ARCHAEOLOGY IN NEW ZEALAND

A CHERT QUARRY WORKSHOP (Q7/346)

AT ONERAHI, WHANGAREI

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The Onerahi chert quarry workshop (site Q7/346) is situated on the north-eastern side of the upper Whangarei Harbour, near the Whangarei suburb of Onerahi (Fig. 1). A second workshop (Q7/33) is present approximately 1000 metres south-west of the site. The Onerahi site is the larger and least disturbed of the two workshops. The site consists of a scatter of flaked chert material extending over a beach frontage which is covered by water at high tide.

The Onerahi workshop is under threat by the encroachment of mangroves. The growth of these is a consequence of silting of the upper Whangarei harbour shoreline. This probably occurred following the construction of a railway embankment after the end of World War II. Aerial photographs taken in the 1940s, before the embankment had been constructed, show that the workshop was originally situated in a small sandy bay. Today this bay is characterised by extensive mangrove-covered mudflats. The presence of deep mud and stands of large mangroves (many more than two metres tall) have acted to obscure much of the chert workshop. It can be anticipated that with further growth in the mangrove cover, and the accompanying buildup of mud and organic material, most of the site will become entirely obscured within the next few years.

Site Survey

A plane-table survey of the site was undertaken by the author in mid-1989 to record the visible extent of the chert scatter. The survey took two people a period of two days to complete. The map produced from the survey is illustrated in Fig. 2. Three types of chert scatter were recognised and are shown in Fig. 2 as sparse scatter, dense scatter and concentrations. Sparse scatter consists of small numbers of flakes, cores and other items, which are spread over an area of approximately 35 m x 110 m. Dense scatter is comprised of a large amount of material presenting a continuous 'carpet' of debitage (Plate 1). Concentrations are represented by distinct clusters of flakes, cores and other pieces and are probably the product of the *in situ* reduction of chert nodules (Plate 2). The distinction between dense scatter and concentrations was

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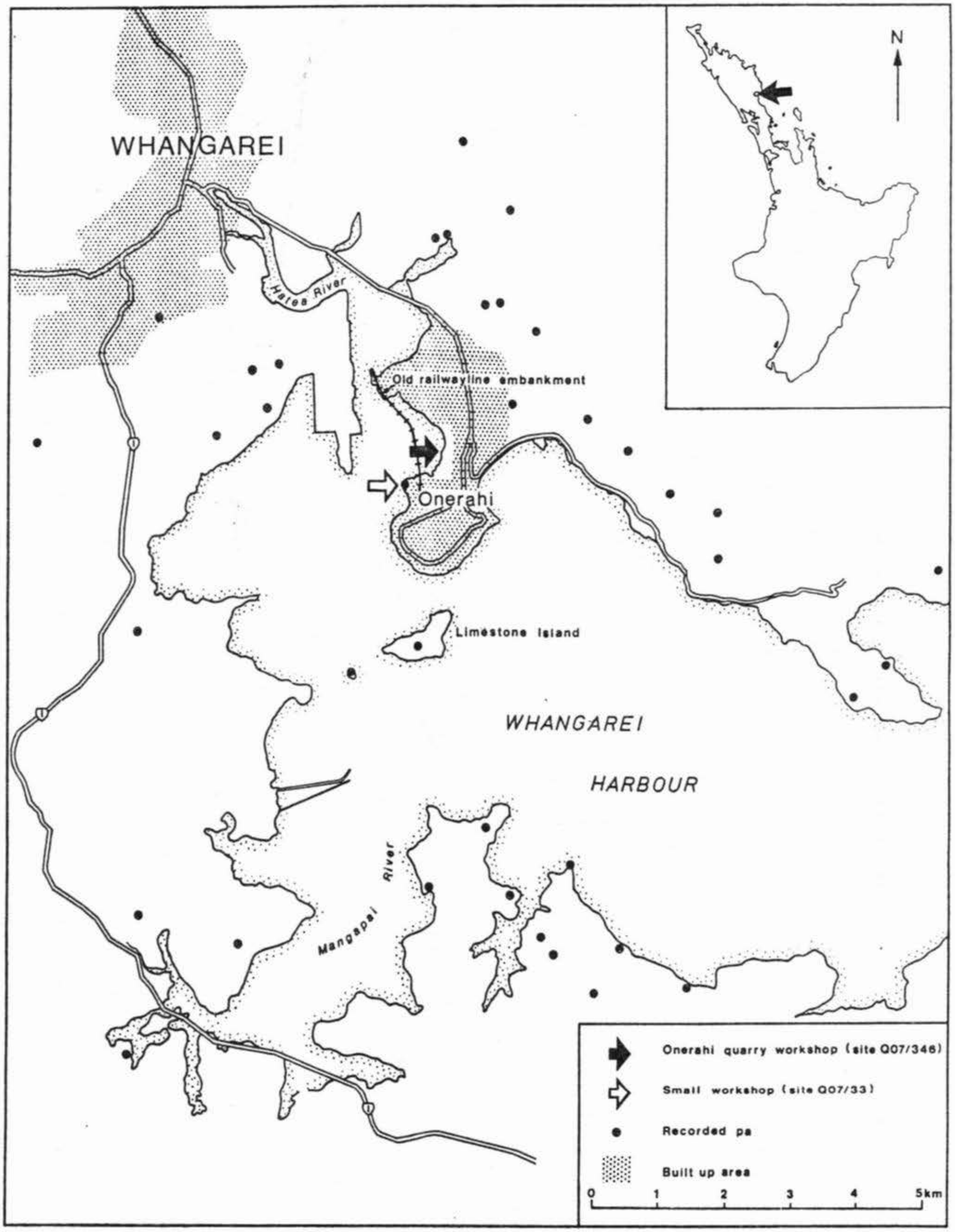

Figure 1. Location of the Onerahi chert quarry workshop (Q7/346)

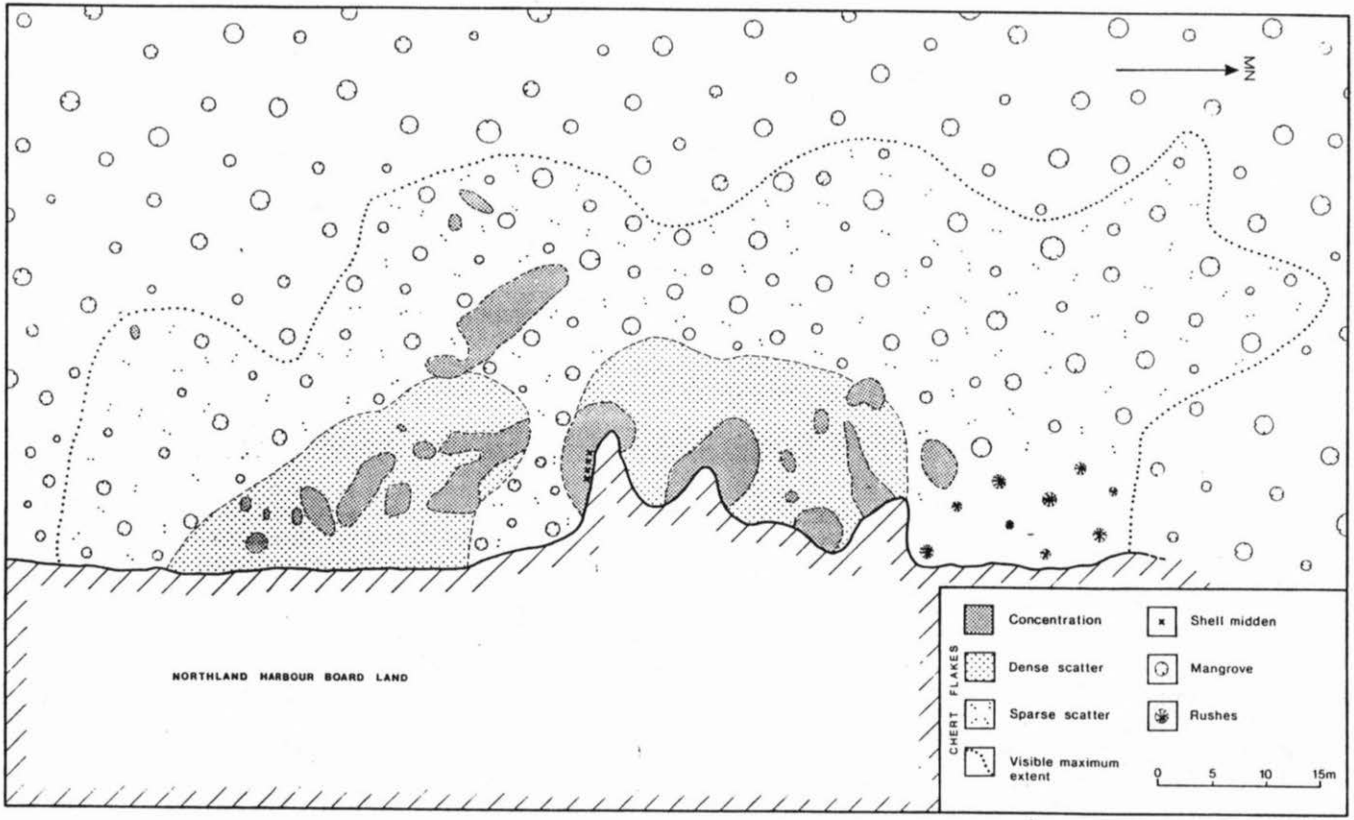

Figure 2. Plane-table plan of the Onerahi chert quarry workshop (Q7/346).

not always easy to define. The boundaries illustrated in Fig. 2 should therefore be regarded as somewhat subjective. It is also highly likely that many chert pieces are buried beneath mud, which becomes deeper toward the harbour channel (westward in Fig. 2).

Origin of the Chert

Geologically the Onerahi peninsula consists of sedimentary rocks exhibiting a variety of lithologies and ages. The Onerahi rocks have been termed chaos-breccia, reflecting a mixed 'chaotic' stratigraphy (Kear and Waterhouse 1967). The origin of this chaos-breccia has been a topic for debate among geologists, with some arguing that the deposit resulted from gravity sliding (Kear and Waterhouse 1967:631, O'Brien and Rodgers 1973:273-274), while others prefer a theory for a tectonic origin (Schofield 1983). Whatever the geological origin of Onerahi chaos-breccia, the important feature of this deposit for archaeologists is that it presented the prehistoric inhabitants of Northland with an opportunity to exploit a number of sedimentary chert-bearing rock formations (Moore 1977:58-59). The Onerahi workshop and the smaller site Q7/33 workshop 1000 m south-west, represent the only known localities in this region of Northland where chert-bearing formations were quarried in prehistory.

The immediate origin of the chert at the Onerahi workshop lies with concretionary boulders which are found at the waters edge. These occur at a number of other locations along the western side of Onerahi peninsula (although some may have been only recently exposed through erosion, road construction and housing development). Nevin (1984:32) reports that some smaller Onerahi chert boulders were transported to sites up to 2 km inland for use as cores. The characterisation of such archaeological material to the Onerahi source is based mainly on colour. Chert from the Onerahi workshop is yellow to light brown in colour, with some pieces exhibiting dark brown banding.

Observations on the Assemblage

In the absence of systematic sampling and analysis, only qualitative observations can be made on the nature of the stone assemblage at the workshop site. Four categories of material were observed during the survey and while studying a large collection gathered by Mr Barry Keene of Whangarei. The categories recognised are hammerstones, cores, flakes and scatter:

1. Hammerstones - Most of these are roughly spherical in shape and would fit comfortable into the palm of the hand, although a few larger examples were also observed. The hammerstone material has not been positively identified,

Plate 1. The Onerahi quarry workshop looking north-east.

Plate 2. In situ concentration of flaking debris (scale in 10 cm intervals)

but some resembles extremely hard concretionary silicate which is sometimes found associated with chert deposits.

2. Cores (Plates 3 and 4) - These range from approximately 8 cm to 50 cm in size. The smaller cores are heavily worked nodules, with some possessing a near conical shape as the result of unidirectional flaking (Plate 4a). The largest cores are what Crabtree (1972:54) terms 'embryonic cores'. These are simply large chert nodules from which one or two large flakes have been struck.

3. Flakes - These are defined after Crabtree (1972:64) as "a portion of isotropic material having a platform and bulb of force at the proximal end". Many flakes at the site exhibit pronounced percussion bulbs, which probably indicates they were struck from cores by the application of direct hard hammer percussion (Crabtree 1972:44). Flakes vary in size from small secondary thinning flakes to large primary decortication flakes.

4. Shatter - This consists of residual stone fragments produced as a by-product of the knapping process. This is the most commonly occurring type of material at the site and is present as pieces ranging in size from very small fragments to large 'chunks' representing the remnants of quartered nodules.

The presence at the workshop of small items of debitage (heavily reduced cores, thinning flakes, small shatter) may indicate tools or tool preforms were manufactured at the site.

Tool Types

No items which could be positively identified as tools were observed during mapping of the workshop site. However, this locality has been fossicked for at least 20 years and it is likely that most completed tools would have been collected. Additionally, although tools were probably manufactured at the workshop, it is possible this was not the locus for intensive tool use. Most tools, except those which were accidentally broken during production, were likely to have been transported to habitation and specialised tool using sites (such as seal butchery sites). Chert pieces resembling those at the Onerahi workshop have been recovered during investigations at the nearby archaeological sites of Smugglers Bay (Q7/83) (Nevin 1984:77), Port Whangarei (Q7/58) (Walton 1977) and Ruarangi Pa (Q7/30) (Hougaard 1971).

Chert tools have been recovered from the small workshop (Q7/33) south-west of the Onerahi site and from the shoreline of Limestone Island (Fig. 1). These are present in collections held by Mr Barry Keene and the Auckland Institute and Museum.

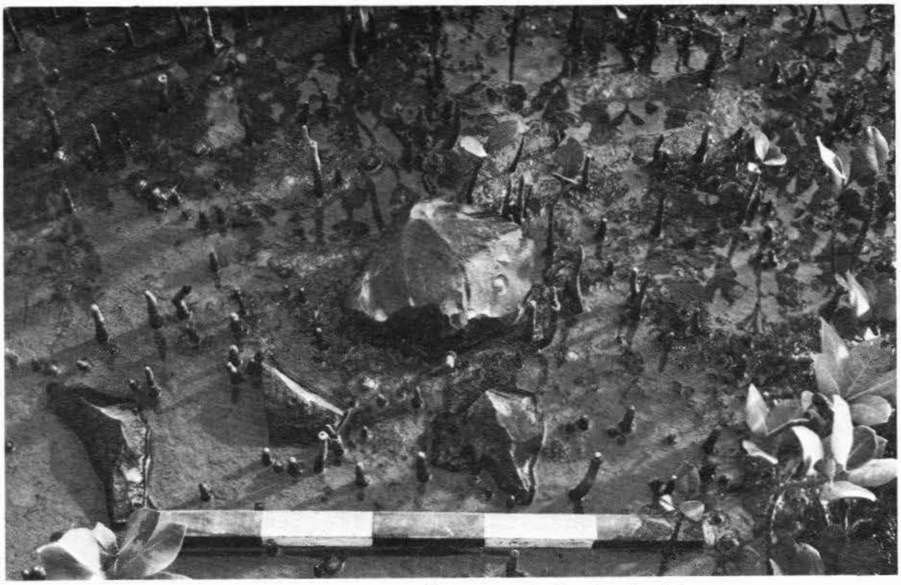

Plate 3. Core and associated shatter
(scale in 10 cm intervals).

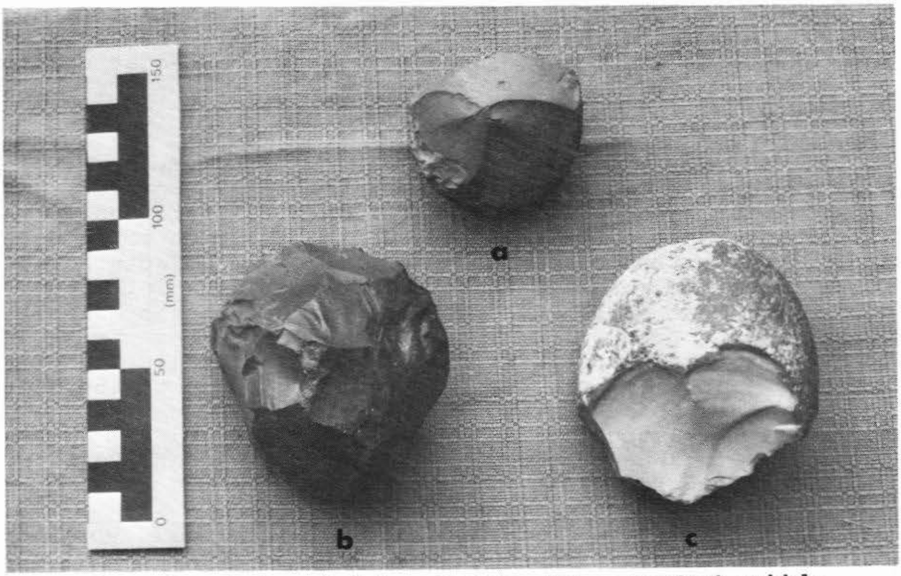

Plate 4. (a) and (b) = cores; (c) = worked cobble
used as a core tool.

The tools appear to be of two types - those which have been deliberately shaped through secondary flaking to produce morphologically distinctive tools, and those which are unmodified pieces only identifiable as tools by the presence of use-wear. A selection of these tools is illustrated in Plates 5 and 6.

The two tools shown in Plate 5 have been shaped through secondary flaking. Tool (a) has been reduced on one edge to form an awl or drillpoint. Tool (b) has been flaked on two edges to produce a tang. This may indicate this piece was hafted, possibly for use as a scraper. Other shaped pieces, some resembling core tools, are present in the Barry Keene and Auckland Museum collections. The three tools illustrated in Plate 6 are all large flakes or shatter which have not been shaped to produce formalised tools. However, Tool (c) does possess evidence of flaking along one edge, possibly to decrease the edge angle in order to create a more effective working edge. The three pieces shown in Plate 6 are identified as tools on the basis of macroscopically observed damage along one edge. This is inferred to be use-wear, although edge damage through other factors (knapping, water rolling, trampling, etc) cannot be ruled out. Edge damage on all three tools occurs bifacially and consists of large regular step and hinge terminated microflake scars. This may indicate functions involving heavy sawing or chopping. Many smaller unshaped pieces displaying possible use-wear are in the Barry Keene and Auckland Museum collections.

Discussion

With the Onerahi workshop there is the potential for a comprehensive analysis of chert tool production in far northern New Zealand. Such a study could be conducted along a number of lines. One form of analysis could involve a study of how tools were made (i.e. manufacturing technology). This would involve measuring attributes of the debitage, cores and hammerstones to elucidate the knapping technique involved in the production of tools. For instance, flakes can be measured to gauge flake shape which can be related back to the use of a particular knapping technique; the study of flake scar morphology on cores can reveal useful information on how force was applied to the core; and information from the measurement of hammerstone size and weight can be used to determine which stage of the knapping process is represented by the archaeological evidence. Crabtree (1972) provides an outline of how observations on archaeological material can be used to infer the techniques involved in stone tool manufacture. Studies of this kind have been undertaken in New Zealand to elucidate aspects of prehistoric Maori stone technology (Jones 1984, Leach 1969).

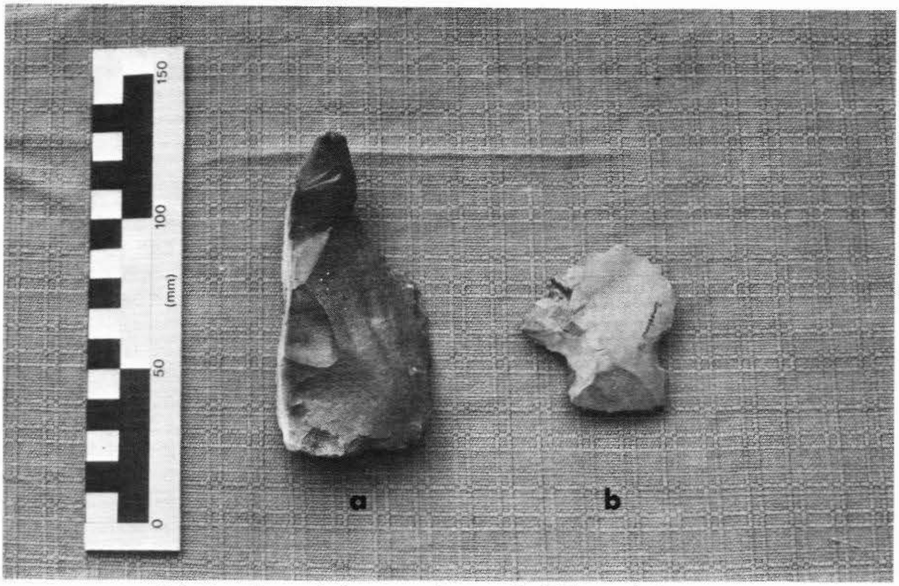

Plate 5. (a) = awl or drill point;
(b) = possible tool with notched tang.

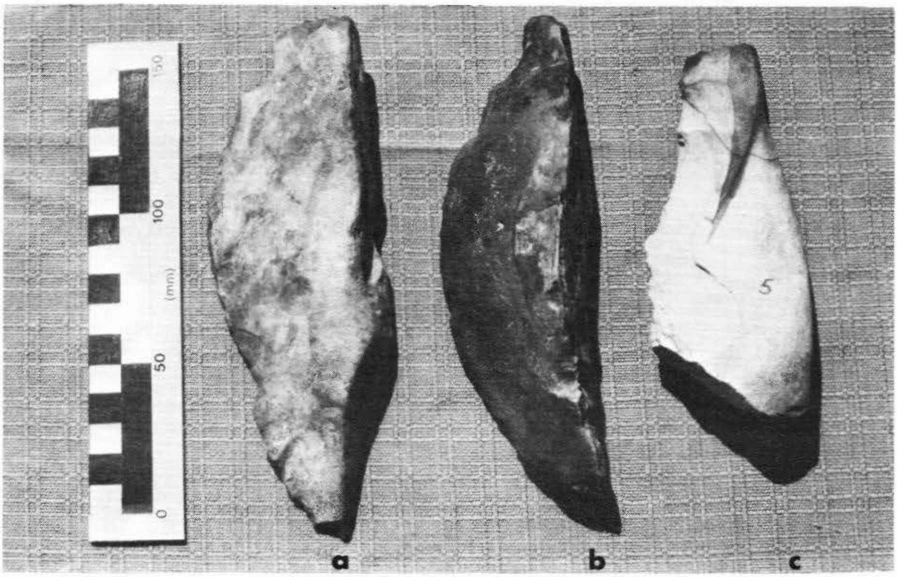

Plate 6. (a) and (b) = unmodified flakes with possible use-wear along one lateral edge; (c) = flake or shatter with retouch and possible use-wear.

Another productive avenue of research would involve determining how far and to which kinds of sites chert from the Onerahi workshop was transported. This would necessitate undertaking a characterisation study of chert in a number of archaeological assemblages. Preliminary hand specimen studies along these lines have been carried out for sites elsewhere in Northland (Brassey 1985, Prickett 1990), while Moore (1977) has discussed the location of probable chert-bearing formations in this region. However, what is needed is a comprehensive study employing sophisticated techniques, such as X-ray diffraction (Takacs-Biro 1986) and electron spin resonance analysis (Griffiths and Woodman 1987), to match chert artefacts with particular quarry workshops. The application of such techniques may prove useful in determining the pattern of exchange for chert from the Onerahi workshop.

A third potential line of research would be to undertake a detailed study of the tools fashioned from chert from the Onerahi workshop. High quality chert was probably regarded by the prehistoric Maori as desirable as obsidian for the manufacture of certain tools. A study of the types of tools manufactured from Onerahi chert could be undertaken to discover if the range of tools was similar to that present in obsidian tool assemblages. This research could be linked with the analysis of debitage at the workshop to reveal the stages (or reduction sequence) involved in tool production. Studies of this kind have proven useful in defining the reduction sequences of adze and blade tool manufacture at southern New Zealand workshop sites (Leach 1984, Leach and Leach 1980). A functional study, perhaps involving edge and/or microwear analysis, could be integrated with the study of tool types to reveal how the completed tools were ultimately utilised.

Conclusion

No research has been undertaken in northern New Zealand on prehistoric chert quarries. This is in spite of the fact that chert was widely used in the north for the manufacture of a variety of flaked tools. The Onerahi site is a rare example of a relatively undisturbed quarry workshop possessing a range of chert debitage, cores and hammerstones. The site has great potential for revealing valuable information on northern Maori chert tool production. However, a steady increase in the mangrove cover at the workshop poses a serious threat to this site. It is imperative that immediate action be carried out to preserve that part of the site not yet covered by vegetation. This will ensure that archaeologists do not lose the opportunity to undertake a comprehensive study of one of the few known prehistoric chert quarry workshops in New Zealand.

Acknowledgements

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References

Brassey, R.J.N. 1985. An analysis of some lithic artefact assemblages from Pouerua, Northland. Unpublished M.Phil. Thesis, University of Auckland.

Crabtree, D.E. 1972. An introduction to flintworking. Occasional Papers of the Idaho State University Museum, No 28.

Griffiths, D. and P.C. Woodman 1987. Cretaceous chert sourcing in north-east Ireland: some preliminary results. In Sieveking, G. De G. and M.H. Newcomer, The Human Uses of Flint and Chert:249-252. Cambridge University Press, Cambridge.

Hougaard, M.P. 1971. Excavations on Ruarangi Pa (site N20/41), Whangarei, New Zealand. Rec.Auck.Inst.Mus. 8:1-22.

Jones, K.L. 1984. Lithic waste flakes as a measure of cultural affinity: a New Zealand case study. Lithic Technology 13 (3):71-83.

Kear, D. and B.C. Waterhouse 1967. Onerahi chaos-breccia of Northland. N.Z. Jnl of Geology & Geophysics 10 (3):629-646.

Leach, B.F. 1969. The Concept of Similarity in Prehistoric Studies. University of Otago Studies in Prehistoric Anthropology, Vol. 1.

Leach, H.M. 1984. Jigsaw: reconstructive lithic technology. In Ericksen, J.E. and B.A. Purdy, Prehistoric Quarries and Lithic Production:107-118. Cambridge University Press, Cambridge.

Leach, H.M. and B.F. Leach 1980. The Riverton site: an archaic adze manufactory in eastern Southland, New Zealand. N.Z. Jnl of Archaeology 2:99-140.

Moore, P.R. 1977. The definition, distribution, and sourcing of chert in New Zealand. N.Z.A.A. Newsletter 20:51-85.

Nevin, G. 1984. Whangarei Harbour Study Technical Report No. 9. Northland Harbour Board, Whangarei.

O'Brien, J.P. and K.A. Rodgers 1973. Alpine-type serpentines from the Auckland Province - II. North Auckland serpentines. Jnl of the Royal Society of N.Z. 3:263-280.

Prickett, K.E. 1990. Identification and sourcing of lithic materials. Appendix 3 in C.F.K. Fredericksen, An archaeological investigation of a habitation and food storage site (O06/307-308) at Motutoa, South Hokianga, Northland. Science and Research Internal Report 78, Department of Conservation, Wellington.

Schofield, J.C. 1983. Northland Cretaceous - Oligocene strata - allochthonous or autochthonous? N.Z. Jnl of Geology & Geophysics 26:155-162.

Takacs-Biro, C. 1986. Sources of raw materials used for the manufacture of chipped stone implements in Hungary. In Sieveking, G De G. and M.B. Hart, The Scientific Study of Flint and Chert:121-132. Cambridge University Press, Cambridge.

Walton, A. 1977. Archaeological investigations of the Northland Harbour Board site, N20/102, Port Whangarei. Unpublished report to N.Z. Historic Places Trust.