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EEL-TRAPPING CHANNELS AT TANGIMATE LAGOON, HOROWHENUA

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Tangimate Lagoon is the site of "the most remarkable group of ... artificial eel-trapping channels in Horowhenua" (Adkin, 1948:357). Eel-trapping channels in Horowhenua are the best documented of any in the country. They usually take the form of a single channel cut between a lagoon and adjacent lower-lying ground. By creating a flow of water through the channel in the appropriate season eels would 'run' and so provide an opportunity for large numbers to be taken in a very short period of time. Some channels dug through sand ridges bordering the lagoons are of considerable size: a channel at Pakauhokio Lagoon was 95 yards long and cut through a 23 feet high sand dune (Adkin, 1948:27).

What makes Tangimate exceptional is the multiplicity of channels (Fig. 1). Adkin (1948:20) suggested that the number of channels served to break up the run of eels and so allowed more people access to the resource.

Tangimate Lagoon

The water level in Tangimate Lagoon has changed markedly in recent years. When Adkin visited the lagoon in 1935 and 1936 the lagoon was almost dry. A survey plan (ML 2685) dated 1914 and aerial photos taken in February 1942 and November 1974 also show the lagoon almost dry and suggest it has been low for most of this century. Since the lagoons of the dune belt derive their supply from ground water the levels are subject to long-term fluctuations (Adkin, 1948:17). Recently the water level has risen about 1.5 m and in doing so has flooded land that has long been in pasture. To reclaim this land a drainage scheme was prepared and this entailed damage or loss of some of the archaeological features present. An authority (1982/38) was granted by the Historic Places Trust and was made subject to the ditch-digging machinery being made available to do do some limited sub-surface investigation of features.

The site is recorded as N152/47 (766115). It consists of a number of channels which will be referred to in terms of their setting or characteristics. The lagoon-side channels thus lie between the lagoon and the adjacent lower-lying swamp. The valley channel runs along the length of the valley beyond the above mentioned swamp. The valley channel is straddled by an embankment and where the valley opens up there is a channel

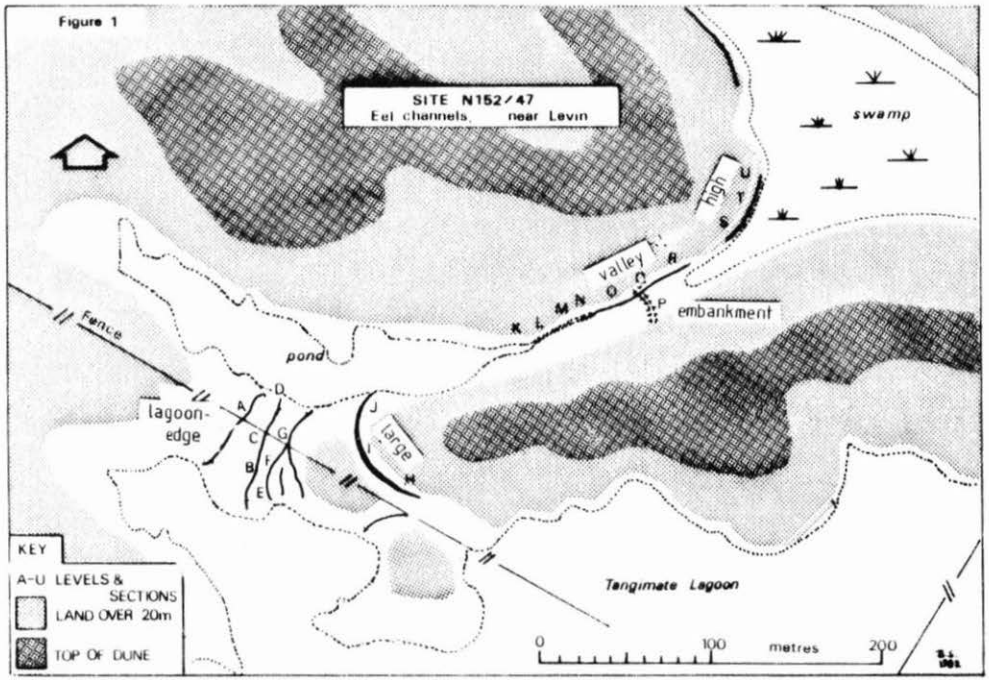

FIGURE 1. Map of eel channels (N152/47), Tangimate Lagoon.

(high channel) on the lower slopes of the valley side. This last feature is something of an enigma. There is a further length of channel in a similar setting to the valley channel in the next valley beyond.

Of the lagoon-side channels all but one (the large channel) are cut into low-lying ground that separates the lagoon from the adjacent swamp. The large channel has been cut through the end of the ridge. Adkin (1948:30) thought that one explanation for the occurrence of this large channel right alongside the others might be that the larger channel was of greater antiquity.

Adkin was encouraged in this belief by the similarity in form and scale of this channel to the one at Pakauhokio Lagoon. Mr R McDonald, an elderly local resident who has apparently had first hand experience of this form of eel trapping, had found no living memory of the construction of the Pakauhokio channel and thought that it had a considerable antiquity.

Adkin was shown the Tangimate site on 21 July 1935 and he returned to map it on 10 April 1936. He found this a "very difficult job on account of vagueness of both the channels and the former edge of the lake, but worried through it" (Adkin, ms:10 April 1936). The valley channel was only partially drawn on the original plan but was sketched in on the published plan in Horowhenua (Adkin, 1948:29). It is probably because he devoted most of his time to mapping the features next to the lagoon that Adkin failed to record the features further away.

The investigation

With the changing water level in the lagoon it was necessary to establish the level at the time the channels were constructed and determine whether the channels were designed to operate within a broad or narrow range of water levels. If the large channel had been cut to a significantly different level than the others there would be good grounds for assuming it was not contemporary with them.

All the lagoon-edge channels (including the large channel) and the valley channel were found to have been dug to a similar level and all were designed to operate within a narrow range of about 40 cm. This is roughly at the level observed at the time of the investigation. The levels were taken with the assistance of Mr Schuppan of the Manawatu Catchment Board and were tied into the arbitrary level used in planning the drainage scheme (c.f. Manawatu Catchment Board (1981) Tangimate Lagoon Investigation and Proposed Lowering, plan 2354).

The lagoon-edge channels. Since all channels operated when the water level in Tangimate Lagoon was at one level it is not clear why the large channel should have been cut through a ridge when, with less effort, it could have been cut through the adjacent lower-lying ground just as the others were. The dimensions, as recorded by Adkin (1958:30), are; length 3¼ chains (71 m), minimum original depth 17 feet (5.6 m), maximum width at top of excavation 24 feet (8 m). A motive for the construction of a channel of this size is difficult to envisage in these circumstances.

If this channel were of greater antiquity it would still only make sense if, at the time it was built, it was constructed on the then lowest point on the ridge (as the Pakauhokio channel was). For this to have been the case there would have had to have been considerable erosion subsequently which removed part of the dune and created a lower-lying area where most of the other channels were later located. There is however no indication that such a change has occurred as the erosive forces involved would make it difficult to see how the large channel itself could have escaped substantial damage.

If all the channels are broadly contemporary, the people who excavated the large channel may have had no rights to the easier tract of lower-lying ground.

The steep sides of the large channel may have offered an additional advantage, perhaps in containing the eels.

The valley channel. On surface examination this channel appeared to run the whole length of the valley. A series of cross-sections however showed that a clearly-defined artificial channel only extended a short distance on either side of the embankment (between R and a point mid-way between O and Q on Figure 1). This is the highest section of the valley floor. The base of the channel was at roughly the same level as the channels by the lagoon and it is not difficult to conceive the valley channel as part of the same system.

The embankment. The embankment is sited at the highest point along the length of the valley bottom. It was built of topsoil and is a metre high. As its construction could not be considered a casual task possible functions need to be considered. It has the appearance of a dam but would not have served as such, firstly because of the height of the ground on which it stands and secondly because the channels would seem to have contained no more than a trickle of water. They are steep-sided and show no sign of the collapse that is to be expected if they had been

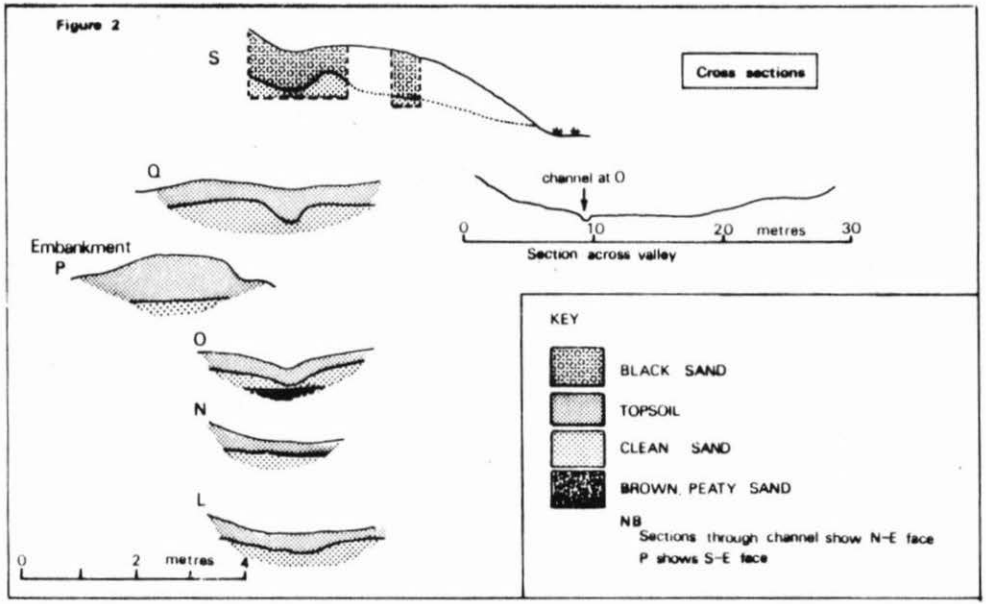

FIGURE 2. Cross sections of eel channels.

full. Assuming the embankment is functionally related to the other features, one possibility is that it was a barrier to trap eels, perhaps storing them live for capture at a later date (c.f. Adkin, 1948:19).

The high channel. The original base of this channel, at the single point at which it was measured, is a metre higher than the adjacent swamp. It is also 80 cm higher than the base of any other channel. Levels taken on the ground surface confirmed that the channel had a gradient too slight to induce a directional flow. The channel is certainly on the same line as the valley channel but a farm road has hopelessly obscured the relationship between the two. The high channel thus appears to be diverting water away from the second swamp. Thus while having all the appearances of a channel it is difficult to conceive of it having that function.

Discussion

A basic reconstruction of the appearance and dynamics of the site when the channels were freshly-cut is made possible by considering the effects of different levels of water in the lagoon. Cross sections through the channels indicated that they would have held no more than a trace of water. At the level observed during this investigation, water would have trickled through the lagoon-edge channels and filled the pond. The extent of the pond under these conditions is sketched on Figure 1. Any eels beginning their migration would have to take this route (which is also the natural exit) and pass through the lagoon-edge channels and into the pond; there to continue through the swampy corridors between the dunes to the Manawatu River and the sea.

The combination of features examined on this site appear to offer more than a simple means of pulling-out migrating eels. Firstly, the channels would offer the most moist, and thus easiest route for the eels on the first stage of their journey but, in concentrating the run, would also offer an ideal situation for their capture. Secondly, the embankment would prevent their escape from the pond and, with a breachable section across the valley channel, would offer a simple means of controlling their release or recapture at a later date.

These observations combine to suggest that the site would have offered an effective means of managing a stock of migrating eels: culling those required for immediate use and holding back live eels for later consumption. This now leaves two basic questions to be answered. Were there eels in the Tangimate Lagoon and, if so, when could the channels be used for their capture.

Despite the observations of McDonald and Adkin, that the lakes and streams of Horowhenua teemed with eels, not all lakes contained them. Rev. Richard Taylor's comment on similar dune impounded lakes in South Taranaki is relevant: "... passed by nearly a dozen small lakes. I was told some contained eels and others not, which I have heard asserted before of other lakes without being able to account for the fact" (Taylor, ms:20 June 1848). Most lakes of the dune belt in Horowhenua have no outlet but eels have become established in many of them because of their ability to travel overland. However, some lakes had to be artificially stocked. McDonald (1979:47) reports that in the late 19th century some lakes were regularly artificially stocked.

Young elvers (at about 2½ years of age) return from the spawning grounds far off at sea. They are able to negotiate substantial obstacles on land to reach rivers and lakes where they mature. When they reach maturity they embark under cover of darkness on a summer or autumn migration back to the spawning grounds. They never return (Todd, 1981).

Both the young elvers and the mature eels can travel overland although it is not an easy task. They exude mucus from their skin to keep the body surface moist and to lubricate their path. Out of water, limited respiration takes place through the skin and, provided they do not get caught in the sun and overheat, they can survive for a couple of days (Moriarty, 1978: 53). Sand or dust, however, clogs the mucus-covered skin and so suffocates any eel that tries to cross it. The eel channels at Tangimate would thus attract eels with only the barest trickle of water as they would provide a moist route through a hostile environment.

A recent and comprehensive study of the timing and periodicity of migrating New Zealand fresh water eels (Todd, 1981) compares Todd's own field observations of the long and short finned eels with other observations in the literature. From Todd's observations at Lake Ellesmere, it can be seen that migrating eels can be caught throughout the summer and autumn (Todd, 1981:226-227). Migrations are also documented as an evening venture. McDonald (1979:47) describes the eels running under cover of darkness for two to three hours after dusk.

No independent dating evidence has been gathered from the site but a fairly late date is suggested by its good state of preservation in such an unstable medium as sand. Although there is no documented use of the Tangimate channels, Adkin believed that the majority of eel channels in Horowhenua were of comparatively recent date. He had noted McDonald's comments that although no Maori he had spoken to had any idea when the nearby Pakauhokio channel had been cut, it had been used in

recent times (McDonald, 1979:47). Adkin also noted that local people not only made use of the Pakauhokio channel but had constructed others in considerable numbers in various parts of their territory (Adkin, 1948:26). If the Tangimate channels were part of this complex, they would date to the late 18th or early 19th century.

Conclusions

Most of the features near the lagoon can be interpreted as eel-trapping channels. The evidence suggests that the mature eels leaving the Tangimate Lagoon for their breeding migrations would have been presented with a series of moist channels across the otherwise hostile dunes. Their concentrated paths would have aided capture and the earthworks would have served to regulate their exodus and possibly retain a stock for later capture. All channels operated within a narrow range of water levels in the lagoon and were required to carry no more than a trickle of water.

It has not been possible to provide an interpretation of every part of the site. The high channel in particular remains a problem.

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