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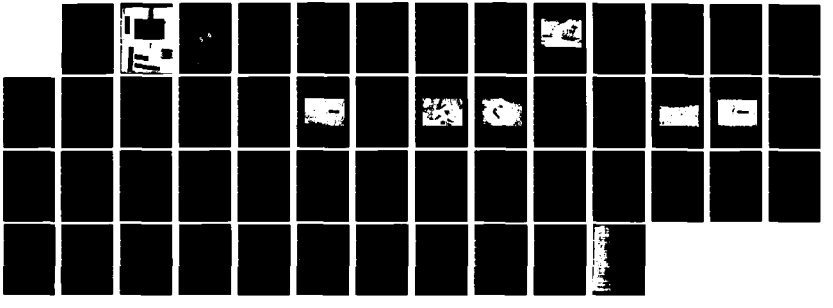

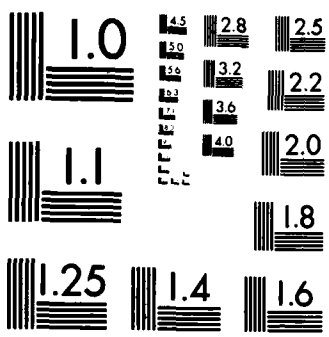

FROM

Bernice P. Bishop Museum

(1)

ARCHAEOLOGICAL AND HISTORICAL RECONNAISSANCE SURVEY OF THE UGUM RIVER VALLEY, GUAM, MARIANA ISLANDS

Ms. 061578

ARCHAEOLOGICAL AND HISTORICAL RECONNAISSANCE SURVEY OF THE UGUM RIVER VALLEY, GUAM, MARIANA ISLANDS

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Honolulu, Hawaii

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INTRODUCTION

Under Contract DACW84-77-C-0019 with the U.S. Army Engineer District, Pacific Ocean, members of the Department of Anthropology, Bernice P. Bishop Museum, Honolulu, Hawaii, and of the Pacific Studies Institute, Agana, Guam, conducted an archaeological and historical reconnaissance survey of portions of the upper Ugum River drainage system. The survey was undertaken between May 1 and 17, 1978, under the direction of the authors, with the assistance of Nolan Hendricks.

Reconnaissance survey, designed to determine the presence or absence of archaeological and/or historical sites, is the initial step in determining action required to mitigate the adverse effects of proposed dam construction and subsequent flooding of the upper Ugum River drainage. The dam, first proposed by Arthur M. Piper (1946:41) would create a freshwater reservoir, nearly 200 acres in surface area, for the people of southern Guam.

Prior to survey commencement a research design was submitted to the Army, as specified in item 5a of the revised scope of work (dated 14 December 1977). This document (Appendix A) provided a theoretical framework for the research and proposed a stratified, systematic interval transect survey as a means of obtaining readily quantifiable and statistically valid data. The remaining work task details enumerated in the scope of work were satisfied by the survey described in the present report.

DESCRIPTION OF SURVEY AREA

The 640-acre survey area is located along and between the headwaters of the Ugum and Bubulao Rivers, situated in southeastern Guam (Talofofo Quad. U.S.G.S. 1:24,000; Fig. 1). The Ugum River serves as the boundary between Inarajan and Talofofo Districts, with the majority of the survey area falling within the latter district.

The survey area, a dissected sloping and rolling land developed in underlying volcanic substrate, is characteristic of the interior regions of SE Guam. The valleys of two rivers, the Ugum and its tributary, the Bubulao, are the major landforms within the survey area. The Ugum, which flows NE, is joined by the E-flowing Bubulao 1,067 meters (3,500 ft) above Talofofo Falls. From this con-

fluence, the Ugum continues to flow NE, ultimately joining the Talofofo River 914 meters (3,000 ft) before it empties into Talofofo Bay. Both the Ugum and Bubulao are fast-flowing rivers with occasional large pools. Local faulting has produced right-angle bends in both rivers and has created a series of rather scenic small waterfalls along the Bubulao, adding to the overall beauty of the area.

Both river valleys are steeply cut and only very narrow floodplains have developed (Fig. 2). The average relief of the area is about 45 meters (150 ft) with a maximum of 70 meters on the upper reaches of the Bubulao. Some boulder talus has developed along the S bank of the Bubulao.

Four smaller streams are expressed as level, swampy areas with only a slight water discharge. The survey took place at the end of Guam's dry season, however, and it is likely that increased rainfall supplements stream-flow sufficiently to define banks on these smaller streams.

The land overlooking these river valleys to the N and S is gently rolling with a slight downward slope to the E. The break between the gentle relief of this land and the often precipitous stream valleys is sharp and easily defined.

Vegetation in the survey area may be divided into two microenvironmental zones (Appendix A:33). Plant identifications were made with reference to Stone (1970). Zone 1 is a mixed, broad-leafed, tropical forest (Fosberg's Unit 2; Tracey et al. 1959:171) on volcanic soils, dominated by ravine forest (Ibid.:176) of variable composition, with local patches of both reed marsh (Ibid.:179) and swamp forest (Ibid.:181). The ravine forest is the most extensive botanical association in the survey area, covering the alluvial flats of the running streams, the taluvial slopes of the valley sides, and in areas adjacent to the survey boundaries, on inter-valley ridges. This forest is characterized by a low, uneven canopy of *Hibiscus tiliaceous*, *Pandanus* sp., *Areca catechu*, *Cocos nucifera*, *Ficus* sp., *Mangifera indica*, and *Artocarpus* sp., with a tangled undergrowth dominated by *Triphasia* sp., and occasional stands of *Piper* sp., *Morinda citrifolia*, *Cycas circinalis*, and *Alocasia* sp. *Bambusa* sp. is found in thick stands on alluvial flats, and a single *Colocasia esculenta* was noted on the upper reaches of the Ugum. Various other unidentified species also occur.

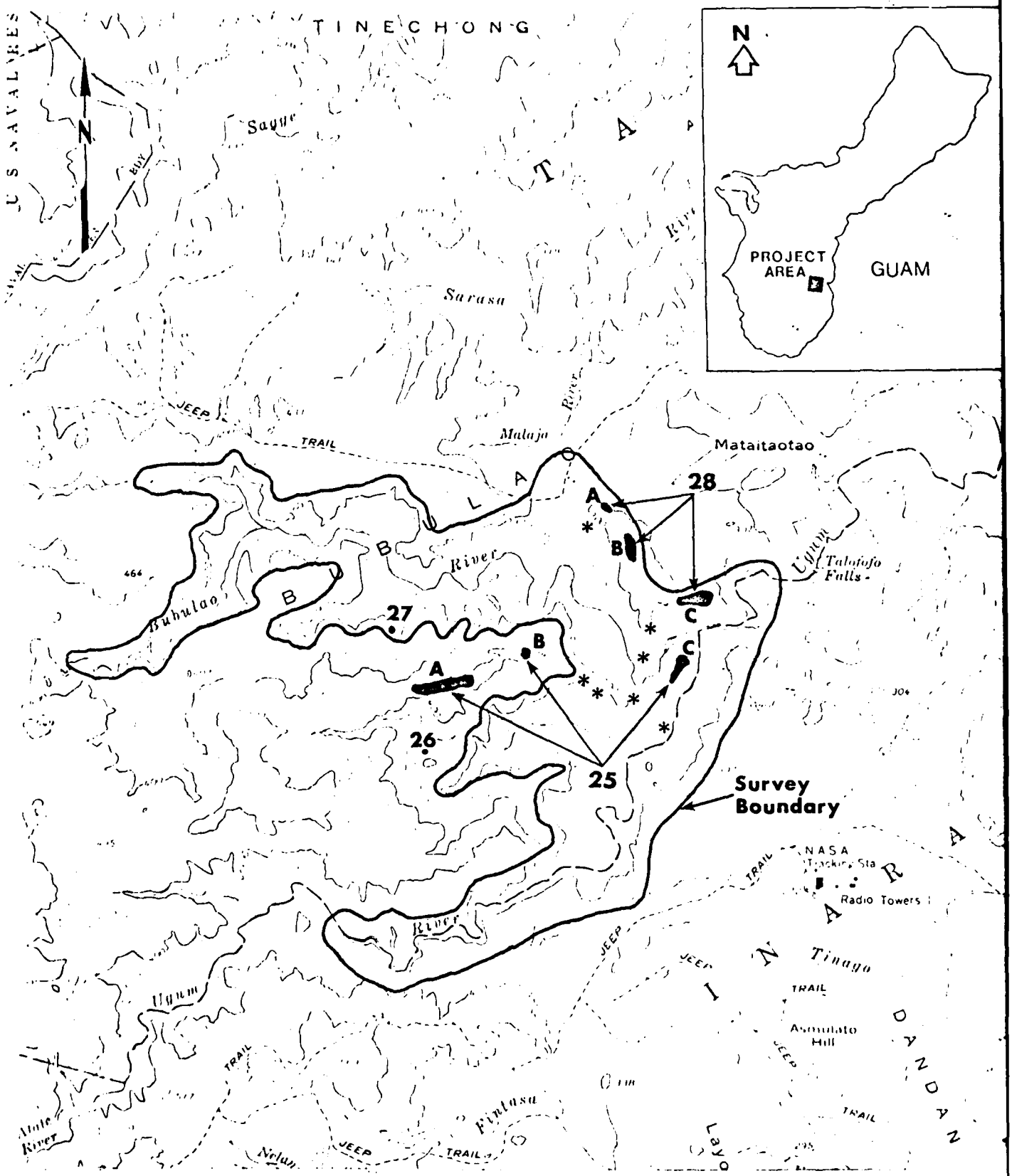


Fig. 1. MAP OF SURVEY AREA, SHOWING LOCATIONS OF RECORDED SITES.

Fig. 2. UPPER UGUM RIVER LOOKING SE. Note poorly developed alluvial flat, steep valley side.

The reed marshes and swamp forests are intergrading associations contained exclusively in the wet land along three of the four small intermittent streams. Here pure stands of the reed, *Phragmites karka*, are slowly being replaced by a woody, swamp association dominated by *Hibiscus tiliaceous* mixed with *Pandanus* sp.

Zone II is predominantly a *Miscanthus* sp. savanna with local erosional scars, and fenced, regularly spaced stands of *Cocos nucifera* on ranches along the N banks of the Bubulao River. This zone is limited to the inter-valley ridges and the gently rolling land along the N and S edges of the survey area. Savannas are frequently burned; three separate savanna fires occurred during the short fieldwork period.

PREVIOUS INVESTIGATIONS

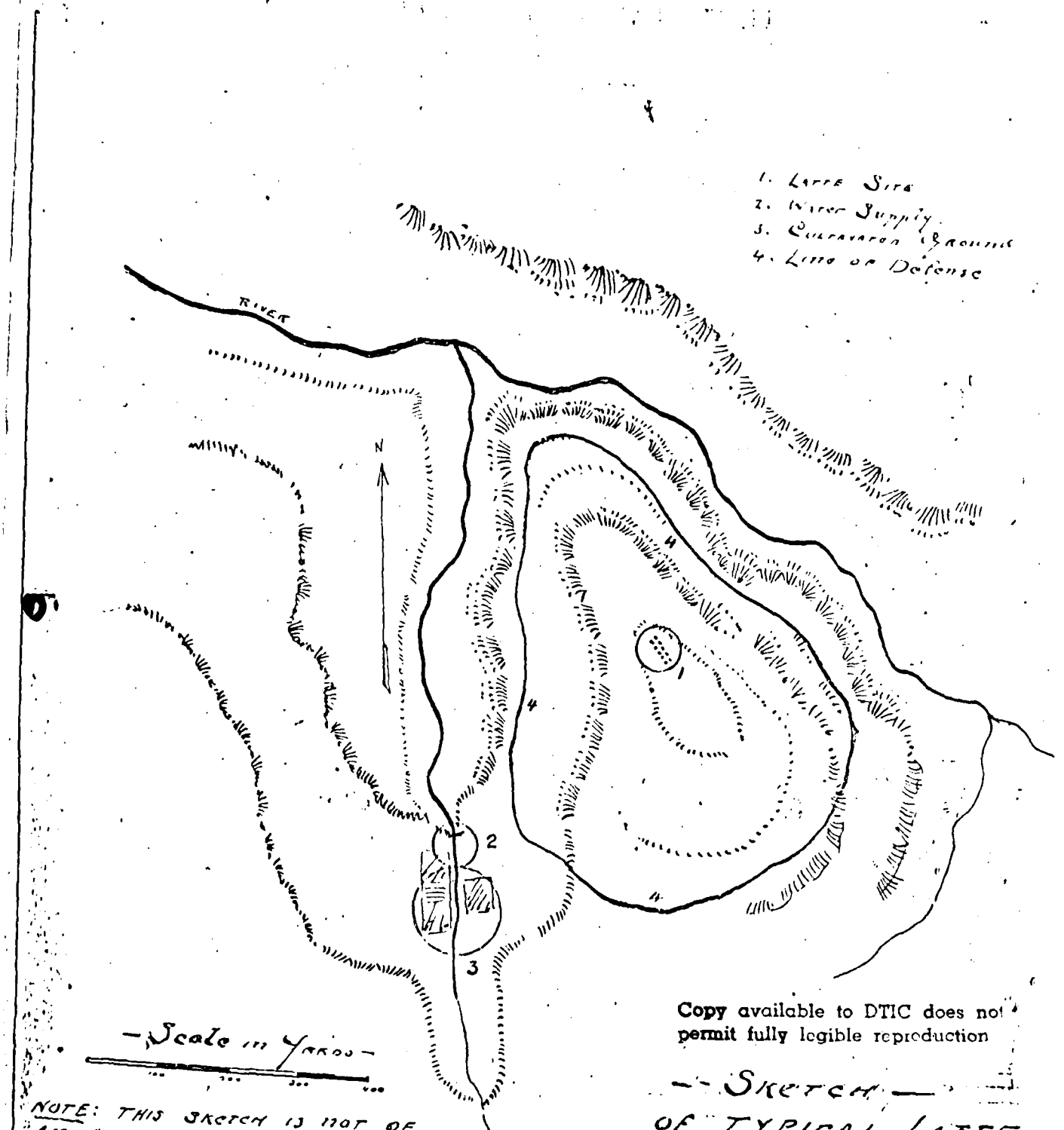
The Mariana Islands have certainly been the focus of more archaeological activity than any other island group in Micronesia, with Guam apparently receiving more archaeological attention than any other single island within Micronesia. Even so, Guam is only incompletely known.

Early investigation of Guam is summarized in Thompson (1932), based largely on the fieldwork of Hans Hornbostel. Hornbostel's "Notes on Upland Latte" (n.d.) contains a hypothetical map of a "typical" *latte* site in south central Guam (Fig. 3), showing a single *latte* structure located on a ridge overlooking the confluence of two rivers. Of particular interest is the presence of an area labeled "cultivated ground" on both banks of a river proximal to the *latte* structure.

Later reconnaissance surveys (Osborne 1947; Reed 1952) and larger scale investigations (Reinman 1977) covered various sections of the island, although some portions of the interior of southern Guam still have never been surveyed.

Reinman has located sites on the lower reaches of the Ugum and has excavated selected sites in both the Talofofo and Inarajan Districts (Reinman 1977). His investigation of the Ugum River drainage involved surveying areas S and E of the Ugum and crossing the river N of Talofofo Falls ((Reinman, pers. comm.:March 8, 1978) and as such as exclusive of the present survey area. Taken together, the two surveys provide data on archaeological site distribution within a complete drainage system. Reinman's excavations at Site MaGI-8*, near the confluence of

*Ma = Mariana Islands, G = Guam, I = Inarajan District, and the last digit designates the individual site.



NOTE: THIS SKETCH IS NOT OF AN ACTUAL LATTE SITE BUT A COMPOSITE OF MANY LATTE LOCATIONS IN THE SOUTH CENTRAL PART OF THE ISLAND.

— SKETCH —
OF TYPICAL LATTE
SITE SOUTH CENTRAL
— GUAM —

— SKETCH # 2 —

Source: Hornbostel Ms.

the Ugum and Talofofo Rivers, revealed a multi-component area both horizontally and vertically. Radiocarbon age determination of a sample from an early level resulted in a date of 270±90 B.C. A later stratum, characterized by the presence of megalithic *latte* structures, was dated into the second millenium A.D. (A.D. 1530±150).

Site MaGI-28, erroneously reported to lie within the present survey area (Appendix A:29), was found on a ridge overlooking the Ugum drainage above the limits of the present survey.

CULTURE HISTORY

Other islands of the Marianas have been investigated (Spoehr 1957; Pellett and Spoehr 1961; Takayama and Egami 1971) and have yielded evidence of cultural development similar to Guam.

Spoehr was the first to establish a basic culture chronology for the Marianas, based largely upon pottery types and the presence of the megalithic structures known as *latte*. Supported by radiocarbon dates, Spoehr stated that the earlier phases of Marianas prehistory were characterized by thin, finely made, red-slipped pottery and associated with a basal date of 1527±125 B.C. Through time, this type of pottery became less prominent and eventually was replaced by a thicker, more crudely made ware, which he called Marianas Plain. This type contained many varieties and became numerically prominent about the time of the first appearance of *latte* structures. Spoehr dates this occurrence at about A.D. 845.

While Spoehr's work did not include Guam, Reinman's activities on this island have substantiated Spoehr's findings on Saipan, Tinian, and Rota. Reinman argues that the Marianas Red/Plain types do not work well on Guam and suggests that early and late pottery are better distinguished by differences in tempering materials. Thus, he has established the Calcareous Sand Temper (CST) and the Volcanic Sand Temper (VST) divisions which, he states, can also be found in Spoehr's pottery sample.

Differences in settlement patterns through time, at least on Guam, have been postulated by Reinman. He suggests that sites in the interior river valleys and uplands did not occur until relatively late in Guam prehistory. Owing to the lack of midden deposits in these interior sites, Reinman states that these

sites either were occupied seasonally for short periods or were constructed in the early historic period as a reaction to hostile encounters with the Spaniards (Reinman 1977:19, 20).

HISTORIC LAND USE

No records of land use, in the specific areas designated, were located for the periods prior to World War II and the subsequent American period of Guamanian history. During World War II, and for several years after cessation of hostilities, the survey area was used as a place of refuge for Japanese soldiers after the American invasion of the island in 1944. The most notable of these is Sgt. Shoichi Yokoi, who for 28 years hid out unnoticed in a cave near the Talofofo River, NW of the present survey area. No evidence of the activities of Yokoi or of other Japanese holdouts was noted in the survey area.

Present land use is dominated by Guamanian ranches. These generally consist of a small plot of land, often fenced, that is tended on the weekends by the owner and his family, who live elsewhere. A single small structure of corrugated tin provides sufficient shelter. Tree crops, especially betel nut (*Areca*), coconuts (*Cocos nucifera*), and various fruit trees (*Mangifera, Artocarpus*) are tended, with an occasional vegetable garden in evidence. A single small ranch of this type is located within the survey area, along the S banks of the upper Ugum River. A large, atypical ranch with extensive pasture is located on the gently rolling land N of the Bubulao River. Large herds of carabao and pigs graze here, and hunting, most often in the form of poaching, is a common activity. The numerous small jeep roads through this ranch provide convenient access for guided jeep and bus tours of visitors who wish to view Guam's jungle and its wild animals.

The frequent burning of savannas may be an activity related to deer hunting. Informants say that deer are attracted to the tender new grass shoots that appear shortly after burning, and are easy prey at night in the open fields.

Both the Ugum and the Bubulao are sources of freshwater eels (*Anguilla* sp.), prawns, and molluscs (*Neritina* sp.). Traps baited with fresh coconut are often set by local residents.

RECONNAISSANCE SURVEY

FIELD METHODS

An archaeological reconnaissance survey is designed to determine the presence or absence of sites within a specified area. These data are then used to formulate responsible recommendations on the nature and extent of further archaeological work, usually as a mitigative action prior to large-scale construction activities.

Where a 100% sample of the entire area is not feasible, surveys of this type require investigation designed to yield quantifiable data with a determinable probability of error. This was accomplished through use of a stratified, systematic-interval transect survey, with strata defined by microenvironmental zones through which selected transects were walked. The microenvironmental zones that constituted the sampling strata were essentially those outlined in the research design (Appendix A) with the addition of the swamp/marsh association as a subdivision of Zone I. The revised microenvironmental zones are as follows:

ZONE I: Upland Valleys.

- IA: Forested alluvial flats in the valley bottom, not very extensive.
- IB: Taluvial slopes of the valley sides, the dominant component.
- IC: Swamps and marshes along intermittent streams.

ZONE II: Inter-valley, savanna-covered ridges.

Zones IA and II were designated as the primary sampling strata, with Zones IB and IC as secondary sampling strata, on the basis of Reinman's general survey of Guam (Reinman 1977).

A satisfactory stratification of survey intensity was achieved by determining the effective transect width within each microenvironmental zone while in the field and then walking sufficient transects to achieve the desired level of intensity. Effective transect widths are as follows.

Zone IA - 10 meters (c. 33 ft)

Zone IB - 5 to 7 meters (c. 16 to 30 ft)

Zone IC - 1 meter (c. 3 ft)

Zone II - 20 meters (c. 66 ft).

Due to the rugged terrain and locally heavy vegetation, straight-line transects were often impossible and were consistently achieved only through Zone II.

All transects were plotted in the field on a U.S.G.S. topographic map with a scale of 1:24,000 (Fig. 4). The length of each transect was then computed from the map, with the resulting total from each microenvironmental zone multiplied by the effective transect width, yielding an estimate of the area surveyed within each zone. These figures were then compared with the total area of each microenvironmental zone as determined from U.S.G.S. maps and aerial photographs. The resulting figure, a percentage of the zone surveyed, is thus a reliable estimate of survey intensity within each of the designated sampling strata.

When an archaeological feature was located, its position was plotted on a U.S.G.S. topographic map, salient morphological features were noted, and photographs were taken. The extent of pottery scatters was difficult to ascertain because of heavy ground cover in some areas and erosion in others.

The sampling strategy devised for this project and discussed in the research design proved to be most effective; as anticipated, terrain and vegetation were prohibitive to complete coverage of the survey area. At the same time, the concept of sampling by strata allowed for maximum coverage in those areas most likely to exhibit sites, while allowing adequate coverage of those areas least likely to contain sites. As is demonstrated in the next section, site distribution varied little from the expected pattern. A discussion of the survey sample, including predictions of unrecorded sites, is presented in Appendix B.

SURVEY RESULTS

A total of approximately 107 acres, or 17% of the project area, was surveyed. The forested river flats (Zone IA) and savanna-covered ridges (Zone II) received the most intensive coverage, followed, respectively, by the forested taluvial slopes (Zones IB) and the swamp/marsh association (Zone IC). The small size of the river flats and the open terrain of the savanna made extensive coverage in these areas a relatively easy task, while the rugged taluvial slopes, with an undergrowth of spiny *Triphasia*, and the incredibly dense foliage of the swamps and marshes made the relatively less-extensive coverage in these two zones an arduous endeavor.

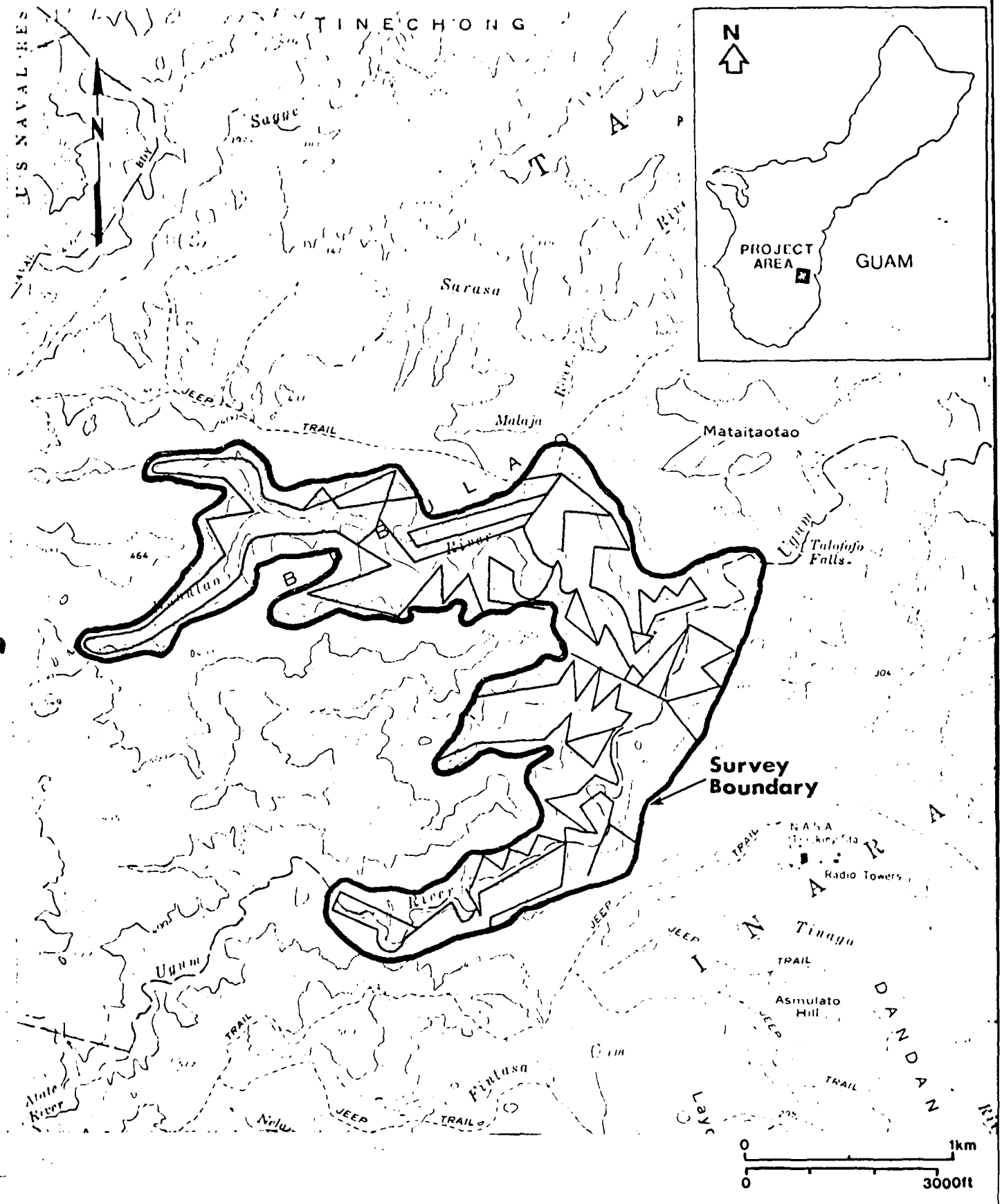


Fig. 4. MAP OF SURVEY AREA, SHOWING SURVEY TRANSECTS.

The area surveyed in each vegetative zone was as follows:

Zone	Total Acreage	% of Survey Area	Acres Surveyed	% of Zone Surveyed
IA	6	1	6	100
IB	569	89	71	12
IC	33	5	0.3	1
II	32	5	29	91
Totals	640	100%	106.3	17%

Eight areas of prehistoric activity were located during reconnaissance survey. Five of these were discovered within the survey area--four while walking transects, and the fifth while searching for independent confirmation of a site distribution pattern observed in the field. Three areas were located outside of the survey area--one through information supplied by local residents, another while searching for the source of eroded pottery found within the survey area, and the third while searching for a convenient place to cross a wide marsh with abundant carabao sign. These eight prehistoric activity areas have been assigned four site numbers (MaGT-25 through 28*). Two ridges, each with three loci of prehistoric activity, are designated as single sites on the basis that no clear break between loci, evidenced either by lack of archaeological features or by presence of any outstanding physiographic feature, was apparent. The other two site numbers were given to apparently isolated features, although further survey in the Ugum area, or in SE Guam, may reveal possible functional/temporal relationships with the site complexes noted above or with other, as yet unrecorded, arhcaeological features.

Three historic features, all apparently dating from World War II and now in disuse, were noted. In addition, the rusted wing tank for an airplane was found in a recently burned savanna, and various fragments of exploded ordnance can be seen throughout the area. The historic features are described below, but site numbers have not been assigned to them.

Analysis of 27 pottery sherds recovered during the survey is included as Appendix C.

*Ma = Mariana Islands, G = Guam, T = Talofofo District, and the last digits designate individual sites.

Site Descriptions

Site MaGT-25

This site is a complex of three prehistoric activity loci located along the crest of a ridge that runs roughly E-W between the Bubulao River and an unnamed intermittent tributary of the Ugum River (Fig. 1). The three loci, labeled A, B, and C for convenience, are defined as follows.

Locus A, located outside of the survey boundaries in a heavily forested area dominated by *Artocarpus*, *Areca*, *Pandanus*, *Ficus*, and *Cocos*, is a cluster of ten *latte* structures and six mortar stones. Each *latte* structure has between six and ten basalt uprights, most still standing, with basalt capstones lying nearby. The mortar stones, most placed in front of the *latte*, are also fashioned of basalt and exhibit either one or two well-defined, smooth depressions. Pottery, a plain, thick, volcanic-tempered ware, was found in soil disturbed by an uprooted tree; its absence on the surface elsewhere within this locus may be a function of the depth of deposit and/or the lack of erosion on this heavily forested portion of the ridge. No other artifacts were observed.

Locus B is an *in situ* deposit of pottery eroding out of the crest of a savanna-covered knoll just W of the survey boundary. This locus is the probable source of a secondary deposit of plain, volcanic-tempered pottery located within the survey area, below the knoll on a recently burned and eroding savanna. Sherds eroding from the knoll are quite large (Fig. 5); one sherd appears to represent perhaps one-third of a complete vessel.

Locus C is an apparently *in situ* deposit of pottery of undetermined extent, located on a small level area of the ridge crest that is heavily forested with *Pandanus* sp. and *Areca* sp. with a thick understory of *Triphasia* sp. Dense vegetation precluded determination of the areal extent of what appears to be a primarily subsurface deposit. No other features were noted.

Scattered pottery was found along the ridge between Loci B and C (Fig. 1), and in the backdirt of a large historic-era pit (described below) on a toe of the ridge near the N bank of the Ugum. While no intact areas of primary deposit were located in these areas, simple slope-wash is an inadequate mechanism for transporting material such a long distance over uneven terrain. Thus, pottery transport either was facilitated by the construction of a jeep road (described below), or *in situ* pottery is still undiscovered.

Fig. 5. POTTERY ERODING FROM KNOLL, SITE MaGT-25, LOCUS B (arrow = 25 cm).

Site MaGT-26

The remains of an apparently isolated *latte* structure are located on a small level area in a slope that rises from a reed marsh. Vegetation is predominantly *Pandanus* sp., with significant stands of *Artocarpus*, *Areca* sp., and *Hibiscus* sp. Of the three basalt boulders found, one is upright (Fig. 6), and the other two rest on the ground. All are similarly sized, with lengths between 0.6 meter and 0.88 meter and widths between 0.35 meter and 0.42 meter. No capstone-shaped boulders were found, and the surface was devoid of pottery or other artifacts. Isolated *latte* structures are common in the interior areas of Guam, as noted by Reinman:

> Individual *latte* (or the remains of a former structure), some distance from one another, were characteristics of the remaining sites in the river valleys. Even where two or more structures were located within a single site designation, the *latte* were from 150 to over 500 yards apart [1977:16].

Site MaGT-27

This site is an apparently isolated mortar stone and a nearby unmodified boulder on a broad, sloping, relatively boulder-free ridge overlooking the Bubulao River. The mortar is roughly hexagonal, 61 cm in diameter and 25 cm tall, with a smooth central depression, 19 cm in diameter and 12 cm deep (Fig. 7). Two very shallow, smooth depressions border the deep central depression. The unmodified boulder, 48 by 39 by 22 cm, lies 0.52 meter N and slightly downslope of the mortar. Both stones are a light gray, vesicular basalt with numerous phenocrysts of a black mineral. A nearby rectangular pit, 1.0 by 1.2 meters and 0.48 meter deep, is probably a recent feature, but its function was not determined. Vegetation is primarily unidentified grasses in the immediate vicinity of the mortar, but nearby are stands of *Cycas*, *Areca*, *Pandanus*, *Cocos*, and *Artocarpus*.

Site MaGT-28

A complex of three prehistoric activity loci is located on a ridge running NW-SE on the N side of the Bubulao River. The three loci, labeled A, B, and C, are described as follows.

Locus A is a concentration of transported and *in situ* plain, volcanic-tempered pottery, exposed in the eroded edge of a jeep road that follows the crest of this ridge. This locus is the source of pottery found on the slope of the ridge just above an extensive swamp.

Fig. 6. *LATTE* UPRIGHT AT SITE MaGT-26 (arrow = 25 cm).

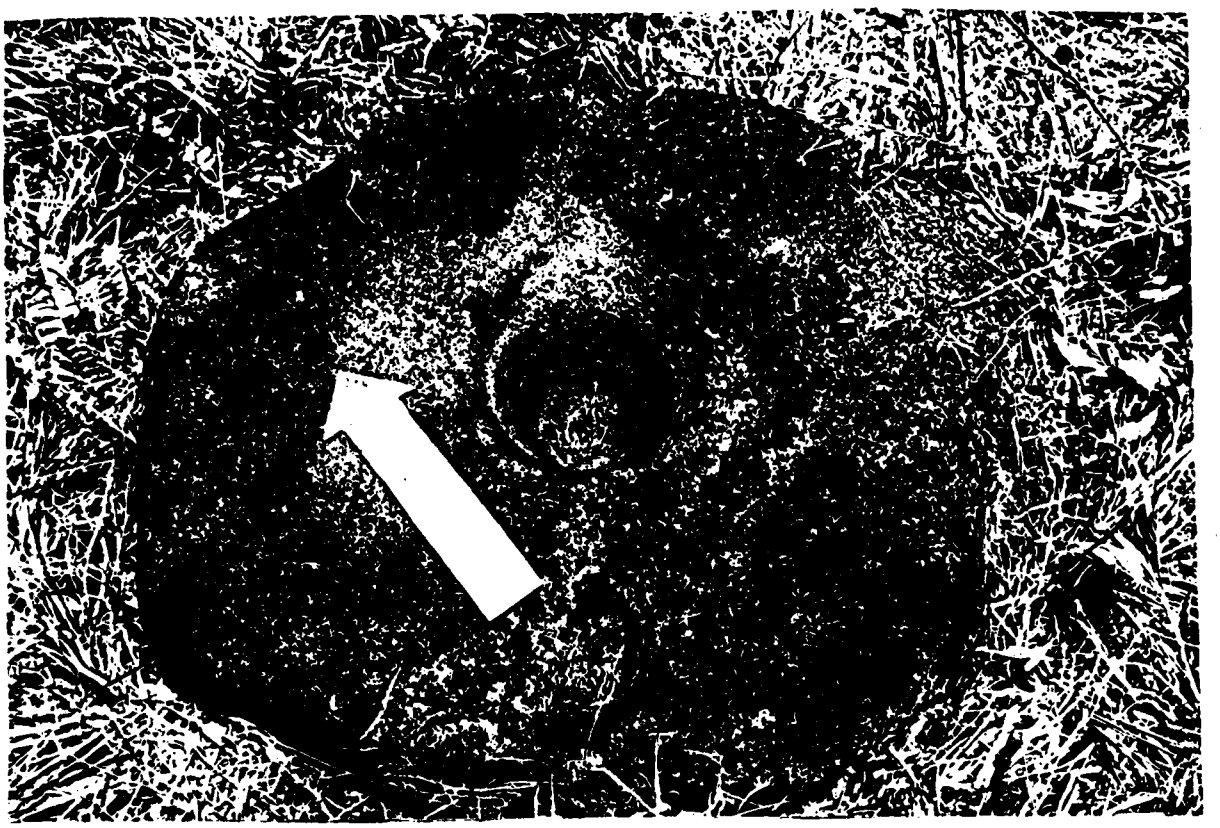


Fig. 7. ISOLATED MORTAR, SITE MaGT-27 (arrow points north).

Locus B consists of at least five *latte* structures located in an area forested with *Pandanus, Cycas, Artocarpus, Areca,* and *Hibiscus,* and in the adjacent savanna. Each structure has between four and ten uprights of basalt, breccia, and coral, and capstones of these same materials are found nearby. One *latte* has eight uprights still standing (Fig. 8). A single mortar stone and four pestles were found on the surface, as was pottery, both plain and decorated, and worked chert flakes.

A possible source of chert nodules was found in what appears to be an old stream bed situated on the slope below Locus B and above the present banks of the Bubulao. *In situ* waterworn nodules of chert were observed within an eroded portion of this slope.

Locus C is a scatter of pottery, apparently *in situ,* a mortar stone, at least two pestles, and a basalt chisel, in a savanna-covered area overlooking the confluence of the Bubulao and Ugum Rivers. Several large, scattered basalt boulders may be the remains of *latte* structures. Pottery here is plain, rather thick, volcanic-tempered ware. Large sherds are present in abundance on the surface and include a good sample of rims.

Historic Features

Three historic features were found during reconnaissance survey; all apparently date from World War II.

A jeep road, according to local landowner J. Roberto, was constructed by American occupation forces. This road, which is still used by four-wheel-drive vehicles, enters the survey area from the E, and descends a small ridge to the Ugum. Nothing now remains of a river-crossing structure, but abundant tread marks from heavy equipment are cut into the breccia stream banks here. The road resumes on the W side of the Ugum, running along the ridge that supports Site MaGT-25. Just below the knoll of Locus B the road forks, one branch continuing on up the ridge to Locus A, and the other descending to the Bubulao River and a shallow ford. This branch has been recently bulldozed, and a bed of crushed rock has been laid. After crossing the Bubulao, the road is joined by numerous small jeep trails and heads out of the survey area to the N.

The second historic-era feature is a large pit, 15 meters long, 8 meters wide, and 2 meters deep, located 15 meters W of the Ugum River along the above-

described jeep road. No function is postulated for this massive earthwork, but its historic origin seems assured as it apparently was constructed after the jeep road.

The third feature is a probable World War II troop entrenchment within the confines of Site MaGT-25, Locus B. Concentrations of shrapnel (Fig. 9) near erosional scars may mark the sites of other entrenchments of this type, now eroded away.

Fig. 8. UPRIGHTS STANDING ON *LATTE*,
SITE MaGT-28, LOCUS B.

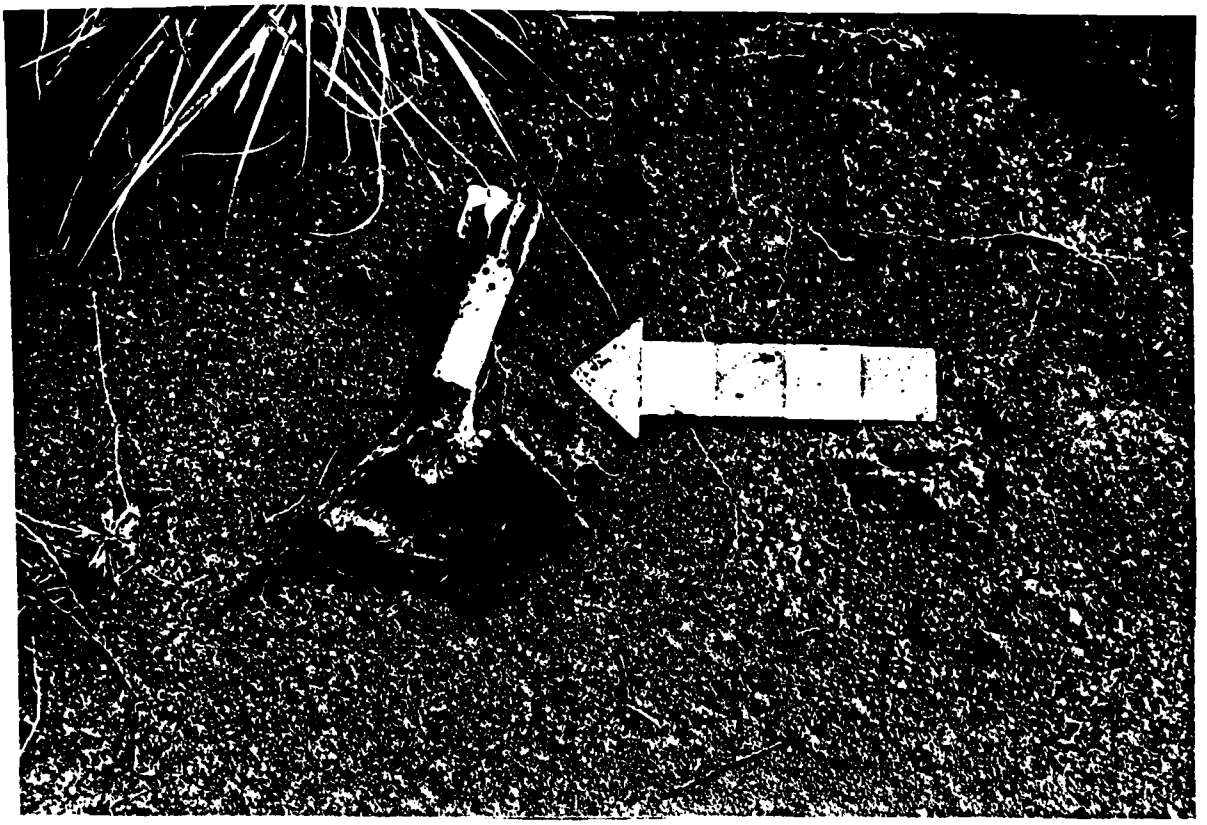


Fig. 9. SHRAPNEL AT SITE MaGT-25, LOCUS B (arrow = 25 cm).

SUMMARY AND CONCLUSIONS

DISCUSSION

The eight loci of prehistoric activity described above form two site complexes, of three loci each, and two apparently isolated features. The rationale for this division of features has already been discussed.

The area is significant in that it is one of the most interior sited areas surveyed on Guam, and is situated at the headwaters of a large drainage system that now has been surveyed, virtually entirely, from the coast to the uplands. Excavations by Reinman (1977) at Site MaGI-8, near the confluence of the Ugum and Talofofo Rivers, have provided a time frame for habitation of this river drainage from 270±90 B.C. to 1570±150 A.D. Data from upland interior sites is very sparse, and as a result only general hypotheses have been presented (e.g., Reinman 1977:19).

Several patterns of inland site distribution are apparent from the present survey data. These patterns may have wider implications for settlement patterns in the interior of southern Guam.

Sites MaGT-25 and -28 are virtual mirror images of each other, sharing identical site components in similar ecological settings, suggesting that this type of ridgetop settlement was the culturally preferred mode of habitation in upland areas. Clusters of *latte* structures are located along the crests of ridges forested with a preponderance of food and narcotic-producing plants. These include the breadfruit (*Artocarpus incisus*, *Artocarpus mariannensis*, and hybrids of the two*), a staple starch throughout much of Oceania; Federico palm (*Cycas circinalis*), which has seeds that can be processed into an edible flour; coconut palm (*Cocos nucifera*), the most important food plant in Micronesia; and betel nut (*Areca catechu*), chewed for its stimulant effect. Although feral yams (*Dioscorea* sp.) were not found, these plants lose their leaves seasonally and could have been represented merely by withered stems at the time of the survey. The presence of the listed plants is an indication of the secondary nature of the forest (Fosberg in Tracey et al. 1959:177) and possibly of the horticultural activities of the Chamorros. Several of these species were apparently introduced to Guam prehistorically (Ibid.).

*For a discussion of man's role in hybridization of these two species see Fosberg 1960a.

The forested *latte* area of each site is closely associated with rather extensive savanna-covered ridges with *in situ* deposits of potsherds. It had been argued (e.g., Fosberg 1960b; Stone 1970) that these savannas were formed as the result of purposeful burning of portions of the forested areas that originally covered most of Guam. The spatial correlations between the savannas and *latte* sites strongly suggest that of savanna development and/or expansion was contemporaneous with site utilization.

Both sites include an extensive deposit of volcanic-tempered pottery on the level area of the ridge closest to a running stream. In Site MaGT-25 this locus (C) is heavily forested in a second growth of *Pandanus* and *Triphasia*, while at Site 28 it occurs in open savanna. The preponderance of restricted-neck vessels in pots with volcanic temper (Reinman 1977:76) may indicate that these two loci were somehow associated with water supply to the *latte* areas farther upridge.

Finally, both sites are proximal to areas of swamp/marsh. These expanses of wet ground would have been ideal locations for cultivation of hydrophytic crop plants such as taro (*Colocasia esculenta*) and rice (*Oryza sativa*). Botanist Fosberg opines that in pre-Spanish times "undoubtedly the ravines were largely used for agriculture--taro and rice-growing, and coconut culture" (Tracey et al. 1959:177). A single specimen of feral *Colocasia esculenta*, found on the upper reaches of the Ugum, indicates the prior cultivation of this aroid somewhere in the valley, but sheds no light on where or when this took place. No evidence of rice was observed.

The necessarily tentative picture that emerges is that of a permanent or seasonal ridge settlement characterized by *latte* sites surrounded by a forest of selected economic trees. The arboriculture practiced by the inhabitants of the *latte* may have been supplemented by field crops; perhaps taro and yams, grown in nearby swiddens, or by rice and taro cultivated in swampy areas along intermittent streams. The water source was obviously the fast-flowing major streams; water may have been transported to the site in restricted-neck pots (see Appendix C). The streams may also have been the source of protein foods, such as prawns, eels, and molluses.

IMPACT OF THE PROPOSED PROJECT ON ARCHAEOLOGICAL RESOURCES

Dam construction on the Ugum River and subsequent flooding of both the Ugum and Bubulao Rivers to an elevation of c. 276 ft also would have a direct impact on Site MaGT-25, Locus C, and Site MaGT-28, Locus C. In addition, low-lying swamps and marshes will be inundated.

Any subsequent use of the reservoir for recreational activities open to the public would adversely impact the remaining loci of Sites MaGT-25 and -28 by affording increased access. Further, these prehistoric activity loci would be located only a few meters above the water level of the reservoir, enhancing the probability of destructive erosion.

SIGNIFICANCE OF SITES

The significance of archaeological sites is based upon potential for further research or interpretive display. Sites directly impacted by the proposed project will lose this potential on inundation and thus must be salvaged prior to completion of construction.* Sites in areas of secondary impact may or may not be adversely affected; contingency plans to be implememted prior to the onset of foreseeable adverse impacts are therefore presented.

The archaeological sites located during this survey should provide data relative to a number of research questions. Due to the paucity of data from interior sites on Guam, these questions are necessarily broad. They include, but are not limited to, the following:

(1) What is the spatial relationship between archaeological features and (a) dominant landforms, (b) locally available resources (e.g., water, cultivable land, clay), and (c) other archaeological features?

These questions would be satisfied by detailed mapping of the archaeological features located with an emphasis on the local ecology. Thus, the final site map would include not only archaeological features but also salient aspects of local geology, hydrology, and botany.

(2) What is the time frame for inland settlement?

Excavation and recovery of datable materials, preferably from habitation areas, will provide a chronology for settlement of an inland

*The recorded sites are eligible for inclusion in the National Register of Historic Places under National Register Criterion "d" (36 CFR Part 60.6), which states that a property may qualify if it has "yielded or may be likely to yield, information important to prehistory or history."

river valley. "Absolute" age determinations from radiocarbon will be of more utility than tentative chronologies based upon pottery types (Reinman 1977:89-91). Volcanic glass, now commonly used for hydration-rind age determinations in the Pacific, is present on Guam (Tracey et al. 1959:79), but apparently has not yet been found in an archaeological context. The utilization of chert (Reinman 1977:103) indicates a recognition by the prehistoric inhabitants of Guam of the utility of glassy rock, suggesting that the present lack of volcanic glass may simply be a sampling problem.

(3) Was the inland settlement seasonal or permanent?

Direct evidence for this may be lacking in the lateritic soils of upland Guam. It may be possible to infer one or the other on the basis of a more complete knowledge of the range of activities, especially subsistence activities, practiced by inhabitants of the area.

(4) What were the subsistence activities of the inland *latte* inhabitiants?

Two lines of research are potentially profitable. The first is an investigation of the swamp/marsh soils for presence of pollen from cultivated crops, particularly rice. Two series of cores, one for immediate analysis, and another to be held in storage for future developments in soils research (e.g., analysis of opal phytoliths) would be sufficient. The second is an inventory of plants associated with prehistoric activity loci, to test the hypothesis that arboriculture was an integral part of the inland subsistence strategy.

(5) What is the material culture associated with inland habitation?

Extensive surface collection and excavation of selected sites will provide a sufficient inventory of artifacts to analyze and contrast with assemblages reported by Reinman (1977).

RECOMMENDATIONS

Based on the above discussion, specific recommendations for further archaeological work are made for each of the eight loci of prehistoric activity recorded during the present survey.

Site MaGT-25

Locus A is located in an area of possible secondary impact, should the reservoir be opened to the public for recreational use. Two adverse impacts can be foreseen: (1) loss of peripheral portions of the site due to slumping of ridge sections subsequent to inundation, and (2) disturbance of features (e.g., displacement of upright stones, removal of mortars, collection of surface artifacts) due to increased public access. The first of these impacts can be mitigated by monitoring the condition of ridge slopes for a predetermined period subsequent to inundation. If deterioration of the slopes becomes apparent, steps may be taken to stabilize affected areas, or a program of salvage excavations may be implemented if the cost/benefit ratio of stabilization is determined to be unsatisfactory. The second impact will be mitigated by detailed plane-table mapping of the site locus and extensive surface collection of artifacts. The interpretive potential of these megalithic structures is great, and a program of preservation and restoration would be a boon to the people of Guam and to future archaeologists.

Locus B, also located outside the area of direct impact, is at present eroding rapidly. Increased public access would undoubtedly hasten this erosion. Mitigation of this secondary impact would be afforded by a successful program of soil stabilization, possibly through landscaping efforts, or alternatively salvage excavations to recover data now being washed down the eroded slopes of this knoll.

Locus C, located within the area of direct impact, should be subjected to a program of complete salvage prior to completion of construction activities. This salvage would include delimiting the full extent of the pottery scatter, controlled surface collection, and excavation of selected areas based on data recovered from surface collection.

Site MaGT-26

Located outside of the area to be directly impacted by the proposed project, this site is not easily accessible, and will probably not suffer as a consequence of increased visits by tourists. Slumping along ridge slopes poses little threat to this site, as its exposure faces away from the area of inundation. Further work at this site would thus be peripheral to mitigation efforts.

Site MaGT-27

This isolated mortar stone lies just above the projected inundation level of 276 ft a.s.l. Periodic monitoring of the slope near the site will indicate any future danger. Fortunately, this feature is portable and any potentially dangerous slumping of the slope may be followed by removal of the stone for safe-keeping, either to a museum or to a nearby area of interpretive display of archaeological sites.

Site MaGT-28

This site lies entirely within the area of direct impact, though Loci A and B may remain elevated above the waterline. It is thus recommended that this site be the focus of archaeological investigations within the present project area. Complete salvage would include a detailed map of the entire ridge, including vegetation zones, systematic surface collections at Loci A, B, and C, and extensive excavation at Loci B and C. Further, core samples of the nearby swamp should be secured. These data would be relevant to research questions posed above and would be a significant contribution to the archaeology of Guam.

RESEARCH DESIGN FOR ARCHAEOLOGICAL AND HISTORICAL RECONNAISSANCE SURVEY OF THE UGUM RIVER VALLEY, GUAM

Submitted to:

U.S. Army Corps of Engineers (Pacific Ocean Division)
Contract DACW-77-C-0019
Mod. P00010

Department of Anthropology
BERNICE P. BISHOP MUSEUM
Honolulu, Hawaii

February 6, 1978

INTRODUCTION

Under Contract DACW-77-C-0019 with the U.S. Army Corps of Engineers (Pacific Ocean Division), the Department of Anthropology, Bernice P. Bishop Museum, will conduct an archaeological and historical reconnaissance survey of cultural resources in the Ugum River Valley, Guam. The overall aim of this survey is to identify the general nature of cultural resources probably present in the Ugum area, and to assess the probable impact of Federal construction-related activities on these resources. This document outlines the research design--including general work tasks, archaeological sampling procedures, and field techniques--that will direct the operation of the survey.

The project area encompasses 259 hectares (640 acres) in the upper drainage basin of the Ugum River and its tributary, the Bubulao River (Fig. 1). This area forms part of the dissected upland terrain of southern Guam with underlying volcanic substrate. The lower boundary of the survey area lies at approximately the 61-meter (200-ft) contour line, some 610 meters (2,000 ft) SW of Talofofo Falls, while the upper limits of the survey area extend into the farther reaches of the Ugum and Bubulao Valleys at approximately 107 meters (350 ft) a.s.l. Included within the survey area are extensive dissected ridges with altitudes up to 152 meters (500 ft) a.s.l. Further environmental aspects of the survey area are considered below in conjunction with the question of sampling design.

The Ugum River Valley is a tributary of the larger Talofofo Valley, one of the largest drainage basins in southern Guam, with extensive alluvial floodplains in its lower reaches. The area near the mouth of the Talofofo Valley appears to have been an attractive locus for human settlement, and is known to include numerous archaeological sites (Reinman n.d.; Guam Historic Preservation Plan 1976). The Talofofo River Valley Site (MaGI-8), excavated by Reinman (n.d.:33) yielded evidence of human occupation dated as far back as 270 B.C., associated with extensive cultural remains including comb-decorated pottery.

Only a single prehistoric site has been recorded within the confines of the present Ugum Valley survey area; it must be noted, however, that archaeological survey in this area, to date, has been cursory at best. The one known site, designated MaGI-28 by Reinman (n.d.:24) and subsequently changed to 66-09-0097 by the Guam inventory (Guam Hist. Pres. Plan 1976:71), is located on a

grassy knoll overlooking the Ugum River, and comprises a shallow, badly eroded midden deposit containing fragments of stone bowls, pestles, adz fragments, and hammerstones (Reinman n.d., fig. 5d, e). Certain environmental aspects of the survey area, such as the presence of feral crop plants (see below) provide additional indications of indigenous human use of the Ugum River Valley. Indeed, the present survey provides an opportunity for the archaeological investigation of a hitherto largely neglected aspect of Marianas prehistory: the nature of inland settlement. The Ugum River locality may potentially produce significant data regarding prehistoric land use in the interior reaches of the Talofofo Valley, one of the major population centers of prehistoric Guam. The survey may also offer further descriptive evidence of possible use of the study area as a safe haven for Japanese soldiers following the end of World War II.

GENERAL SURVEY TASKS

The present survey has been defined at the level of "cultural resources reconnaissance" (Revised Scope of Work, 14 Dec. 1977). Such a survey comprises "a literature search and records review plus an on-the-ground surface examination of selected portions of the area to be affected, adequate to assess the general nature of the resources probably present and the probable impact of a project" (Dept. of the Army ER-1105-2-460, p. 3; see also Dept. of Interior 1977:5381).

Four general survey tasks have been determined for the Ugum River Valley project:

1. Preparation of Research Design. This preliminary task, a prerequisite to fieldwork and analysis, is accomplished with the present document.

2. Archaeological Field Survey. An on-the-ground reconnaissance of the Ugum Valley area; details of the field procedures to be utilized, including sampling design, are considered below.

3. Historical Data Collection. Historic records pertaining to historic-period land use and other events associated with archaeological sites in the survey area will be compiled. The aim here is to provide further background and documentation of cultural resources of the Ugum area. Investigation of available literature records and graphic materials will include those on file at the B. P. Bishop Museum and at the Micronesian Area Research Center, University of Guam, and other Government of Guam offices. If deemed necessary,

written sources may be supplemented by local interviews. Consultation will also be made with the Guam Historic Preservation Office.

4. Data Analysis and Report Preparation. Following completion of the archaeological field survey and the collection of historical materials, these data will be analyzed with regard to the spatial distribution and frequency of sites, their probable significance, and the probable impact of Federal construction-related activities on them. Recommendations will be made with regard to the need for further intensive survey and/or salvage of sites, and special attention will be devoted to the formulation of hypotheses, the testing of which may provide a basis for continued work in the area. An attempt will be made to assess, in general terms, the significance of the Ugum area in terms of the cultural history of Guam and the Marianas Islands, from prehistoric times through the modern period.

ARCHAEOLOGICAL SAMPLING PROCEDURES

The purpose of a reconnaissance survey is to assess the probable nature and extent of cultural resources present in an area by examining selected portions of that area. This level of survey is generally utilized where--as in the case of the Ugum Valley--little is known of the resources of the region, and a reconnaissance is judged to be the most efficient use of funds and personnel to generate data adequate for further planning decisions. Since a reconnaissance by definition does not involve intensive examination of the entire survey area, considerable forethought must be devoted to the choice of particular sub-areas to be subjected to field investigation.

In the Ugum region, the problems of archaeological field survey are further compounded by the nature of the heavily dissected and vegetated terrain. A considerable portion of the Ugum survey area is composed of a savanna association of swordgrass (*Miscanthus floridulus*) and reeds (*Phragmites karka*) that are extremely difficult to traverse. The difficulties encountered in such terrain are often underestimated by those who have not experienced the agony of swordgrass at first hand; witness the following comments by Raymond Fosberg, a botanist with vast field experience throughout the Pacific islands:

> The grassland, where mostly either swordgrass or reeds, is almost impenetrable off the trails and ridgetops because of the dense tangle of small tough canes and the sharp cutting edges of the leaves [Tracey et al. 1959:169].

> Foot travel in a dense stand of swordgrass, except on trails or ridgetops, is always slow and at times almost impossible. The clumps of finger-thick canes are springy and tangled, and the microscopically saw-toothed edges of the hard-textured leaf blades cut the skin like knives [p. 184].
>
> [Reed brakes (savanna)]: Walking through such a brake is a slow, fatiguing task. The canes may be pushed aside readily enough, but the soft mushy ground underfoot, with tangled canes which snare one's feet, make it desirable to avoid this sort of ground if at all possible [p. 185].

Areas of the Ugum drainage not in such savanna are vegetated with an association frequently as demanding of the fieldworker, and include dense stands of *Hibiscus tiliaceous* and thickets of thorny wild yams (*Dioscorea esculenta*). While such conditions will not deter the resolute fieldworker, they can not be ignored in any reasonable evaluation of field time/areal coverage estimation.

Given this situation of reconnaissance-level survey in difficult terrain--with the aim of achieving as accurate an assessment as possible of the area's cultural resources--we propose a systematic interval transect sampling method, with intensity of sampling dependent upon stratification of the survey area by microenvironmental zones (see Read 1975, and Judge, Ebert, & Hitchcock 1975, for definition of terms and concepts).

The reasoning behind this choice of method may be simply stated. First, available environmental data (Tracey et al. 1959) and previous knowledge of West Micronesian archaeology (Thompson 1932; Spoehr 1957; Reinman n.d.) clearly indicate that the Ugum area is not uniform with regard to environment, nor would the varying environmental zones within the area be expected to have been evenly exploited in prehistoric times. Thus, a random-sampling procedure may be discarded in favor of a stratified procedure wherein the survey area is subdivided into strata for individual sampling. In this case, the strata consist of the microenvironmental zones as defined below. Choice of a transect method--as opposed to a quadrant or other method--is made on the basis of terrain difficulty and the need to cover as much ground as possible as efficiently as possible. The quadrant technique is rejected for the Ugum survey because an inordinate amount of field time would be expended in choosing and laying out of field plots. In a carefully controlled experiment, Judge, Ebert, and Hitchcock (1975:121-23)

determined that a system of interval transects is a highly efficient and accurate sampling technique for archaeological survey, closely replicating results obtained by more elaborate and less efficient quadrant methods.

The microenvironmental zones that will comprise the sampling strata in the Ugum survey area may be defined as follows.

ZONE I: Upland Valleys. Basal geology consisting of Tertiary rocks, principally Bolanos conglomerate, breccia, and some limestone, with tuffaceous sandstone and shale also present. The vegetation comprises Fosberg's Unit 2 (Tracey et al. 1959:171), mixed forest on volcanic soils: a moist, broad-leafed, secondary evergreen forest including *Hibiscus*, *Pandanus*, *Artocarpus*, *Areca*, and *Triphasia*.

Zone I may be subdivided into two components:
IA: Alluvial flats in the valley bottom, not very extensive.
IB: Taluvial slopes of the valley sides, the dominant component.

ZONE II: Inter-Valley, Savanna-Covered Ridges. Basal geology identical with Zone I. Vegetation of Fosberg's Unit 5 (Tracey et al. 1959:171): a mosaic of grassland and herbaceous plants; erosion scars with shrubs and tangled ferns. Dominants here include *Miscanthus* and *Casuarina*.

The only known archaeological site in the Ugum survey area is situated in Zone II. Reinman's general survey of Guam (n.d.) suggests that Zone II and Zone IA (particularly on flats at the IA/IB interface) are the most likely to yield evidence of former sites. It is therefore proposed that these zones be designated as the primary sampling strata, with Zone IB as a secondary sampling stratum. Field survey techniques will thus involve the traversing of transects at intervals cross-cutting these zones, careful plotting of transects and any sites discovered along them, and standard archaeological procedures of recording, sketching, and photographing when sites are encountered. Greater emphasis will be given to the primary sampling strata; a greater number of transects and a smaller transect interval will be employed in Zones IA and II than in Zone IB.

THE UGUM RIVER VALLEY IN THE CONTEXT OF MARIANAS PREHISTORY

The prehistory of the Marianas, including Guam, is by no means an archaeological *terra incognita*. A solid culture-historical foundation has been laid by the work of Thompson (1932), Spoehr (1957), and Reinman (n.d.), among others. Nevertheless, there has been a decided emphasis upon the investigation of

permanent, usually coastal, artifact-rich settlement sites. While such sites are important for the definition of a basic cultural sequence, they can not reveal the full story of human occupation and exploitation of Guam. In order to achieve a broader reconstruction of ancient Chamorro culture, we need to adopt an eclectic, often inter-disciplinary approach. Such an approach was, in fact, advocated by Spoehr in the conclusion to his monograph on Marianas prehistory:

> What is called for, therefore, is a well-defined approach stemming from what is not a well-defined field--human ecology. Yet because the principal objects of study are tangible life forms clearly related to man, an ecological point of view is essential to progress in the understanding of culture history in the Pacific [1957:182].

The Ugum Valley may indeed provide a useful locale for the study of certain still-neglected aspects of Guam's prehistory, especially the utilization and exploitation of the interior regions of the island. If the area's seeming potential is to be realized, however, an ecological point of view must be adopted. A narrow concentration solely upon archaeological evidence, in the strict sense, will fail to achieve this aim. It is clear, for example, that the vegetation of the Ugum area may hold significant clues to its past utilization by man (see Fosberg in Tracey et al. 1959:177). The stands of feral yams that apparently are plentiful in the area (Stone 1970:128) are in one sense justly termed "artifacts" as much as are prehistoric potsherds, for they are unquestionably the product of former human activity in the area. The Ugum Valley may prove to be a significant proving ground for the application of an ecological approach to Marianas prehistory.

THE UGUM RIVER VALLEY IN THE MODERN PERIOD

The upper Ugum River Valley, located on the southwest end of Guam, well away from the population center at Agana and across the island from Apra Harbor, has been little affected through the Spanish, Japanese, and American periods. Partly because of this, the Talofofo Falls area has played a part in one of the more unusual stories to come out of World War II. In 1944, when the American troops liberated Guam, at least ten Japanese soldiers fled to the Ugum River Valley and survived there unnoticed. One by one they have been discovered or have died in the jungle. The latest refugee to be discovered was Sergeant Shoichi Yokoi, who was captured in 1972, after 28 years of hiding. Evidence of this recent habitation doubtless remain, though the secretive nature of the soldiers' existence

makes it doubtful that their impact on the biota or landforms of the valley is other than very locally intensive. It is unlikely, then, that this latest habitation in the upper Ugum River Valley will pose any problems in interpretation of earlier, prehistoric remains.

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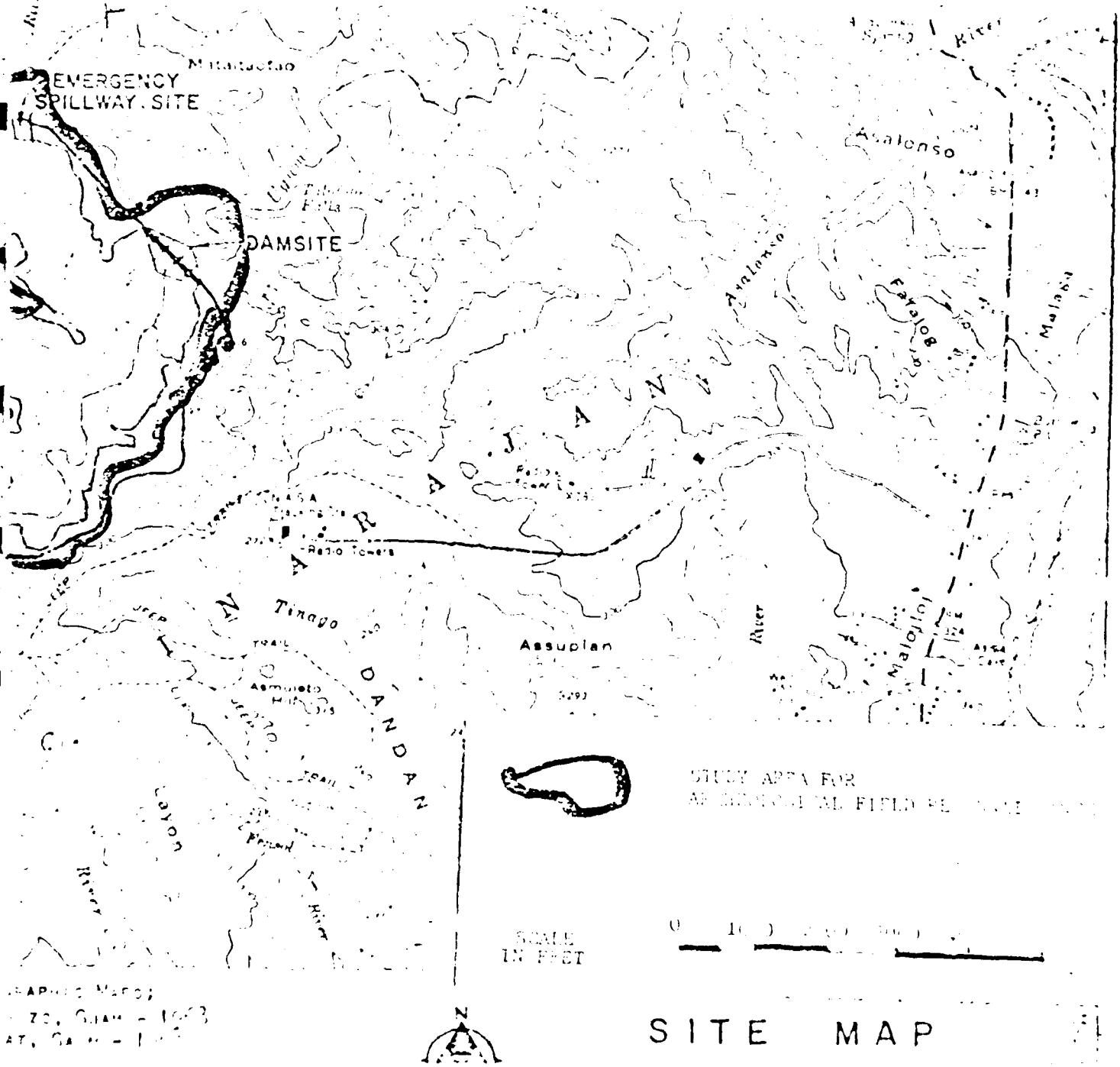
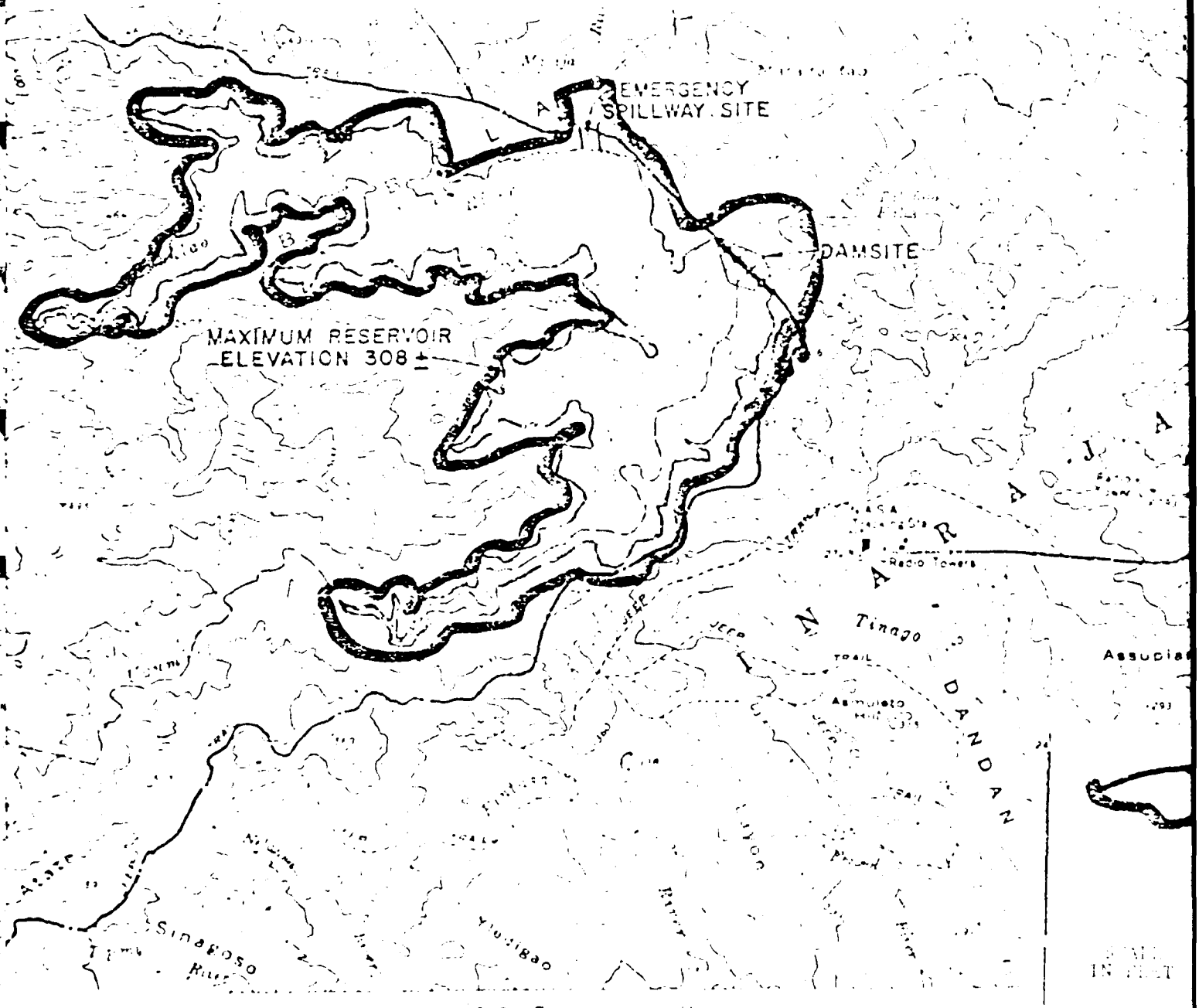


SITE MAP

Figure 1.



REFERENCES: U.S.G.S. TOPOGRAPHIC MAPS:
TALOFOFO, GUAM - 1968 MANGILAO, GUAM - 1968
BARRIGADA, GUAM - 1968 AGAT, GUAM - 1968

FIGURE 1

N

APPENDIX B

DISCUSSION OF SURVEY SAMPLE

Methods employed in the stratified, systematic interval transect survey reported above have yielded quantifiable data and allow prediction of the number of sites that remain unrecorded within the survey area.

ZONE IA

No sites were found in the forested alluvial flats of the valley bottoms. The 100% coverage of this microenvironmental zone ensures that no sites remain unrecorded here.

ZONE IB

The forested taluvial slopes of the valley sides, the dominant component of the survey area, yielded one isolated site (MaGT-27), and a portion of an extensive ridge site (MaGT-25C) in the 12% of the zone sampled. A purely statistical extrapolation would indicate that fourteen additional sites remain unrecorded in Zone IB. This figure is probably misleading, however. The two recorded sites are located in relatively flat areas, elevated on three sides above the immediately surrounding terrain. A qualitative observation, gained from contact with 71 acres of this environment, indicates that this topographic situation is not common and that such areas were sampled more extensively than the steeply sloping component of this zone. The predicted number of unrecorded sites should thus be revised downward, though the extent of this revision remains undetermined. Further, it can be expected that as yet unrecorded sites will be relatively small, isolated features such as the mortar stone (MaGT-27). Site MaGT-26, an apparently isolated *latte* structure with two, possibly three, remaining uprights, may be indicative of the maximum site size within this zone. Isolated secondarily deposited pottery sherds are a common feature of slopes proximal to ridgetop *latte* structures and primary pottery deposits.

ZONE IC

The swamp/marsh association was the least intensively sampled zone within the survey area. The nature of this zone, with its dense, aggressive foliage and boggy foundation, is not conducive to either construction or preservation of

surface features. Thus, the lack of surface features noted in the small sample is sufficient to predict their absence through the entire zone. As noted above, however, there may be subsurface evidence, in the form of pollen or opal phytoliths, of past cultivation of rice or taro in any of the three marshes within the survey area.

ZONE II

Sites located in savanna were limited to two *in situ* deposits of pottery (MaGT-28, Loci A and C) and three of the seven *latte* structures were discovered during confirmation of an observed pattern of site distribution, rather than while walking a transect, they are omitted from the following discussion.

The effective transect width for Zone II of 20 meters, adequate when considering substantial sites such as the megalithic *latte* structures, is not necessarily valid for smaller, dominantly subsurface pottery deposits, especially in areas of dense grass. Pottery in savanna areas was found on, or derived from, deposits on ridge crests and not on the gently sloping savanna north of the Bubulao River. This suggests that pottery distribution in the savanna is directly related to specific topographic features--in this case, ridges near fast-flowing rivers. Thus, the ridge between Loci B and C of Site MaGT-25 is the most likely location for unrecorded *in situ* pottery deposits in this zone.

The 92% transect sample, and the additional discovery of Site MaGT-28B, allow confident prediction that no archaeological features other than pottery deposits remain undiscovered within Zone II.

APPENDIX C

ANALYSIS OF RECOVERED POTTERY

Twenty-seven pottery sherds were collected in areas of secondary sherd deposit at Loci B and C of Site MaGT-25 for classification and comparison with published reports of pottery collected by Reinman (1977). Sherd collection was qualitative, rather than quantitative, with a bias toward collection of rim sherds because of their relatively greater number of classificatory attributes. Collection method and small sample size prohibit neaningful statistical analysis of the present assemblage.

Each sherd is labeled with site and locus designations and a specimen number, sequential within each collection area. Thus, MaGT-25B-4 represents the fourth piece of pottery numbered from the collection made at Site MaGT-25, Locus B. Subsequent collections may be conveniently included by simply assigning the next number available for the collection site.

All 29 sherds (22 from MaGT-25B, five from MaGT-25C, and two from MaGT-28B) are a volcanic-sand-tempered, well-fired ware that ranges in color from a light reddish-brown to dark gray. Several sherds exhibit contrasting interior and exterior colors, the result of differential weathering, firing conditions, or use, perhaps as cooking utensils. Two sherds (MaGT-25B-11 and MaGT-25C-[illegible] bear faint, nearly parallel impressions made by an unknown object, possibly a blade of grass. On MaGT-25B-11, a rim sherd, these impressions are on the interior surface, just below and parallel to the lip.

Sixteen of the sherds (14 from Locus B and two from Locus C) are portions of pot rims. Each rim sherd has an enlarged, non-everted lip, consistent with Reinman's simple Type B. Nine of the rim sherds are large enough to determine diameter of the pot orifice (Table 1). Diameters range from 12 to 42 cm, well within the range of Type B rim diameters reported by Reinman (1977:77), both for Guam and the Talofofo River Site MaGI-8. Each of these nine sherds is from a restricted-orifice vessel, which is typical for Type B rims (Ibid.:77).

The eleven body sherds range in thickness from 5 to 15 mm (Table 1). Again, this is well within the range for Guam pottery (Reinman 1977:74). The thickness of rim sherds was measured at the widest portion of the lip on a line perpendicular to the vertical axis of the pot as it stood upright. The pot's upright

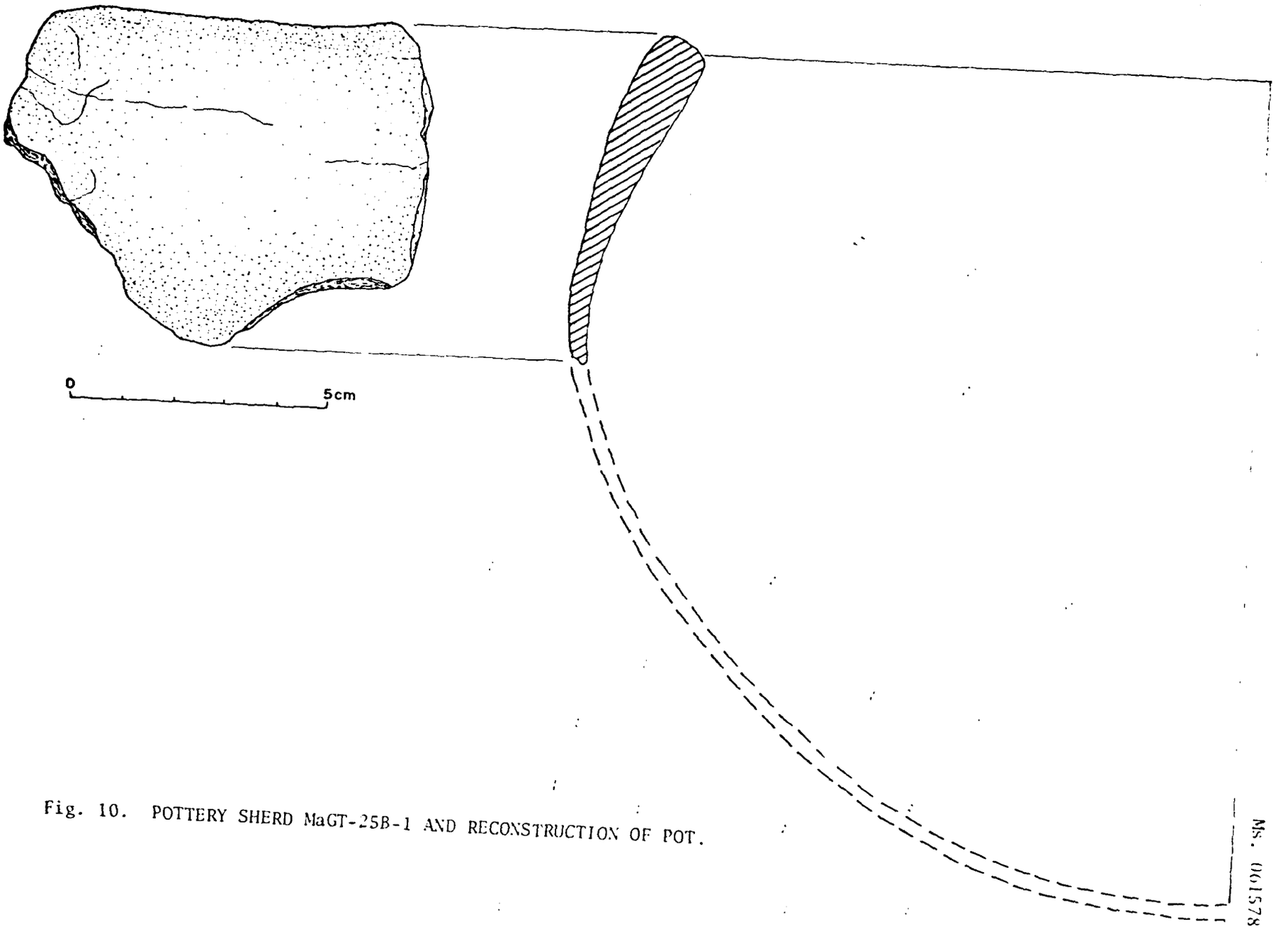


Fig. 10. POTTERY SHERD MaGT-25B-1 AND RECONSTRUCTION OF POT.

position was determined by rotating each rim sherd until the upper edge was horizontal.

Vessel form has been reconstructed for a single pot, based on the characteristics of sherd MaGT-25B-1 (Fig. 10) and observations on vessel shape made by Reinman (Ibid.:76, 77).

A single combed sherd (5 by 4 cm) was collected from MaGT-28, Locus B. This sherd exhibits a series of five parallel grooves, each approximately 3 mm in width. Color varies from a reddish-brown exterior to a gray-brown interior, and temper consists of volcanic sands. While decorated sherds form only 9% of Reinman's total pottery sample (Reinman 1977), the combed style of decorating was the most common. Of the 2,865 decorated sherds recovered from the five sites that Reinman excavated, 2,787 (95%) were combed, with the remaining 5% consisting of cord/paddle, incised, trailed, impressed, and painted (Ibid.:73, table 9). Reinman distinguishes the combed style from the cord-marking identified by Spoehr (1957:114) by examining the grooves for evidence of cordage impressions (Reinman 1977:69). The combed design is applied to sherds of Marianas Plain; thus the combed sherd falls into the same general taxonomic category as all other sherds from Site MaGT-28.

Table 1. SUMMARY OF ANALYSIS OF 29 POTSHERDS

Sherd No.	Description	Estimated Diameter of Orifice (cm)	Sherd Thickness (mm)
MaGT-25B- 1	Simple Type B Rim	22	12
B- 2	Simple Type B Rim	32	21
B- 3	Simple Type B Rim	42	21
B- 4	Simple Type B Rim	?	17
B- 5	Simple Type B Rim	38	21
B- 6	Simple Type B Rim	26	13
B- 7	Simple Type B Rim	?	18
B- 8	Body		7
B- 9	Simple Type B Rim	?	12
B-10	Body		10
B-11	Simple Type B Rim	?	13
B-12	Body		5
B-13	Body		15
B-14	Simple Type B Rim	12	12
B-15	Simple Type B Rim	?	17
B-16	Body		9
B-17	Type B Rim	?	18
B-18	Body		12
B-19	Simple Type B Rim	?	17
B-20	Simple Type B Rim	30	16
B-21	Body		7
B-22	Body		12
C- 1	Body		7
C- 2	Body		8
C- 3	Body		7
C- 4	Simple Type B Rim	28	15
C- 5	Simple Type B Rim	26	24
MaGT-28B- 1	Body - Combed		11
B- 2	Simple Type B Rim	?	23

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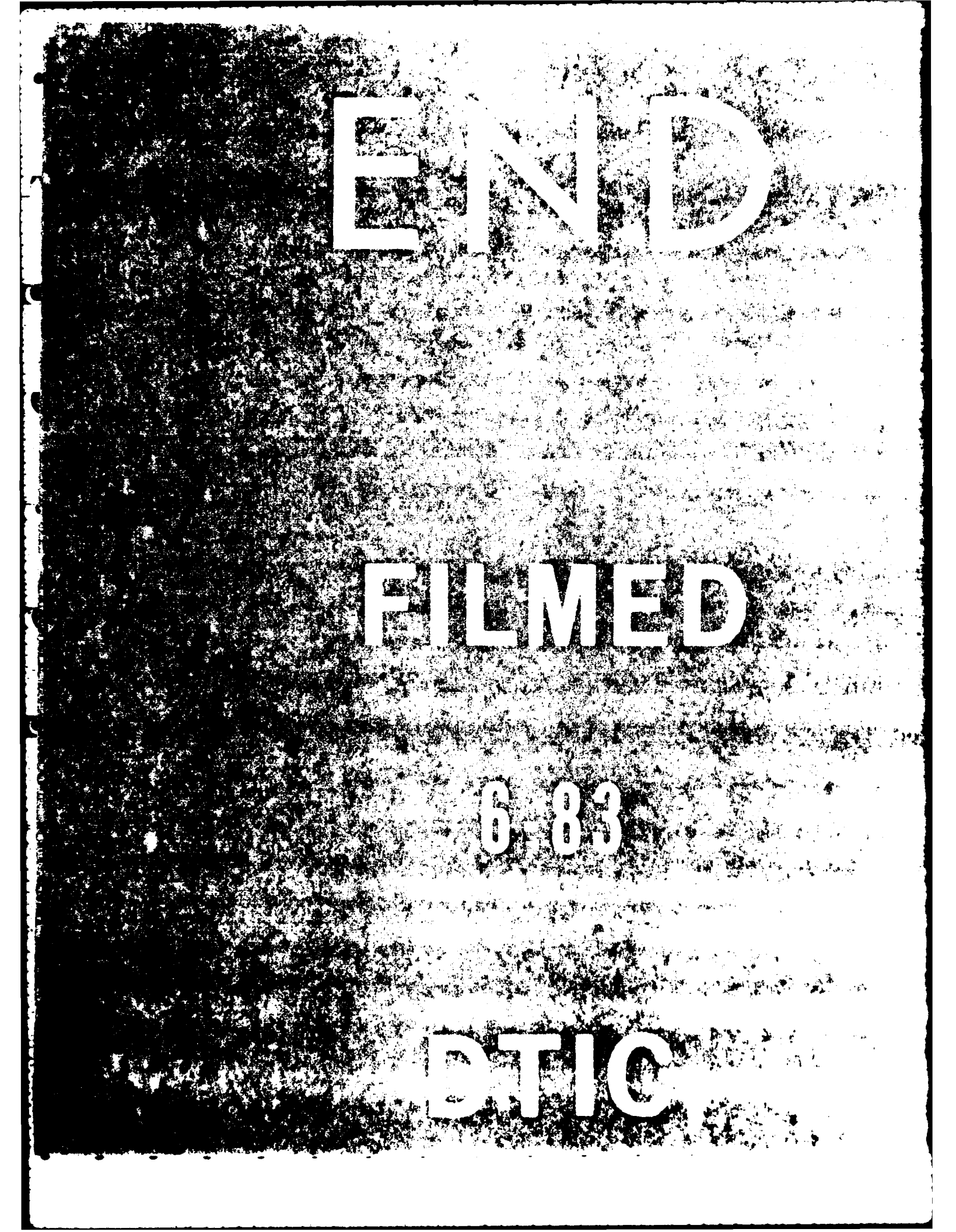
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