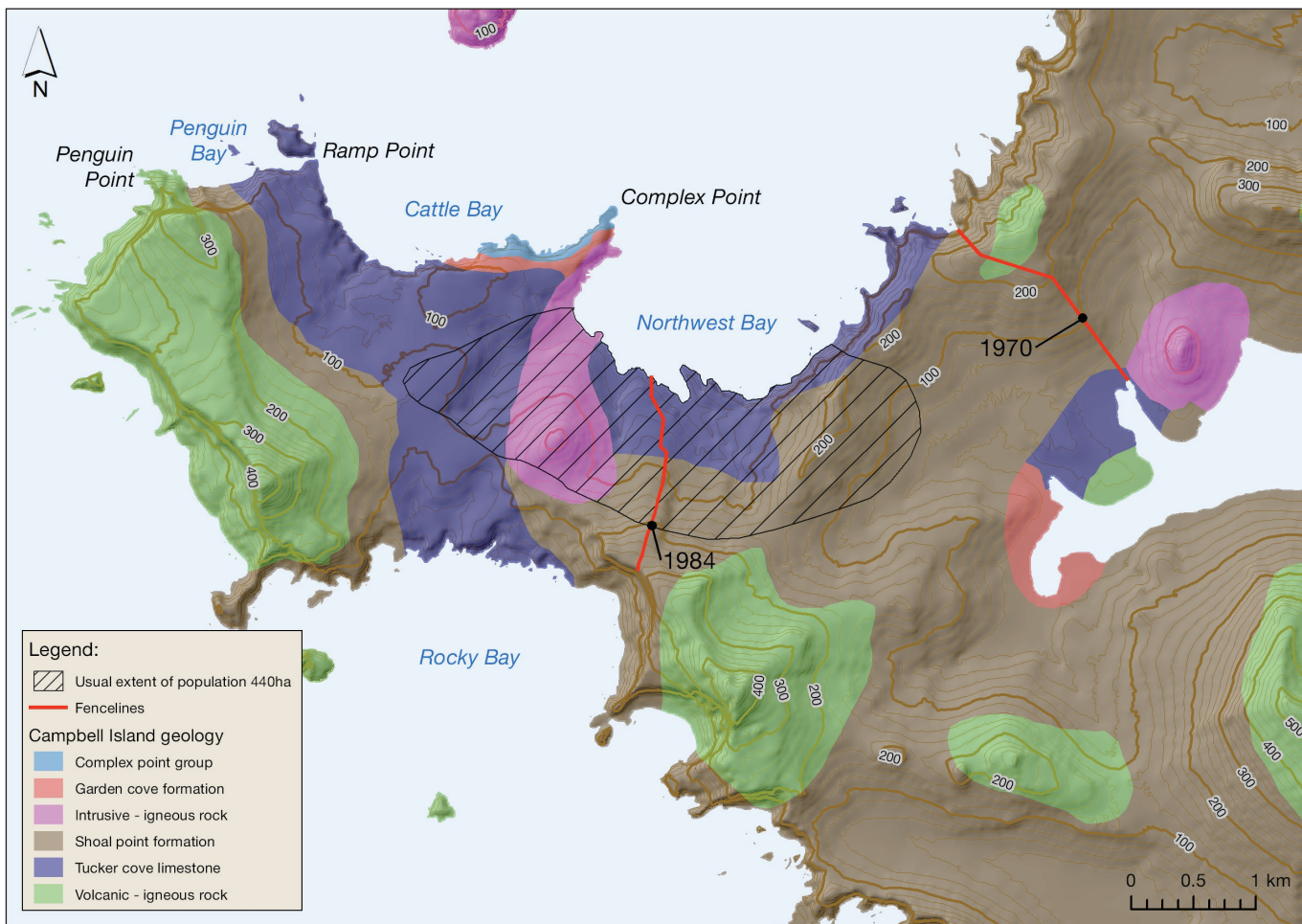


Figure 2. Geology of the Northwest Bay area of Campbell Island, showing correlation between the usual feral cattle range and the largest area of limestone geology on the island.



Figure 3. Feral cattle on Campbell Island (1976), on slopes near Menhir Peak looking toward Northwest Bay (Photo: Department of Conservation).

January. Observations over eight seasons showed an average of only 10% of cows (a maximum of 25%) calved in any one year, compared to 47–67% (2 years data) on Enderby Island in the Auckland Island group (Taylor 1990). Evidence from the island (Hutton 1976) showed sheep livers obtained from the Northwest and Cattle Bays limestone area had appreciably higher copper concentrations than sheep livers from elsewhere on the island. Taylor (1976) suggested the limestone area provided essential minerals and a drier substrate, and a copper deficiency elsewhere on the island may be responsible for the very low reproductive rate and by inference the failure of cattle to spread more widely over the island. Sex ratios always seemed to favour females, significantly different to the situation on Enderby Island (Brown & Cox 2022). Most of the cattle were described as reddish-brown with white markings, but others were the same base colour or sandy-brown without any white (Fig. 3). Virtually all the bulls and most of the cows were horned.

The cattle were clearly a remnant from a previous farming era and had no clear value in the functioning of an important nature reserve that had high value for indigenous flora and fauna. Visiting scientists in the 1970s and early 1980s noted the effect of the cattle on the subantarctic environment. No formal studies were conducted of cattle-specific environmental effects, but Foggo (1981) recorded that their presence significantly churned up the ground and noted that cattle may have some adverse effects on penguin nesting success.

In the early 1980s, discussions were held between the administering Lands and Survey Department and scientific advisors concerning development of the island's inaugural management plan. This included the future of the feral sheep population that was widespread over the southern half of the island, having previously been removed from the northern sector (Brown et al. 2022). The approved option was to fence off a small southwestern section of the island and to cull all the sheep on the outside (to the east) of this fenceline. The practical route of the proposed fence forced an appraisal of the situation regarding the remnant herd of cattle. The Department noted that the fence transected the cattle range and could not be maintained with their presence. Given it would be difficult to move them to the New Zealand mainland, they had no agricultural significance due to the small population, and any scientific interest was secondary to the sheep or other conservation priorities, they would need to be eradicated (Lands and Survey 1982). Thus, while cattle eradication may have been considered at some future time, it was prioritised largely by the needs of the 1984 sheep control project.

The approved Campbell Island management plan of 1983 had a policy to eradicate the feral cattle, stating "it was desirable to halt the browsing of part of the indigenous plant associations peculiar to the Menhir limestone country (cattle range). Protection of both the sheep and cattle is not compatible and the cattle have less scientific significance" (Department of Lands and Survey 1983, p. 54).

Methods

In the early 1980s an eradication plan for the feral cattle on Campbell Island was developed. Due to its isolation and lack of resident conservation staff, conservation managers could only occasionally (generally annually) access Campbell Island. A priority task for a 1983 visit to the island was developing the specifics of an operation to eradicate cattle to ensure the greatest

efficiency of the project (Peacock 1982). The eradication was planned for the summer trip of 1983/1984, at the same time as a fence was constructed to restrict the sheep population to the southwestern portion of the island. The small number of cattle and their limited home range meant stalking and shooting any animals was considered a relatively straightforward operation. The eradication planned to use a Royal New Zealand Navy (RNZN) helicopter already on the island in summer 1983/84 to detect the cattle, and for a single foot hunter to walk to or be dropped at sites where cattle were detected.

Results

In January 1984 an RNZN helicopter assisted with the transportation of fencing materials to construct the new sheep fence. The pilot was briefed to keep an eye out for any cattle as he was flying over the area while carrying loads. Three cattle were observed on the slopes of Mt Dumas among thick scrub and a Lands and Survey hunter (R. Peacock) was dropped off at a suitable location. These three cattle were stalked and shot in a single day's effort. The cattle were a middle-aged bull, a cow and a c.15-month old bull (Peacock 1984). These were the only cattle spotted during the 1983/84 trip despite considerable human activity in the area.

However, several months later (4–5 May 1984) fresh cattle tracks were incidentally observed by a wildlife researcher in a different location several kilometres away, in an area behind Camp Cove and towards South Col Ridge (the cliff-top ridge running south from Col Peak). It appears that a very small number of animals (estimated to be 1–2; G. Taylor pers. comm.) survived in this area disjunct from their normal distribution. Consequently, they were undetected by the helicopter and cattle hunter in January 1984. A single pale-coloured cattle beast was observed at about the same time, running off into the scrub near Camp Cove. Subsequent attempts by a Meteorological Service staff member to locate and shoot the animal proved unsuccessful, though considerable sign of cattle presence was seen in the scrub-filled valley running from Camp Cove to below Cave Rock to the south (G. Taylor pers. comm.). Only opportunistic monitoring occurred post-January 1984 by the small number of Meteorological staff and wildlife researchers (<12 people) based on the island. No further sign of cattle was seen after winter of that year, and the unknown but small number of cattle that survived the cull in the Camp Cove area almost certainly died of natural causes over the particularly severe 1984 winter (G. Taylor pers. comm.).

Discussion

The ecological response to the removal of the cattle was not specifically assessed, though it is certain they were having an effect on vegetation through selective grazing, trampling of plants and damage to soils, and impacting terrestrial wildlife through disturbance to nesting birds and reduction of protective cover. However, any vegetation recovery would almost certainly have been inhibited by the continued presence of feral sheep in part of the same area for another 6 to 7 years. Since the sheep were removed in 1990–91 there has been a noticeable recovery of subantarctic megaherbs and tussocks (Brown et al. 2022). Feral cats *Felis catus* died out some time after 1987 (Brown et al. 2022) and Norway rats were

removed in 2001 (McClelland 2011), leaving the island free of all introduced mammals.

The attempted eradication of cattle from Campbell Island in 1984 did not succeed in its immediate aim as insufficient time and resources were allocated to the detection and hunting effort and also to the follow-up monitoring. However, it was fortuitously successful in its eventual outcome, seemingly aided by environmental or stochastic events. Given that 11 cattle were observed just a year before the planned eradication it seems odd that only three animals were located and shot in January 1984, and only 1–2 survivors were subsequently detected in a disjunct area immediately post the hunting operation. A number of chance events probably contributed to the demise of the population in the months prior and subsequent to this date.

Sheep numbers in the southern half of the island (around the normal cattle home range) had expanded from c. 2500 in 1970 to c. 4700 in 1984 (Rudge 1986), and the increased competition reduced the formerly rank grass to a lower-cropped sward, making foraging for cattle increasingly difficult. Dilks and Wilson (1979) suggested the decline in cattle numbers may have been related to the sheep population increase, noting that intensified sheep grazing was most obvious in the cattle area. In the early 1980s, cattle sign was occasionally seen in a completely different sector of the island, an area behind Camp Cove (G. Taylor pers. comm.). Use of this new area was not recorded in previous years, indicating some factor such as reduced food availability or known but officially unreported hunting disturbance (largely for sheep but potentially occasionally for cattle) had compelled some of the cattle to move out of their traditional home range.

When the sheep fence from Northwest Bay was constructed in early 1984, it appears that an unknown number of the cattle were to the eastern side of this fence, rather than on the western side as would have been expected. They may have been in the area near Camp Cove, where dense *Dracophyllum* scrub would have provided shelter and cover for these animals. Sign of these animals was seen subsequent to the eradication attempt in January 1984, but was not seen beyond the extremely heavy snows experienced on the island in August 1984 (G. Taylor pers. comm.). Ballance (1985) also reported a very unusual 5 consecutive days in a row of snow lying on the ground in early August 1984. This period of snowfall was anecdotally the most extensive and longest in duration for many years (available NIWA data on cliflo.niwa.co.nz is less clear on this assessment), and would have placed added stress on already marginal feeding areas for the remaining cattle. The fence may also have precluded their attempts to return to their traditional home range and its potentially important limestone geology.

It is also possible, but unconfirmed, that a few head of cattle were shot (but not reported as such) by island-based Meteorological Service personnel, prior to the planned 1984 eradication but after the eradication had become policy (i.e. within the period 1983 to early 1984). It is known that previously a number of sheep and a few cattle beasts were occasionally shot for supplementation of meat supplies or possibly also for sport by unauthorized persons. However, this would have been at a very low scale, and the activity was discouraged after 1976 when freezer facilities were installed at the Meteorological Service base, negating need for supplementation of meat supplies (N. Judd pers. comm.). Any previous hunting attempts would have made the few remaining animals extremely wary of human activity, potentially contributing to the secretiveness of the animals, wider dispersal and the subsequent inability of the hunter or other observers to locate them all during the

1984 operation.

The low recruitment of young animals into the breeding population (see Table 1) probably was linked to sub-optimal habitat but could also have been influenced by annual climate variations and/or conditions at critical times such as calving in such a marginal environment. If the drop in population was caused entirely by natural factors, it appears in hindsight that the population could have naturally died out within a few years, or even months. At the time of the operation (1984) only one known female remained, the one shot by the Lands and Survey hunter. Her offspring was a male calf and at the time of the cull the female was not pregnant. It appears breeding frequency and/or calf survival rates were very low on Campbell Island, and it would be a feasible scenario that the female could have died of natural causes before producing a female calf that would survive to maturity itself.

The continual low population of the cattle over the entire 53-year period of their feral inhabitation of Campbell Island, coupled with their strong association with only one small area of the island, indicates strongly that the habitat on Campbell Island at 52°S was, at best, marginal for cattle. In contrast, five cattle introduced to 5500 ha Amsterdam Island (37°S) in a farming endeavour in 1871 became feral one year later and increased to c. 1500 by 1931 (Micol & Jouventin 1995), and the much smaller 695 ha Enderby Island (50°S) in the Auckland Island group maintained a population of 35–60 animals between 1963–1991 (Brown & Cox 2022). Stochastic events (such as severe weather events, a sequence of poor breeding seasons or an imbalance in sexes) along with increased competition with sheep for grazing could have eventually seen the natural demise of the cattle, but the shooting of at least three animals in 1984 accelerated this possibility. This cull almost certainly ensured eradication was achieved, if by somewhat fortuitous means.

Author contributions

DAB compiled historical records and wrote the manuscript with input from FSC.

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