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SITE SURVEY METHOD AND STANDARDS:A CHECK SURVEY OF MOTUTAPU ISLAND

Garry Law
Auckland

Research design for site recording is a field which has little history in New Zealand. While the use of aerial photography to find sites has a long history, different methods of field survey have received little attention, in comparison to a large overseas literature on methods of survey. Methods applied elsewhere include such transects and quadrants, and application of such concepts as stratified sampling of areas whereby different zones are given more or less attention. A notable exception to this lack of interest in new Zealand is Aidan Challis's chapter in the Association's site recording handbook (Daniels, 1979).

Moreover there appears to be no literature suggesting people have critically examined the degree to which personal factors have come into the finding of sites, interpretation of sites, and the accuracy of the records made.

While archaeologists are showing more interest in spatial analysis of survey data (Irwin, 1985) and statistical comparison of the class frequency of sites in different areas (Purey, 1981) it is critical to the success or otherwise of such ventures that the data used is controlled to be consistent.

It should be noted that there can be no absolute standard for field data collection, only that each project wishing to use data for comparative purposes has to set its own standards and set up some sort of quality control in applying them.

This study was designed to take the form of a check survey of an area previously intensely surveyed. The aim was to check the applicability of a different form of survey, to check if personal factors came into the recognition of sites and their lumping or splitting into a greater or lesser number of sites, and to see if the citing of grid references for sites varied greatly.

The study

The area chosen for the study was Motutapu Island, the scene of a field programme led by Janet Davidson (Davidson, 1978, is a summary article). The present author had taken part in excavations and surveys on the island but was not familiar with all of it. In consequence the areas (but not the transects,

see below) chosen or check survey were constrained to ones which he had not previously visited. It must be said though that the author was very familiar with the range of sites apparent on the island and their appearance in the field. Moreover he had accompanied Davidson and some of her co-workers on several site survey or visiting trips to the island so could be said to have shared the experience of deciding if sites were sites, or were possible sites.

Prior to this survey the author had site survey experience which related to diverse parts of New Zealand, but which in aggregated time would not have exceeded three months. In this respect he happily defers to the greater experience of Davidson, the principal recorder of sites on the island checked in this study.

Motutapu was blanketed by ash from adjacent Rangitoto Island when it erupted in the 14th century A.D. (Law, 1975). The sites known on the island are almost all later than this event. The friable nature of the soils formed on this ash made for indistinct surface features, and also some erosion features which make the recognition of pit and terrace sites somewhat equivocal. One is often confronted with sites under grass which suggest terraces or more rarely pits, but which are not as clear as one could wish to be certain that they are sites. In consequence there are a lot of sites on the island recorded as doubtful. Anne Leahy has excavated one of these more questionable sites and demonstrated that while there was some use of the site by people resident at a definite site above it on a steep slope, the terrace in question was natural (Leahy, 1986). Roger Green has similarly investigated some mega-terraces and demonstrated a geological origin for these. This latter category of field information was not a matter of concern in this study, but the first was.

Davidson and her co-workers surveyed the island by walking over it following a strategy of searching all beaches and all ridges and knolls which were felt likely to contain earthwork sites. The island is generally in pasture and hence ideal for a high recovery of sites. Intense military activity in the Second World War has produced categories of sites which do not appear to be capable of confusion with prehistoric sites. Exposure of midden by cattle tracks and other stock disturbance is a variable factor which makes discovery of such sites with no other surface evidence dependent on being at the site while the turf cover is incomplete. In favourable summers the grass is often long and makes recognition of sites difficult unless they are walked directly over. A second vegetation factor in site recognition is scotch thistle which occasionally forms thickets on knolls and discourages inspection by lightly clad field surveyors.

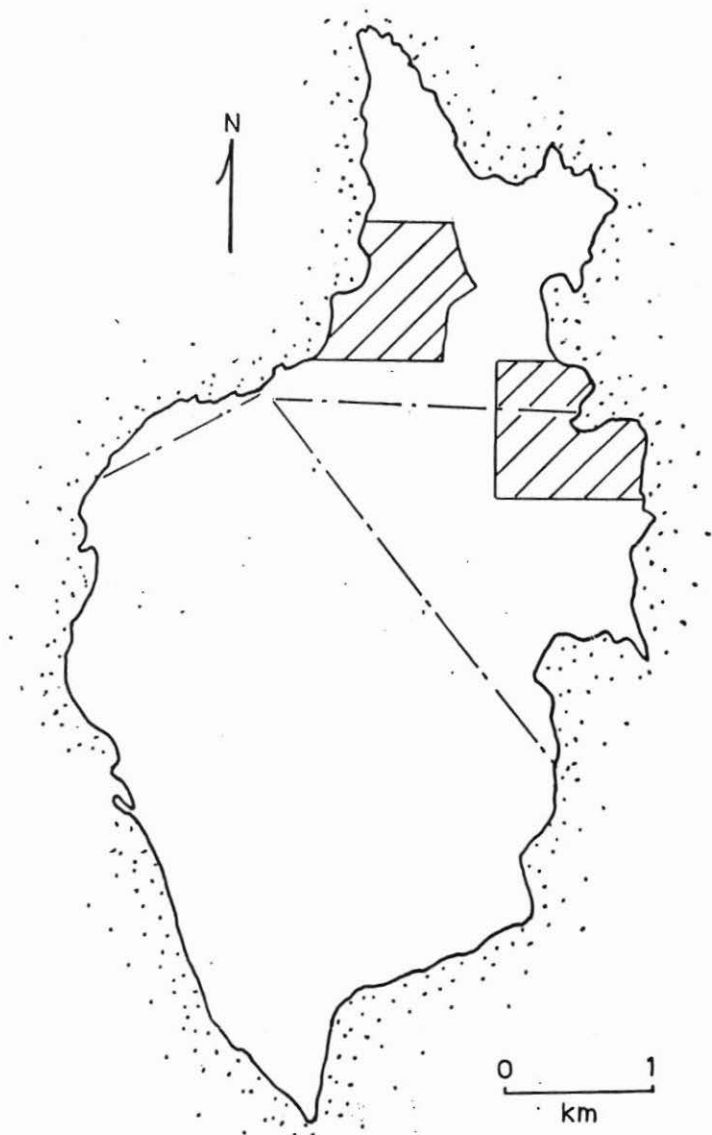


Figure 1. Motutapu Island showing the three transects and the check survey areas.

Sites recorded by Davidson were marked on aerial photographs, and the grid references extracted subsequently by relating the photos back to the survey map. Unusually for New Zealand there is a 1:25,000 Lands and Survey map for the island (1943 A.D.). The author's survey marked sites directly onto the map, by inspection rather than use of any more sophisticated methods such as triangulation by magnetic compass bearings.

The check surveys took two forms. Firstly three transects were walked. These were chosen as vectors from the base camp on the island. The particular vectors were chosen by random means. At the time of the survey (January) the grass was quite long and the surveyor's passage through the grass was readily visible and after the first section had been walked on a compass bearing it was easy to check the accuracy of the bearing walked by taking a back bearing on the track left. Diversions of up to 10 m were made from the strict track if it was believed likely a site would be within that range. Otherwise sites observed from the route were not recorded as part of the transect sample.

The second form of survey was an area survey. Two areas were surveyed bounded by grid lines in most cases and a ridge divide in one case. The transects and areas are shown on Figure 1. The search strategy followed in the area surveys was to visit all beaches and walk all likely ridges and spurs in the survey area. Thus it matches Davidson's strategy in surveying the same areas. In both the transects and the area survey sites were classified as acceptable and doubtful. Davidson was on the island at the time of the survey carrying out her own programme. It should be emphasised that the writer surveyed independently and did not consult Davidson's records until after the survey. Two days of field work by one person was taken in the survey.

Results

Some 50 sites were located in this programme. Of these 19 were on the transects and 33 in the survey areas. The figures do not add to 50 as two sites were both on a transect and in an area. Table 1 compares the number of sites to those known on the island at the time of the programme, classified by their acceptability as sites.

The proportion of doubtful sites found in each case is almost identical (23% and 22% respectively). However the number of doubtful sites appears to vary with the survey method. Table 2 gives the breakdown from this survey by acceptability of site.

	WHOLE ISLAND	LAW SURVEY
Acceptable sites	318	39
Doubtful sites	94	11
Total	412	50

Table 1. Motutapu Island survey: whole island and Law survey.

In Table 2 the proportions vary. A chi-squared contingency table statistical test to check if the differences is significant yielded the result that the difference could have arisen by chance. Thus while it may appear rational that the transects may discover more doubtful sites this cannot be asserted with confidence from these data.

	TRANSECTS	NON TRANSECT AREAS
Acceptable sites	12	27
Doubtful sites	7	4
Totals	19	31

Table 2. Transects and non-transect areas.

Only one new definite site was discovered by the transect survey. It was a terrace site on a gentle slope well off a ridge towards the centre of the island. It was understandable that this particular location had not been walked in the area survey. It must be said though, that the finding of one site missed hardly suggests there is any serious bias in the original survey. There may however be other circumstances where sites in previously unexpected locations could be found by such methods as transects, which free the survey from prior conceptions of where sites are likely to be found, even if the method degrades the efficiency of the survey in sites found per surveyor hour.

Some interesting results emerged when the results of this survey were compared to the records from the original survey. Table 3 compares the sites from the transects. Of the 19 sites recognised by the author, Davidson had previously made records for 13 but because she had 'lumped' sites together there were only 11 'Davidson' records. Moreover, one acceptable 'Law' site was classified as doubtful by Davidson and two sites regarded as doubtful by this author, were accepted by Davidson. One acceptable and four doubtful 'Law' sites had no Davidson equivalent.

In one case the reason for this author splitting a site was clear, as a site ran down a long curved ridge, which was crossed twice by the transect. Without diverting the transect onto the ridge, the connection was not known and hence was recorded as two sites.

Davidson Survey	One 'Law' Site		Two 'Law' Sites	
	Acceptable	Doubtful	Both Acceptable	One Doubtful
Acceptable	7	2	1	1
Doubtful	1	-	-	-
Not Found	1	4	-	-

Table 3. Site comparison from transects. Numbers in the table are in terms of 'Davidson' sites.

Because of the transect method it is not possible to analyse if this survey missed sites recognised by Davidson. This is however possible with the area surveys (see Tables 4 and 5). At first sight the Davidson total of 37 (5 doubtful) and the present author's total of 33 (6 doubtful) look reassuringly similar, but closer inspection shows some wider discrepancies. Of the 33 'Law' sites, Davidson site records exist for 23 but again because of lumping, there are only 19 'Davidson sites' represented. Two sites recognised as doubtful by Law were acceptable to Davidson, and 10 sites (4 doubtful) recognised by Law had no 'Davidson' equivalent. None of the five doubtful 'Davidson' sites were recognised by Law and a total of 13 acceptable 'Davidson' sites were not found by this author. Two sites acceptable to Davidson were doubtful to Law. In all there were only 14 sites in the areas which were strictly equivalent in the two surveys, in being not split by one or other surveyor and being regarded equally as acceptable or doubtful by both.

	a	b	c	d	e	f	g	h	
Law Acceptability									
Acceptable	a	27							
Doubtful	b	-	6						
Davidson Sites Equivalent	c	14	2	16					
Part of larger site	d	7	0	-					
Not Found	e	6	4	-	-	10			
Davidson Acceptability									
Acceptable	f	21	2	16	7	0	23		
Doubtful	g	0	0	0	0	0	-	0	
Not Found	h	6	4	0	0	10	-	-	10

Table 4. A cross classification table of 'Law' sites. In each box the 33 sites found in the Law survey of the sample areas are classified.

	a	b	c	d	e	f	g	h	
Davidson Acceptability									
Acceptable	a	32							
Doubtful	b	-	5						
Law Sites Equivalent	c	16		16					
Split by law	d	3	0	-	3				
Not Found	e	13	5	-	-	13			
Law Acceptability									
Acceptable	f	17	0	14	3	0	17		
Doubtful	g	2	0	2	0	0	-	2	
Not Found	h	13	5	0	0	13	-	-	13

Table 5. A cross classification table of 'Davidson' sites. In each box the 37 sites found in the Davidson survey of the sample areas are classified.

This rather alarming conclusion will be returned to in the discussion.

The reason for new sites being found and old sites being missed can be suggested. In the case of two or three sites recorded by Davidson the present author was dissuaded from searching by thickets of thistle. In some other cases the surface appearance of midden sites may have changed through revegetating or erosion. With the surveys separated by several years, a midden apparent one year may be quite invisible on another. It is also important to note that it was only possible to resolve the lumping/splitting disagreements because the aerial photos marked up by Davidson with the site areas were available.

Over the surveys some 25 sites recognised unambiguously by the author and Davidson could be compared as to grid reference. Reassuringly there were no gross errors by either surveyor but only 11 references agreed exactly with the others being 100 yards different north-south or east-west or both (Table 6). A slight suggestion that Davidson's references fall west and south of the author's is not supported by a statistical test. The comparison can be used to suggest the likely accuracy of grid references at more common map scales. At this scale the probability of getting the grid reference correct in one direction is estimated as 0.814 (hence the probability of getting both directions right by two surveyors is $0.814 \times 0.814 \times 0.814 \times 0.814 = 0.44$, where $0.44 \times 25 = 11$ as observed). At a scale of 1:25000, 100 yards represents 3.66 mm on the map. Assuming a normal distribution of errors, a probability of being within a 3.66 mm range suggests a standard deviation of error of ± 1.4 mm, again on the map.

	-100 E.W.	0 E.W.	+ 100 E.W.
+ 100 N.S.	2	0	0
0 N.S.	4	11	3
- 100 N.S.	2	3	0

Table 6. Fall of Davidson grid references with respect to Law grid references (n = 25).

The most common scale now used for site surveying is 1:50,000 and grid references to 100 m, representing 2 mm on the map. The probability of being within a 2 mm range with a standard deviation error of ± 1.4 mm is 0.52. Hence the likelihood of both a northing and easting on a 1:50,000 map grid reference being correct to 100 m is $0.52 \times 0.52 = 0.27$, or in more straightforward terms about one in four grid references will achieve the claimed accuracy of being to the nearest 100 m.

Discussion and conclusions

With a relatively modest field effort in this check survey, some interesting results have emerged. This in itself suggests that some degree of independent re-survey or check survey should be included in all survey projects as part of the design. If the question of lumping versus splitting is important, and is to be resolved once and for all in the field, and likewise the acceptability of evidence as indicating a site, then it will be important to set and test standards early in a project rather than have them revealed as deficient late in a project.

It would appear from the limited transects used here that they would have produced an acceptable sample of the sites on Motutapu. There is also the hint that using such a mechanical method of searching removes an element of bias. This bias could well be more pronounced in landscapes less dense in sites than Motutapu when surveyor selection of areas to search is more pronounced. The technique could therefore be valuable for unstratified samples, and as here, for check surveys.

An obvious conclusion is that Law is a splitter where Davidson is a lumper. This may not be unrelated to the fact that the present author was not recording sites in any detail other than their location and a few descriptive notes, insufficient to complete a site record form, whereas Davidson had an incentive to lump. This aside, it appears likely there are differences between recorders in the way they see field evidence as 'sites'. To the extent that sites are a bureaucratic device for recording this does not matter. When they become units for statistical analysis with the aim of determining some facts about prehistory, then this is a fundamental concern.

Resurvey finds new sites. This is not surprising or unexpected as the surface evidence of sites does vary with time. It appears here there is a low rate of rediscovery of doubtful sites. What is of more concern is that combined

with the effect of lumping or splitting and the finding of new sites, the record of the sites in the landscape could become very confused; confusion which would be compounded if sites are closely spaced and as suggested here the reproducibility of grid references by different workers is quite low. An unambiguous record of the boundary of a site recognised by a field worker is a vital record in these circumstances.

The standard New Zealand Archaeological Association site record gives a grid reference and may have a sketch or scale map of the site, but this is not designed to define the boundary in terms of the national grid. Marked up aerial photos to supplement the record, as done by Davidson, are clearly a very desirable adjunct. A more 'high tech' solution may be for the computerised index to the site records held by the Historic Places Trust to transform itself into a Land Information System where the boundary of a site rather than a single grid reference is recorded electronically and viewable on a V.D.U. A more sophisticated survey system would be needed, if only to overcome the low precision of grid references as currently determined. Such a transformation would have some other advantages, but this is not the place to pursue those.

More generally this study strongly suggests there are personal factors which are not negligible in the way New Zealand field workers go about site recording, factors which should be addressed if records are to be compared.

Acknowledgement

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