

Fishing Strategies at an Open-coast Fishing Site in East-Northland, New Zealand

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ABSTRACT

About 200 items collected at Archaeological Site Qo4/44 at Paraenui Bay, just north of Bay of Islands, New Zealand, are associated with apparently late pre-Contact fishing. Although the collection methodology was not systematic, the assemblage offers novel insights into fishing strategies. The significant presence of small (≤ 25 mm, usually one-piece) fishhooks could mean leatherjackets *Meuschenia scaber* were a focus, their skin having been used as surrogate sandpaper in pre-Contact Northland. The presence of more than 30 large (almost certainly northern) spiny dogfish *Squalus griffini* spines point to fishing sorties into deep waters (100 m and beyond).

Keywords: Bay of Islands, fishing, Māori

INTRODUCTION

Paraenui (35.151°S; 174.097°E), a small, sandy bay west of the Bay of Islands, is bounded by reefs and high cliffs (Figure 1). The surface- and near-surface archaeological finds at sand-dune 'midden' site Qo4/44, mainly from the early-1960s and many associated with fishing, form part of the Booth Whānau Collection, now housed in Te Kōngahu Museum

of Waitangi. Most of the finds are characteristically Late Period (1650–1800 AD, although we are without associated datings), the majority of fishhooks being two-piece.

Our focus was the only portion of the dune with surface artefacts – an area of about 400 m², seaward from the base of the hill and demarcated to the south by a 2–3 m high eroding bank (Supplementary Section [SS] 1, Figure 2) (It appears this seaward portion of Qo4/44 was washed away in mid-1978; SS1). Also, excavations up to 1 m² in area and 0.5 m deep were made haphazardly (taking in perhaps 20 m² altogether); excavated material was visually sorted but not sieved. Items which appeared archaeological/cultural were retained, including all worked-shell and -bone

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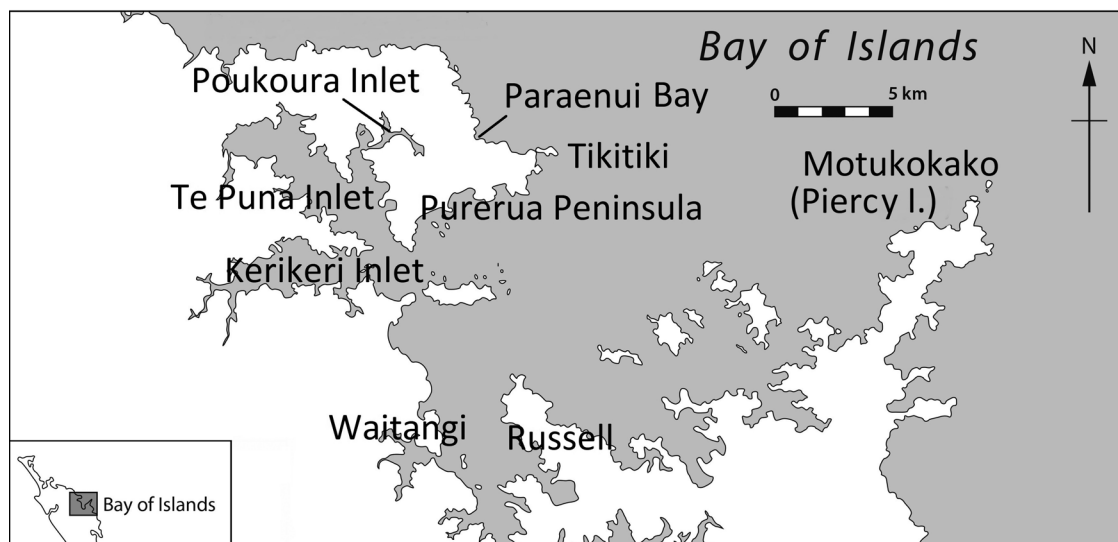


Figure 1. Location of Paraenui Bay on Purerua Peninsula, with inset showing northern New Zealand.

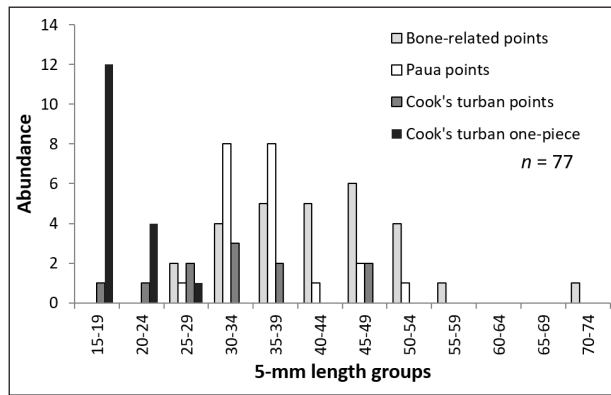


Figure 2. Length-frequency of Paraenui fishhook points by material-type ($n = 77$). Because estimated point-lengths of one-piece fishhooks do not include any overlapped section, their sizes are slightly understated relative to those of points themselves.

(but not necessarily all stone-flakes), and many Polynesian dog (kuri, *Canis familiaris*) bones. All obsidian was from Kaeo (McAlistair pers. comm. 2017).

Items were numbered, and various details entered into the Booth Whānau Collection Catalogue - Part 1, available at Waitangi. During the subsequent half-century, some catalogue numbers have become indistinct, but the Paraenui items remain differentiated, being labelled with numerals only.

The highest ridges backing Paraenui are 60–100 m tall, the narrow stream-valleys opening to the shore resulting in very little near-beach terrain suitable for permanent habitation or cultivation. Encompassing about 0.25 ha (its area wholly constrained in recent geological times by the topography; SS1), the site is unlikely to have ever been large enough to sustain more than a fishing encampment. There are extensive reefs to 20 m depth within 1 km of Paraenui; and the broader shelf north and east is largely reef-bound to depths of 100 m (8 km offshore) and more.

Bay of Islands lies within Northeastern Coastal Biogeographic Region, and the Late-period open-shore fish communities would have been essentially the same as those today, as summarised/listed by Brook & Carlin (1992), Smith (2013) and Booth (2016). Apart from the tunas in particular, there is little or no clear seasonality in inshore occurrence of the important food-fish.

FISHING ARTEFACTS

Of 491 archaeological items, about 40 per cent are associated with fishing, but with no sinkers or floats. These include 117 complete, or near-complete, fishing items, with similar numbers of Cook's turban shell (*Cookia sulcata*), paua shell (presumably *Haliotis iris*), and bone and bone-related (teeth and spines) objects (Table 1); there are similar numbers of broken fishing-items. Our subdivision of them

is made at the highest level (material used; one-piece or composite; lapped- or butted-points; presence of barb), and we then refer to published groupings, primarily those of Davidson (1984) and Sinoto (1991, developed for Hawaiian fishhooks), to put our material into formal context. For the Cook's turban points, the detailed organisation of Law (1984) is followed.

Dimensions given are straight-line measures that do not take into account any curvature. For one-piece fishhooks, point-length is the straight-line distance from the centre of the bend at the bottom to the tip; where the tip is missing, the estimated-length of the point is from the centre of the bend to a height equivalent to that of the lowest lashing-notch at the head.

For the 77 measurable points (including the one-piece hooks), sizes range between bin-lengths 15–19 mm and 70–74 mm, with 23 per cent between 15 and 24 mm (mainly as one-piece Cook's turban hooks; Figure 2). The largest points are of bone; otherwise the mid-sized points are of paua or Cook's turban shell, as well as bone and bone-related material.

Cook's turban fishhooks

These are mainly complete (or near-complete) one-piece fishhooks, and the points of two-piece fishhooks (Table 2; SS3). For most there is little doubt the shell was Cook's turban, but for three (#8, #31 and #2 in SS3 Figure 1A, the numbers referring to the collection catalogue), the gastropod is not unequivocal.

The one-piece fishhooks are similar in overall dimensions to present-day 1/0 to 6/0 fishhooks, indicating a wide size-range of fish being sought. Because the tips of the intact ones are clearly incurved, these hooks are the rotating-type (Sinoto 1991:86; Leach 2006:96). It is not possible to be categorical whether the two-piece fishhook-points were rotating or jabbing – although we suspect most were rotating given almost complete absence of barbs. Most are likely to have been relatively large hooks, and suitable for fish up to the size of small sharks. Apparently, all points were constructed for lapped – not butted – attachment.

Table 1. Numbers of complete/near-complete shell and bone/bone-related fishing items.

	Cook's turban	Paua	Bone/ bone-related
One-piece fishhook	19	0	0
Fishhook point	11	18	28
Fishhook shank	2	8	3
Probable fishhook shank	2	24	0
Probable fishing gorge	0	0	2
Total	34	50	33

Table 2. *Cook's turban fishhooks, points and shanks. Complete, referring to item's state; Rot, rotating-function; Jab, jabbing-function; presum, presumed; –, not applicable; clockwise, referring to handedness (Law 1984).*

	Complete	Rot/Jab	Nearly complete	Rot/Jab	Barb	Clockwise	Anticlockwise
One-piece fishhook	2	Rot	17	Rot (presum)	0	–	–
Fishhook point	11	Rot (presum)	–	–	1	9	2
Shanks & probable shanks	4	–	–	–	–	3	1

There are two essentially-complete shanks (both too small for use with most points above), and two large (presumed) shanks in-the-making (SS3 Figure 1). The low frequency of shanks means it is possible that either points were attached to wooden shanks that have not survived, or they were used with shanks like the paua ones described below.

Paua fishhooks

All paua fishhooks are two-piece (Table 3; SS4), and – with 60 per cent having barbs – a jabbing function is suggested. The sizes suggest medium to large quarry.

Of the eight intact shanks, the largest (#96, SS4 Figure 1B) is 76 mm high, yet so remarkably slender as to draw into question precisely how it functioned; the smallest shank is 35 mm high (#98; SS4 Figure 1C). Four shanks have nicks along almost their entire lengths – which, being additional to lashing grooves, are taken as being ornamental. Three shanks are of the thick, strong part of the shell's lip, which is also highly opalescent and may point to a troll-

ing function. A further 24 paua-items are almost certainly part-shanks (e.g., #15 and #99 in SS4 Figure 1C), or shanks in-the-making (e.g., #92 and #97).

Bone, tooth and spine fishhooks

The largest fishhooks in the collection are of bone, all two-piece in construction (Table 4; SS5). Four dogfish-spines had been used as fishhook points, denoted by lashing grooves (SS5 Figure 1B). With most points almost straight, and with barbs, a jabbing-function is suggested.

The presence of only one complete shank (#184, an enormous 124 mm long and similar to Fig 4A of Sinoto 1991:89, but possibly for capture of petrels [see Paulin 2016:84, 86]), and two incomplete kuri-mandibles that are presumably shanks, again suggests wide-use of paua- and/or wooden-shanks (SS5 Figure 1D).

There are two centrally-drilled, possible gorges (although similar to a drilled-canine categorised as fishhook-point by Furey [1996:87]), with at least one a kuri canine (SS5 Figure 1E).

Table 3. *Paua fishhook points and (presumed) shanks. Rot, rotating-function; Jab, jabbing-function; presum, presumed; Nicks, refers to nicks along length of shank; –, not applicable; ?, not clear.*

	Total No.	Rot/Jab	Knob lashing notches		Barb	Nicks
			1–2	3		
Fishhook point	18	Jab (presum)	–	–	11	–
Shanks	8	–	7	1	–	4
Probable shanks	24	–	?	?	–	?

Table 4. *Bone fishhook points and (presumed) shanks. Rot, rotating-function; Jab, jabbing-function; presum, presumed; Nicks, refers to nicks along length of point; –, not applicable.*

	Total No.	Rot/Jab	Lashing notches			Barb	Nicks
			1–3	3–5	4–8		
Canine fishhook point	5	Jab (presum)	–	4	–	3	–
Spiny dogfish fishhook point	4	Jab (presum)	–	4	–	0	2
Other fishhook point	19	Jab (presum)	–	–	18	14	–
Shanks	3	–	3	–	–	–	–

DISCUSSION

We have characterised fishhooks recovered 50 years ago at ‘midden’ Q04/44, a small sand-dune situated centrally in Paraenui Bay and the only elevated yet more-or-less flat spot. We now draw tentative conclusions around the fishing strategies they represent, although these remain somewhat speculative without systematic recovery methods employed.

The material suggests that the portion of Q04/44 we explored was more than a midden; rather it seems to have been a small living or working site, or both, associated primarily with fishing (SS2). Whereas in other contexts Paraenui’s one-piece fishhooks would suggest early dates (e.g., Furey 2004), this does not necessarily apply to Cook’s turban one-piece fishhooks (Davidson 1984:68). We suggest the portion of Paraenui investigated was not earlier than 1650 AD because there were no moa or marine-mammal fishhooks or associated debitage typical of early sites; the styles of fishhook; and the absence of Mayor-Island obsidian. We suggest it was not much later than 1800 AD because of the absence of clay-pipes, or glass and the like. (However, this is not to say that other parts of the site might have contained material from other eras.)

Fishing componentry and fishing strategies

The numbers and variety of fishhooks suggest angling was important. Although the sizes of points and shanks are not necessarily indicative of complete hook-size (Davidson 1984:68), particularly because small points can be associated with large shanks (Furey 1996:88), the point-lengths are likely to be the primary determinant of quarry-size. Most of the fishhook points are large (≥ 30 mm long). But there is also significant presence of very small points (15–19 mm long, usually as one-piece hooks) and broken components of small hooks soundly outnumber those of large ones. If we discount taphonomic biases, these observations suggest significant focus on certain small fish, which – based on those available (Brook & Carlin 1992) – we suggest were mostly leatherjackets *Meuschenia scaber*, blue maomao *Scorpiis violacea* and sweep *Scorpiis lineolata*, small pelagics such as koheru *Decapterus koheru*, and perhaps small individuals of favoured larger-fish.

Generally, the fishhook points fall readily into previously-described styles, apparently all to be lapped with their respective shanks (although, in the absence of surviving wooden shanks – which might have allowed for butted joints – we cannot be categorical on this). There are many similarities between our 11 Cook’s turban points and those of Law (1984:9). The Paraenui material comes from a locality intermediate between Law’s two largest collections (northern North Island and eastern Coromandel/Hauraki Gulf), but ours is mostly of the predominantly northern form BbA. Almost all our points are clockwise, as were Law’s (1984:10); standardisation ensures points consistent

in handedness with the shanks being used. Whereas for one-piece fishhooks a rotating function is clear, it is not necessarily obvious whether the two-piece hooks were rotating or jabbing.

Across the collection, points are better represented than shanks. Possible explanations for this include shanks often being made of shorter-surviving wood, but also that the seemingly-overrepresented paua-shanks were widely used. Being highly opalescent, paua shanks may have also been trolled.

What fish were sought using the small hooks?

The high proportion of small fishhooks (almost one quarter of the 77 points are < 25 mm long) appears unmatched in other populous northern New Zealand fishhook collections. (Small fishhooks are, however, well-represented in various museums.) Why were certain small fish sought at Paraenui when any number of moderate-to-large fish would have been available year-round? Possibly 1) essentially all fish – irrespective of size – were sought; or 2) certain small fish were highly favoured for their food, medicinal or similar qualities; traditional or spiritual status; or for the technological opportunities provided.

Fish that seldom grow large (usually < 35 cm long) and are present in Hauraki-Gulf middens (Smith 2013:17; Allen 2014:23), and elsewhere (Leach 2006:265–266), include blue maomao (open-coast, ‘very much esteemed’, and seasonally especially high in oil-content [Paulin 2016:29] and the closely related sweep), yellow-eyed mullet *Aldrichetta forsteri* (mainly estuarine), spotties *Notolabrus celidotus* (mostly in sheltered waters), and especially, the open-coast leatherjacket. Indeed, leatherjackets were significant in the north into historical times (e.g., Sewell 1988:10; Smith 2013:17; Allen 2014:23), in parts of the northeast (where they are most abundant; NABIS 2017) being the most numerous fish in middens (Witter 1969:12).

Conversations with Te Tai Tokerau carvers confirm that leatherjacket-skin (together with shark-skin) was used for fine-finishing in pre-Contact times in eastern Northland (Te Warihi Hetaraka, Pou Whakairo for Te Puni Kōkōri Whangarei, and Tohunga Whakairo for Ngātiwai and Ngāpuhi, pers. comm. 2017). Places such as Paraenui could, therefore, have supplied villages not only with fish for consumption, but also leatherjacket-skin for burnishing.

Some workers (e.g., Witter 1969:12; Allen 2014:30) contend leatherjackets, because of their small gape, would have been seldom taken by hook. Yet 1/0 hooks (similar in size to the smaller one-piece fishhook in SS3 Figure 1A) are what we have successfully used along this shore, particularly for large leatherjackets. Leatherjackets – and maomao – were apparently also harvested using fish-traps or circular/funnel/hoop nets, as described by Cook and Banks in their journals, as well as Best (1929:27–31) and Buck (1970:92). But only leatherjackets are significant in dated-excavations over the long record, and it is possible

they were particularly sought for reasons additional to nutrition – their skin being used to burnish wood, bone and shell objects, including fishhooks.

The suggestion that leatherjackets might have been targeted – whether by hook, trap or net – for their skin for use as surrogate sandpaper appears novel in the archaeological literature. We were unable to find any information concerning burnishing from tropical Polynesia (such as Buck's 1930 account from Samoa, and the Cook Islands); such generic archaeological accounts as Best (1929), Buck (1970) and Davidson (1984); or early European accounts of the material culture of New Zealand. Rather, from a single early paper (Knapp 1938), burnishers seem to have been mainly of stone and pumice – and, surely, difficult to use with fine indentations and small depressions on diminutive objects.

Waka fishing

Absence of sinkers is consistent with widespread use of floating-baits (although unmodified stones, or enclosed stones, could have been used). This possibly argues more for shore-casting than waka-fishing: shore-casting inevitably involves hook-ups with rock-edges and kelp that are reduced with constantly-attended floating-baits. Nevertheless, our collection does provide firm evidence for waka-fishing to substantial depths. Among the Paraenui bone-related material are 33 large dogfish spines, four clearly notched, with some of the 'blanks' having been stockpiled one inside another. Representing about 15 per cent of all fishhook-material, these spines are almost certainly northern spiny dogfish *Squalus griffini* (SS6), the only coastal dogfish off Northland. An outer-shelf/upper-slope species, 90% of its population is confined to depths of 100–500 m (Anderson *et al.* 1998) and there is no evidence for inshore migrations (SS6).

Certain fish distributions in New Zealand appear to have altered as a result of exploitation (e.g., hapuku *Polypriorion oxygeneios*; NABIS 2017), and climate change may have affected the range of others, but the northern spiny dogfish is unlikely to be among them. Mostly bycatch, this dogfish has never been sought commercially or recreationally to any extent (Francis 2015:10). Also, although air-temperatures during the Little Ice Age (1500–1900 AD, which takes in the Late Period) were about 1°C cooler than today (Anderson *et al.* 2014:121), this is unlikely to have led to vastly different distributions between the Late Period and now for such deep-water fish.

Although we cannot categorically rule-out occasional inshore-catches of northern spiny dogfish during the Late Period, 33 large spines can be considered to represent more than chance inshore-catches. Indeed, we suggest that focussed fishing took place in waters at least 100-m deep (≥8 km offshore). Ours may be among the few lines of strong evidence for waka bottom-fishing having taken place well-beyond the goldilocks-zone defined by Leach

(2006:265), and bounded by the 50 m depth, and 100 m offshore-horizontal, contours. (Paulin 2016:18 recently extended the depth attribute to between 50 and 100 m; we now extend it to at least 100 m.)

Dogfish spines are not, however, common in New Zealand archaeology. Allen (2014:28, 30–31) reported them from Great Barrier Island middens, illustrating one with lashing grooves. Dogfish spines were also procured for pā kahawai and jigs (Paulin 2016:88, 97, 99); and Matthews (1910:603) reported how spiny dogfish (almost certainly *S. griffini*) at Ahipara (west coast of Northland, 90 km from Paraenui) were more highly valued for both meat and oil than most other sharks. In our collection, spines of similar appearance to those from Paraenui derive from apparently Late-period sites to the north, at Waiaua and Taemaro bays. At Waiaua (18 km northwest of Paraenui), 102 dogfish spines (up to four stacked in series) came from 2 m² of dune surface (Item #73W41 in Part 2 of the collection catalogue).

One way to view these occurrences is that northern spiny dogfish were generally, at most, occasional, incidental inshore catches, but at certain east-coast places (e.g., Paraenui and Waiaua), there was focussed fishing for them (and presumably other deep-water fish such as bluenose) to 100 m or more.

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